CONSTRUCTION CONTRACT

RFP No. DDA 2022-05

CATHERINE AND MILLER BIKEWAY PROJECT

Ann Arbor DDA

Due Date: June 1, 2022 by 3:00 p.m. (local time)

Issued By:

Ann Arbor
Downtown Development Authority (DDA)
150 South Fifth Avenue, Suite 301
Ann Arbor, MI 48104

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CONTRACT

THIS CONTRACT is between the ANN ARBOR DOWNTOWN DEVELOPMENT AUTHORITY, a Michigan Municipal Corporation, 150 S. Fifth Avenue, Ann Arbor, Michigan 48104 ("DDA") and Fonson Company ("Contractor") a Michigan corporation with its address 7644 Whitmore Lake Rd, Brighton MI 48116

Based upon the mutual promises below, the Contractor and the DDA agree as follows:

ARTICLE I - Scope of Work

The Contractor agrees to furnish all of the materials, equipment and labor necessary; and to abide by all the duties and responsibilities applicable to it for the project title **RFP No. DDA 2202-05 Catherine and Miller Bikeway Project**, in accordance with the requirements and provisions of the following documents, including all written modifications incorporated into any of the documents, all of which are incorporated as part of this Contract:

Bid Forms
Contract and Exhibits
Bonds
General Conditions
Standard Specifications
Detailed Specifications
Plans
Addenda

ARTICLE II - Definitions

Administering Service Area/Unit is the Ann Arbor DDA

Project means **Catherine and Miller Bikeway Project, RFP DDA 2022-05**

Supervising Professional means the person acting under the authorization of the DDA's Capital Projects Manager. At the time this Contract is executed, the Supervising Professional is: Felipe Uribe of Wade Trim whose job title is Construction Manager, or his designee.

Contractor's Representative means Jennah Rawahneh whose job title is Project Manager.

ARTICLE III - Time of Completion

(A) The work to be completed under this Contract shall begin immediately on the date specified in the Notice to Proceed issued by the DDA.

(B) The entire work for this Contract shall be completed in accordance with the Detailed Specification for Progress Clause.

(C) Failure to complete all the work within the time specified above, including any extension granted in writing by the Supervising Professional, shall obligate the Contractor to pay the DDA, as liquidated damages and not as a penalty, an

amount equal to $2,500 for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the DDA shall be entitled to deduct these unpaid liquidated damages from the monies due the Contractor.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

ARTICLE IV - The Contract Sum

(A) The DDA shall pay to the Contractor for the performance of the Contract, the unit prices as given in the Bid Form for the estimated bid total of:

Two million seventy two thousand six hundred ninety seven Dollars ($2,072,697.00)

(B) The amount paid shall be equitably adjusted to cover changes in the work ordered by the Supervising Professional but not required by the Contract Documents. Increases or decreases shall be determined only by written agreement between the DDA and Contractor.

ARTICLE V - Assignment

This Contract may not be assigned or subcontracted any portion of any right or obligation under this contract without the written consent of the DDA. Notwithstanding any consent by the DDA to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under this contract unless specifically released from the requirement, in writing, by the DDA.

ARTICLE VI - Choice of Law

This Contract shall be construed, governed, and enforced in accordance with the laws of the State of Michigan. By executing this Contract, the Contractor and the DDA agree to venue in a court of appropriate jurisdiction sitting within Washtenaw County for purposes of any action arising under this Contract. The parties stipulate that the venue referenced in this Contract is for convenience and waive any claim of non-convenience.

Whenever possible, each provision of the Contract will be interpreted in a manner as to be effective and valid under applicable law. The prohibition or invalidity, under applicable law, of any provision will not invalidate the remainder of the Contract.

ARTICLE VII - Relationship of the Parties

The parties of the Contract agree that it is not a Contract of employment but is a Contract to accomplish a specific result. Contractor is an independent Contractor performing services for the DDA. Nothing contained in this Contract shall be deemed to constitute any other relationship between the DDA and the Contractor.

Contractor certifies that it has no personal or financial interest in the project other than the compensation it is to receive under the Contract. Contractor certifies that it is not, and shall not become, overdue or in default to the DDA for any Contract, debt, or any other obligation to the DDA including real or personal property taxes. The DDA shall have the right to set off any such debt against compensation awarded for services under this Contract.

ARTICLE VIII - Notice

All notices given under this Contract shall be in writing, and shall be by personal delivery or by certified mail with return receipt requested to the parties at their respective addresses as specified in the Contract Documents or other address the Contractor may specify in writing. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; or (2) three days after mailing certified U.S. mail.

ARTICLE IX - Indemnification

To the fullest extent permitted by law, Contractor shall indemnify, defend and hold the DDA, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, in whole or in part, from any act or omission, which is in any way connected or associated with this Contract, by the Contractor or anyone acting on the Contractor's behalf under this Contract. Contractor shall not be responsible to indemnify the DDA for losses or damages caused by or resulting from the DDA's sole negligence. The provisions of this Article shall survive the expiration or earlier termination of this contract for any reason.

ARTICLE X - Entire Agreement

This Contract represents the entire understanding between the DDA and the Contractor and it supersedes all prior representations, negotiations, agreements, or understandings whether written or oral. Neither party has relied on any prior representations in entering into this Contract. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Contract, regardless of the other party's failure to object to such form. This Contract shall be binding on and shall inure to the benefit of the parties to this Contract and their permitted successors and permitted assigns and nothing in this Contract, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Contract. This Contract may be altered, amended or modified only by written amendment signed by the DDA and the Contractor.

ARTICLE XI – Electronic Transactions

The DDA and Contractor agree that signatures on this Contract may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this Contract. This Contract may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

FOR CONTRACTOR

By_____

Its: GENERAL MANAGER

FOR THE ANN ARBOR DDA

By_____
Jeff Watson, DDA Executive Director

Miller Catherine Bikeway

E. Schedule of Pricing (20 points)

DDA RFP 2022-05
Addendum No.1

Company: Fonson Company, Inc.
Date: 6/1/2022

Pay Item #	Item Description	Estimated Contract Quantity	Unit	Unit Price	Total Price
130	Protective Fencing	60.00	LFT	$8.00	$480.00
140	Exploratory Excavation, (0-10 ft. deep) (Trench Det 1, Modified)	4.00	EA	$2,000.00	$8,000.00
210-01	Audio-Visual Recording	1.00	LSUM	$1,175.00	$1,175.00
210-02	Certified Payroll Compliance And Reporting	1.00	LSUM	$500.00	$500.00
210-03	General Conditions, Max $100,000	1.00	LSUM	$100,000.00	$100,000.00
210-04	Project Supervision, Max $75,000	1.00	LSUM	$75,000.00	$75,000.00
221-01	Minor Traffic Devices, Max $75,000	1.00	LSUM	$75,000.00	$75,000.00
221-02	Traf Regulator Control, Max $35,000	1.00	LSUM	$35,000.00	$35,000.00
221-03	Barricade, Type III, High Intensity, Double Sided Lighted, Furn & Oper	85.00	EA	$120.00	$10,200.00
221-04	Plastic Drum, Fluorescent, Furn & Oper	220.00	EA	$30.00	$6,600.00
221-08	Sign, Portable, Changeable Message, Ntfcip-Compliant, Furn & Oper	2.00	EA	$4,500.00	$9,000.00
221-09	Sign Cover	6.00	EA	$75.00	$450.00
221-10	Sign, Type B, Temp, Prismatic, Furn & Oper	710.00	SFT	$6.00	$4,260.00
221-11	Sign, Type B, Temp, Prismatic, Special, Furn & Oper	404.00	SFT	$12.00	$4,848.00
221-14	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, white, Temp	2,000.00	LFT	$1.50	$3,000.00
221-15	Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, yellow, Temp	2,000.00	LFT	$1.50	$3,000.00
221-20	No Parking Sign	10.00	EA	$75.00	$750.00
221-31	Pedestrian Path, Temp	500.00	LFT	$18.00	$9,000.00
221-32	Pedestrian Ramp, Temp	14.00	EA	$500.00	$7,000.00
221-33	Pedestrian Type II Barricade, Temp	40.00	EA	$150.00	$6,000.00
221-34	Pedestrian Type II Channelizer, Temp	1,500.00	LFT	$25.00	$37,500.00
222-01	Curb And Gutter, Any Type Or Size, Rem	655.00	LFT	$15.00	$9,825.00
222-02	Sidewalk And Drive, Any Type Or Thickness, Rem	465.00	SYD	$30.00	$13,950.00
222-03	Pavement, Rem	2,270.00	SYD	$45.00	$102,150.00
222-04	Brick Pavers, Rem, Sort And Salvage	280.00	SYD	$50.00	$14,000.00
223-01	Dr Structure, Any Size Or Depth, Rem	1	EA	$900.00	$900.00
223-02	Sewer, Any Size Or Depth, Rem	47	LFT	$80.00	$3,760.00
227-01	Erosion Control, Inlet Filter	15.00	EA	$120.00	$1,800.00
240	Non Haz Contaminated Material Handling And Disposal, Lm	20.00	CYD	$100.00	$2,000.00
250-03	Aggregate Base Course, 21AA, Modified	630.00	CYD	$125.00	$78,750.00
250-04	Machine Grading, Modified (half width)	40.00	STA	$4,150.00	$166,000.00
250-05	Subgrade Undercutting, Type II	80.00	CYD	$120.00	$9,600.00
250-06	Sand Subbase Course, Class II - CIP	325.00	CYD	$125.00	$40,625.00
251-01	Curb And Gutter, Conc, 24 Inch, Any Type	155.00	LFT	$35.00	$5,425.00
251-02	Integral curb	35.00	LFT	$30.00	$1,050.00
251-03	Straight Curb	515.00	LFT	$40.00	$20,600.00
251-04	Bike Curb	45.00	LFT	$85.00	$3,825.00
251-05	Curbed Island	1,055.00	LFT	$140.00	$147,700.00
251-06	Planter Curb	152.00	LFT	$50.00	$7,600.00
252-01	Concrete Pavement, 6 inch	3,230.00	SFT	$7.00	$22,610.00
252-02	Concrete Pavement, 8 inch	3,365.00	SFT	$8.00	$26,920.00
252-03	Driveway Opening, Conc, 8 inch, Type M	105.00	SFT	$40.00	$4,200.00
252-04	Ramp	400.00	SFT	$10.00	$4,000.00
252-06	Sidewalk Ramp, 8 Inch	870.00	SFT	$10.00	$8,700.00
253-01	Detectable Warning Surface, Modified	213.00	SFT	$35.00	$7,455.00
253-02	Detectable Directional Guideway	30.00	SFT	$100.00	$3,000.00
254	Brick, Install Salvaged	180.00	SFT	$40.00	$7,200.00
255-01	HMA, 3E1, 3 inches	238.00	TON	$180.00	$42,840.00
255-02	HMA, 4E1, 2 inches	159.00	TON	$220.00	$34,980.00
255-03	HMA, 5E1, 2 inches	159.00	TON	$230.00	$36,570.00
255-04	Hand Patching, Modified	15.00	TON	$350.00	$5,250.00
257	Regulatory Signs	119.25	SFT	$25.00	$2,981.25
259-01	Pavt Mrkg, Polyurea, 4 inch, Yellow	3,500.00	LFT	$0.99	$3,465.00
259-02	Pavt Mrkg, Polyurea, 4 inch, White	400.00	LFT	$0.99	$396.00
259-03	Pavt Mrkg, Polyurea, Bike Arrow and Yield Sym.	26.00	EA	$120.00	$3,120.00
259-04	Pavt Mrkg, Polyurea, Directional/Turn Arrow	4.00	EA	$185.00	$740.00
259-05	Pavt Mrkg, Polyurea, Bike Sym.	23.00	EA	$120.00	$2,760.00
259-06	Pavt Mrkg, Polyurea, Ramp Arrow Sym.	12.00	EA	$195.00	$2,340.00
259-07	Pavt Mrkg, Polyurea, 12 Inch, Stop Bar Or Crosswalk	1,300.00	LFT	$5.95	$7,735.00

259-08	Pavt Mrkg, Polyurea, 24 Inch, Stop Bar Or Crosswalk	155.00	LFT	$12.95	$2,007.25
259-09	Pavt Mrkg, Endurablend, Bike Lane Green	6,300.00	SFT	$8.50	$53,550.00
259-10	Pavt Mrkg, Polyurea, 18 Inch X 18 Inch Bikeway Marks	450.00	SFT	$7.00	$3,150.00
260-01	Recessing Pavt Mrkg, Longitudinal	3,600.00	LFT	$0.65	$2,340.00
260-02	Recessing Pavt Mrkg, Transverse	1,755.00	LFT	$2.95	$5,177.25
272-01	Hardened Centerline	18.00	LFT	$220.00	$3,960.00
272-02	Bikelane Delineator Post	14.00	EA	$400.00	$5,600.00
279-1	Line Stop, Additional Rental Day	5.00	EA	$750.00	$3,750.00
279-8	Line Stop, Ductile/Cast Iron Pipe, 8 inch	3.00	EA	$3,850.00	$11,550.00
279-14	Line Stop, Ductile/Cast Iron Pipe, 14 inch	1.00	EA	$8,120.00	$8,120.00
278-14	Insertion Valve, Ductile/Cast Iron Pipe, 14 inch	1.00	EA	$32,010.00	$32,010.00
280	Rain Garden Planting Soil	22.50	CYD	$145.00	$3,262.50
282	Tree Grate, 4 ft. X 8 ft.	2.00	EA	$9,000.00	$18,000.00
283	Riprap, Fieldstone	1.00	CYD	$300.00	$300.00
284-17	Sacrificial Anode, 17 lb	5.00	EA	$500.00	$2,500.00
284-32	Sacrificial Anode, 32 lb	2.00	EA	$1,300.00	$2,600.00
285A-4	CL-52, D.I. Water Main, w/Poly Wrap, 4 inch, Tr Det I, Mod	40.00	LFT	$300.00	$12,000.00
285-6	CL-50, D.I. Water Main, w/Poly Wrap, 6 inch, Tr Det I, Mod	40.00	LFT	$320.00	$12,800.00
285-8	CL-50, D.I. Water Main, w/Poly Wrap, 8 inch, Tr Det I, Mod	40.00	LFT	$330.00	$13,200.00
285-12	CL-50, D.I Water Main, w/Poly Wrap, 12 inch, Tr Det I, Mod	460.00	LFT	$265.00	$121,900.00
286-45-4	45 deg Bend, 4 Inch	4.00	EA	$700.00	$2,800.00
286-45-6	45 deg Bend, 6 Inch	4.00	EA	$900.00	$3,600.00
286-45-8	45 deg Bend, 8 Inch	4.00	EA	$1,200.00	$4,800.00
286-45-12	45 deg Bend, 12 inch	14.00	EA	$1,600.00	$22,400.00
286-90-6	90 deg Bend, 6 inch	1.00	EA	$980.00	$980.00
287-8x6	Reducer, 8 inch x 6 inch	2.00	EA	$1,000.00	$2,000.00
287-12x6	Reducer, 12 inch x 6 inch	1.00	EA	$1,200.00	$1,200.00
287-12 x 8	Reducer, 12 inch x 8 inch	2.00	EA	$1,250.00	$2,500.00
288-C-12-12	Cross, 12 inch x 12 inch	1.00	EA	$2,600.00	$2,600.00
288-T-12-12-4	Tee, 12 inch x 12 inch x 4 inch	1.00	EA	$1,900.00	$1,900.00
288-T-12-12-6	Tee, 12 inch x 12 inch x 6 inch	1.00	EA	$2,000.00	$2,000.00
288-T-12-12-8	Tee, 12 inch x 12 inch x 8 inch	2.00	EA	$2,300.00	$4,600.00
288-T-14-12-12	Tee, 14 inch x 12 inch x 12 inch	1.00	EA	$4,000.00	$4,000.00
289	Fire Hydrant Assy, w/Extensions, Complete	2.00	EA	$10,600.00	$21,200.00
290-4	Gate Valve-in-Box, 4 inch	1.00	EA	$1,700.00	$1,700.00
290-6	Gate Valve-in-Box, 6 inch	1.00	EA	$2,000.00	$2,000.00
291-12	Gate Valve-in-Well, 12 inch	4.00	EA	$7,100.00	$28,400.00
293	Excavate & Backfill for Water Service Tap and Lead	40.00	LFT	$125.00	$5,000.00
294	Water Main Pipe Abandonment	150.00	LFT	$50.00	$7,500.00
295	Water Main, Abandon w/Flowable Fill	80.00	LFT	$70.00	$5,600.00
296-01	Gate Valve-in-Box, Abandon	1.00	EA	$1,700.00	$1,700.00
297-01	Gate Valve-in-Well, Abandon	2.00	EA	$1,700.00	$3,400.00
298	Fire Hydrant, Rem	1.00	EA	$1,400.00	$1,400.00
320	RCP, Sewer, C76, CL-IV, 12 inch, Tr Det I	226.00	LFT	$135.00	$30,510.00
350	Sewer, SDR 35 PVC, 8 inch, Tr Det I	25.00	LFT	$180.00	$4,500.00
351	Sewer, SDR 35 PVC, Service Lead, 4 inch, Tr Det I	25.00	LFT	$150.00	$3,750.00
360	Type I Manhole (4 ft. Dia.) (0-10 ft. Deep)	1	EA	$3,800.00	$3,800.00
367	Single Inlet Structure	4.00	EA	$1,900.00	$7,600.00
391	Pipe Undercut & Refill	20.00	Cyd	$110.00	$2,200.00
516	6" Wrapped Edge Drain	355.00	LFT	$20.00	$7,100.00
563-01	Dr Structure Cover Barrier Curb Inlet	3,000.00	LBS	$2.50	$7,500.00
563-02	Dr Structure Cover Gate Well	1,600.00	LBS	$2.50	$4,000.00
564	Reconstruct Structure	1.00	EA	$1,000.00	$1,000.00
566	Adjust Structure Cover	4.00	EA	$700.00	$2,800.00
567	Adjust Monument Box or Gate Valve Box	5.00	EA	$700.00	$3,500.00
580	Remove Pavement Markings	2,945.00	LFT	$0.75	$2,208.75
811	Ginkgo Biloba 'Autumn Gold'	5.00	EA	$700.00	$3,500.00
821	PANICUM VIRGATUM 'SHENANDOAH'	25.00	EA	$26.00	$650.00
822	PENNISETUM ALOPECUROIDES 'HAMELN'	73.00	EA	$26.00	$1,898.00
823	SCHIZACHYRIUM SCOPARIUM 'CAROUSEL'	47.00	EA	$29.00	$1,363.00
	TS Face, Bag	4.00	EA	$525.00	$2,100.00
	TS Face, Bag, Rem	4.00	EA	$300.00	$1,200.00
	Traf Loop	3.00	EA	$3,000.00	$9,000.00
	Wireless Vehicle Sensor Node	2.00	EA	$1,700.00	$3,400.00
	Recable, TS	200.00	FT	$15.00	$3,000.00
	3 inch Schedule 80 PVC Electrical Conduit	50.00	LFT	$40.00	$2,000.00
	Case Sign, Rem	2.00	EA	$450.00	$900.00
	TS, Pedestrian, Pedestal Mtd, Rem	1.00	EA	$300.00	$300.00
	Pedestal, Rem	1.00	EA	$300.00	$300.00
	Pedestal Fdn. Rem	1.00	EA	$300.00	$300.00
	Conduit, Rem	10.00	FT	$35.00	$350.00
	TS, Pedestrian, Two Way Pedestal Mtd (LED) Countdown	1.00	EA	$2,175.00	$2,175.00

	Pedestal, Alum	1.00	EA	$1,225.00	$1,225.00
	Pedestal , Fdn	1.00	EA	$1,475.00	$1,475.00
	2 inch Schedule 80 PVC Electrical Conduit	5.00	LFT	$75.00	$375.00
	Wireless Vehicle Sensor Node, Rem	2.00	EA	$600.00	$1,200.00
	Wireless Vehicle Sensor Node, Salv	1.00	EA	$875.00	$875.00
ALLOWANCE	Signal Modernization at Main @ Miller/Catherine	1.00	ALLOW	$250,000.00	$250,000.00
Bid Total					$2,072,697.00

Bond No. 230197R

PERFORMANCE BOND

(1) Fonson Company, Inc.
of 7644 Whitmore Lake Road, Brighton, MI, 48116 (referred to as "Principal"), and Westfield Insurance Company, P.O. Box 5001, Westfield Center, Ohio 44251-5001, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the Ann Arbor Downtown Development Authority (referred to as "DDA"), for $ 2,072,697.00, the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the DDA entitled Catherine and Miller Bikeway Project, RFP No. DDA 2022-05 and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq.

(3) Whenever the Principal is declared by the DDA to be in default under the Contract, the Surety may promptly remedy the default or shall promptly:

(a) complete the Contract in accordance with its terms and conditions; or

(b) obtain a bid or bids for submission to the DDA for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, arrange for a Contract between such bidder and the DDA, and make available, as work progresses, sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth in paragraph 1.

(4) Surety shall have no obligation to the DDA if the Principal fully and promptly performs under the Contract.

(5) Surety agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying it shall in any way affect its obligations on this bond, and waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work, or to the specifications.

(6) Principal, Surety, and the DDA agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this 8th day of June, 2022.

Westfield Insurance Company
(Name of Surety Company)
By _____
(Signature)
Its Jamie M. Laurencelle, Attorney-In-Fact
(Title of Office)

Fonson Company, Inc.
(Name of Principal)
By _____
(Signature)
Its GENERAL MANAGER
(Title of Office)

Approved as to form:

_____, DDA Attorney

Name and address of agent:

Hylant
24 Frank Lloyd Wright Drive
Suite J4100
Ann Arbor, MI 48105

Bond No. 230197R

LABOR AND MATERIAL BOND

(1) Fonson Company, Inc.
of 7644 Whitmore Lake Road, Brighton, MI, 48116 (referred to as "Principal"), and Westfield Insurance Company, P.O. Box 5001, Westfield Center, Ohio 44251-5001, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the Ann Arbor Downtown Development Authority (referred to as "DDA"), for the use and benefit of claimants as defined in Act 213 of Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq., in the amount of $ 2,072,697.00, for the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the DDA entitled Catherine and Miller Bikeway Project, RFP No. DDA 2022-05; and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963 as amended;

(3) If the Principal fails to promptly and fully repay claimants for labor and material reasonably required under the Contract, the Surety shall pay those claimants.

(4) Surety's obligations shall not exceed the amount stated in paragraph 1, and Surety shall have no obligation if the Principal promptly and fully pays the claimants.

(5) Principal, Surety, and the DDA agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this 8th day of June, 2022

Westfield Insurance Company
(Name of Surety Company)
By _____
(Signature)
Its Jamie M. Laurencelle, Attorney-In-Fact
(Title of Office)

Approved as to form:

_____, DDA Attorney
JERROLD LAX

Fonson Company, Inc.
(Name of Principal)
By _____
(Signature)
Its GENERAL MANAGER
(Title of Office)

Name and address of agent:
Hylant
24 Frank Lloyd Wright Drive
Suite J4100
Ann Arbor, MI 48105

THIS POWER OF ATTORNEY SUPERCEDES ANY PREVIOUS POWER BEARING THIS SAME POWER # AND ISSUED PRIOR TO 05/13/21, FOR ANY PERSON OR PERSONS NAMED BELOW.

General Power of Attorney

CERTIFIED COPY

POWER NO. 2140082 02

Westfield Insurance Co.
Westfield National Insurance Co.
Ohio Farmers Insurance Co.
Westfield Center, Ohio

Know All Men by These Presents, That WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, corporations, hereinafter referred to individually as a "Company" and collectively as "Companies," duly organized and existing under the laws of the State of Ohio, and having its principal office in Westfield Center, Medina County, Ohio, do by these presents make, constitute and appoint

MICHAEL M. HYLANT, JUDY K. WILSON, LISA M. WILMOT, SUSAN E. HURD, VICKI S. DUNCAN, KRISTIE A. PUDVAN, JAMIE M. LAURENCELLE, JOINTLY OR SEVERALLY

of **ANN ARBOR** and State of **MI** its true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred in its name, place and stead, to execute, acknowledge and deliver **any and all bonds, recognizances, undertakings, or other instruments or contracts of suretyship.**

LIMITATION: THIS POWER OF ATTORNEY CANNOT BE USED TO EXECUTE NOTE GUARANTEE, MORTGAGE DEFICIENCY, MORTGAGE GUARANTEE, OR BANK DEPOSITORY BONDS.

and to bind any of the Companies thereby as fully and to the same extent as if such bonds were signed by the President, sealed with the corporate seal of the applicable Company and duly attested by its Secretary, hereby ratifying and confirming all that the said Attorney(s)-in-Fact may do in the premises. Said appointment is made under and by authority of the following resolution adopted by the Board of Directors of each of the WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY:

"Be It Resolved, that the President, any Senior Executive, any Secretary or any Fidelity & Surety Operations Executive or other Executive shall be and is hereby vested with full power and authority to appoint any one or more suitable persons as Attorney(s)-in-Fact to represent and act for and on behalf of the Company subject to the following provisions:

The Attorney-in-Fact. may be given full power and authority for and in the name of and on behalf of the Company, to execute, acknowledge and deliver, any and all bonds, recognizances, contracts, agreements of indemnity and other conditional or obligatory undertakings and any and all notices and documents canceling or terminating the Company's liability thereunder, and any such instruments so executed by any such Attorney-in-Fact shall be as binding upon the Company as if signed by the President and sealed and attested by the Corporate Secretary."

"Be it Further Resolved, that the signature of any such designated person and the seal of the Company heretofore or hereafter affixed to any power of attorney or any certificate relating thereto by facsimile, and any power of attorney or certificate bearing facsimile signatures or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking to which it is attached." (Each adopted at a meeting held on February 8, 2000).

In Witness Whereof, WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY have caused these presents to be signed by their **National Surety Leader** and **Senior Executive** and their corporate seals to be hereto affixed this **13th** day of **MAY** A.D., **2021** .

Corporate Seals Affixed

WESTFIELD INSURANCE COMPANY
WESTFIELD NATIONAL INSURANCE COMPANY
OHIO FARMERS INSURANCE COMPANY

By: **Gary W. Stumper,** *National Surety Leader* and *Senior Executive*

State of Ohio
County of Medina ss.:

On this **13th** day of **MAY** A.D., **2021** , before me personally came **Gary W. Stumper** to me known, who, being by me duly sworn, did depose and say, that he resides in **Hartford, CT;** that he is **National Surety Leader** and **Senior Executive** of WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, the companies described in and which executed the above instrument; that he knows the seals of said Companies; that the seals affixed to said instrument are such corporate seals; that they were so affixed by order of the Boards of Directors of said Companies; and that he signed his name thereto by like order.

Notarial Seal Affixed

State of Ohio
County of Medina ss.:

David A. Kotnik, Attorney at Law, *Notary Public*
My Commission Does Not Expire (Sec. 147.03 Ohio Revised Code)

I, **Frank A. Carrino,** Secretary of WESTFIELD INSURANCE COMPANY, WESTFIELD NATIONAL INSURANCE COMPANY and OHIO FARMERS INSURANCE COMPANY, do hereby certify that the above and foregoing is a true and correct copy of a Power of Attorney, executed by said Companies, which is still in full force and effect; and furthermore, the resolutions of the Boards of Directors, set out in the Power of Attorney are in full force and effect.

In Witness Whereof, I have hereunto set my hand and affixed the seals of said Companies at Westfield Center, Ohio, this 8th day of June A.D., 2022 .

Frank A. Carrino, *Secretary*

BPOAC2 (combined) (06-02)

GENERAL CONDITIONS

Section 1 - Execution, Correlation and Intent of Documents

The contract documents shall be signed in 2 copies by the DDA and the Contractor.

The contract documents are complementary and what is called for by any one shall be binding. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work. Materials or work described in words which so applied have a well-known technical or trade meaning have the meaning of those recognized standards.

In case of a conflict among the contract documents listed below in any requirement(s), the requirement(s) of the document listed first shall prevail over any conflicting requirement(s) of a document listed later.

(1) Addenda in reverse chronological order; (2) Detailed Specifications; (3) Standard Specifications; (4) Plans; (5) General Conditions; (6) Contract; (7) Bid Forms; (8) Bond Forms; (9) Bid.

Section 2 - Order of Completion

The Contractor shall submit with each invoice, and at other times reasonably requested by the Supervising Professional, schedules showing the order in which the Contractor proposes to carry on the work. They shall include the dates at which the Contractor will start the several parts of the work, the estimated dates of completion of the several parts, and important milestones within the several parts.

Section 3 - Familiarity with Work

The Bidder or its representative shall make personal investigations of the site of the work and of existing structures and shall determine to its own satisfaction the conditions to be encountered, the nature of the ground, the difficulties involved, and all other factors affecting the work proposed under this Contract. The Bidder to whom this Contract is awarded will not be entitled to any additional compensation unless conditions are clearly different from those which could reasonably have been anticipated by a person making diligent and thorough investigation of the site.

The Bidder shall immediately notify the DDA upon discovery, and in every case prior to submitting its Bid, of every error or omission in the bidding documents that would be identified by a reasonably competent, diligent Bidder. In no case will a Bidder be allowed the benefit of extra compensation or time to complete the work under this Contract for extra expenses or time spent as a result of the error or omission.

Section 4 - Wage Requirements

Under this Contract, the Contractor shall conform to Chapter 14 of Title I of the Code of the City of Ann Arbor as amended; which in part states "...that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of

subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen, mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. At the request of the DDA, any contractor or subcontractor shall provide satisfactory proof of compliance with the contract provisions required by the Section.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage.

Where the Contract and the Ann Arbor City Ordinance are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used.

If the Contractor is a "covered employer" as defined in Chapter 23 of the Ann Arbor City Code, the Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Contractor agrees to pay those employees providing Services to the DDA under this Contract a "living wage," as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the DDA of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Contract are working; to maintain records of compliance; if requested by the DDA, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision covering subcontractor's employees who perform work on this contract.

Section 5 - Non-Discrimination

The Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. The Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of Title IX of the Ann Arbor City Code, and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

Section 6 - Materials, Appliances, Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary or used for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new, and both workmanship and materials shall be of the highest quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor shall at all times enforce strict discipline and good order among its employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned.

Adequate sanitary facilities shall be provided by the Contractor.

Section 7 - Qualifications for Employment

The Contractor shall employ competent laborers and mechanics for the work under this Contract. For work performed under this Contract, employment preference shall be given to qualified local residents.

Section 8 - Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringements of any patent rights and shall hold the DDA harmless from loss on account of infringement except that the DDA shall be responsible for all infringement loss when a particular process or the product of a particular manufacturer or manufacturers is specified, unless the DDA has notified the Contractor prior to the signing of the Contract that the particular process or product is patented or is believed to be patented.

Section 9 - Permits and Regulations

The Contractor must secure and pay for all permits, permit or plan review fees and licenses necessary for the prosecution of the work. These include but are not limited to City building permits, right-of-way permits, lane closure permits, right-of-way occupancy permits, and the like. The DDA shall secure and pay for easements shown on the plans unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the contract documents are at variance with those requirements, it shall promptly notify the Supervising Professional in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work.

Section 10 - Protection of the Public and of Work and Property

The Contractor is responsible for the means, methods, sequences, techniques and procedures of construction and safety programs associated with the work contemplated by this contract. The Contractor, its agents or sub-contractors, shall comply with the "General Rules and Regulations for the Construction Industry" as published by the Construction Safety Commission of the State of Michigan and to all other local, State and National laws, ordinances, rules and regulations pertaining to safety of persons and property.

The Contractor shall take all necessary and reasonable precautions to protect the safety of the public. It shall continuously maintain adequate protection of all work from damage, and shall take all necessary and reasonable precautions to adequately protect all public and private property from injury or loss arising in connection with this Contract. It shall make good any damage, injury or loss to its work and to public and private property resulting from lack of reasonable protective precautions, except as may be due to errors in the contract documents, or caused by agents or employees of the DDA. The Contractor shall obtain and maintain sufficient insurance to cover damage to any DDA property at the site by any cause.

In an emergency affecting the safety of life, or the work, or of adjoining property, the Contractor is, without special instructions or authorization from the Supervising Professional, permitted to act at its discretion to prevent the threatened loss or injury. It shall also so act, without appeal, if authorized or instructed by the Supervising Professional.

Any compensation claimed by the Contractor for emergency work shall be determined by agreement or in accordance with the terms of Claims for Extra Cost - Section 15.

Section 11 - Inspection of Work

The DDA shall provide sufficient competent personnel for the inspection of the work.

The Supervising Professional shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for access and for inspection.

If the specifications, the Supervising Professional's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Supervising Professional timely notice of its readiness for inspection, and if the inspection is by an authority other than the Supervising Professional, of the date fixed for the inspection. Inspections by the Supervising Professional shall be made promptly, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Supervising Professional, it must, if required by the Supervising Professional, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Supervising Professional, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to be in accordance with the contract documents, the DDA shall pay the cost of re-examination and replacement. If the work is not in accordance with the contract documents, the Contractor shall pay the cost.

Section 12 - Superintendence

The Contractor shall keep on the work site, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Supervising Professional. The superintendent will be responsible to perform all on-site project management for the Contractor. The superintendent shall be experienced in the work required for this Contract. The superintendent shall represent the Contractor and all direction given to the superintendent shall be binding as if given to the Contractor. Important directions shall immediately be confirmed in writing to the Contractor. Other directions will be confirmed on written request. The Contractor shall give efficient superintendence to the work, using its best skill and attention.

Section 13 - Changes in the Work

The DDA may make changes to the quantities of work within the general scope of the Contract at any time by a written order and without notice to the sureties. If the changes add to or deduct from the extent of the work, the Contract Sum shall be adjusted accordingly. All the changes shall be executed under the conditions of the original Contract except that any claim for extension of time caused by the change shall be adjusted at the time of ordering the change.

In giving instructions, the Supervising Professional shall have authority to make minor changes in the work not involving extra cost and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Supervising Professional, and no claim for an addition to the Contract Sum shall be valid unless the additional work was ordered in writing.

The Contractor shall proceed with the work as changed and the value of the work shall be determined as provided in Claims for Extra Cost - Section 15.

Section 14 - Extension of Time

Extension of time stipulated in the Contract for completion of the work will be made if and as the Supervising Professional may deem proper under any of the following circumstances:

(1) When work under an extra work order is added to the work under this Contract;

(2) When the work is suspended as provided in Section 20;

(3) When the work of the Contractor is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, and which were not the result of its fault or negligence;

(4) Delays in the progress of the work caused by any act or neglect of the DDA or of its employees or by other Contractors employed by the DDA;

(5) Delay due to an act of Government;

(6) Delay by the Supervising Professional in the furnishing of plans and necessary information;

(7) Other cause which in the opinion of the Supervising Professional entitles the Contractor to an extension of time.

The Contractor shall notify the Supervising Professional within 7 days of an occurrence or conditions which, in the Contractor's opinion, entitle it to an extension of time. The notice shall be in writing and submitted in ample time to permit full investigation and evaluation of the Contractor's claim. The Supervising Professional shall acknowledge receipt of the Contractor's notice within 7 days of its receipt. Failure to timely provide the written notice shall constitute a waiver by the Contractor of any claim.

In situations where an extension of time in contract completion is appropriate under this or any other section of the contract, the Contractor understands and agrees that the only available adjustment for events that cause any delays in contract completion shall be extension of the required time for contract completion and that there shall be no adjustments in the money due the Contractor on account of the delay.

Section 15 - Claims for Extra Cost

If the Contractor claims that any instructions by drawings or other media issued after the date of the Contract involved extra cost under this Contract, it shall give the Supervising Professional written notice within 7 days after the receipt of the instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property. The procedure shall then be as provided for Changes in the Work-Section I3. No claim shall be valid unless so made.

If the Supervising Professional orders, in writing, the performance of any work not covered by the contract documents, and for which no item of work is provided in the Contract, and for which no unit price or lump sum basis can be agreed upon, then the extra work shall be done on a Cost-Plus-Percentage basis of payment as follows:

(1) The Contractor shall be reimbursed for all reasonable costs incurred in doing the work, and shall receive an additional payment of 15% of all the reasonable costs to cover both its indirect overhead costs and profit;

(2) The term "Cost" shall cover all payroll charges for employees and supervision required under the specific order, together with all worker's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at agreed upon rates, together with cost of fuel and supply charges for the equipment; and any costs incurred by the Contractor as a direct result of executing the order, if approved by the Supervising Professional;

(3) If the extra is performed under subcontract, the subcontractor shall be allowed to compute its charges as described above. The Contractor shall be permitted to add an additional charge of 5% percent to that of the subcontractor for the Contractor's supervision and contractual responsibility;

(4) The quantities and items of work done each day shall be submitted to the Supervising Professional in a satisfactory form on the succeeding day, and shall be approved by the Supervising Professional and the Contractor or adjusted at once;

(5) Payments of all charges for work under this Section in any one month shall be made along with normal progress payments. Retainage shall be in accordance with Progress Payments-Section 16.

No additional compensation will be provided for additional equipment, materials, personnel, overtime or special charges required to perform the work within the time requirements of the Contract.

When extra work is required and no suitable price for machinery and equipment can be determined in accordance with this Section, the hourly rate paid shall be 1/40 of the basic weekly rate listed in the Rental Rate Blue Book published by Dataquest Incorporated and applicable to the time period the equipment was first used for the extra work. The hourly rate will be deemed to include all costs of operation such as bucket or blade, fuel, maintenance, "regional factors", insurance, taxes, and the like, but not the costs of the operator.

Section 16 - Progress Payments

The Contractor shall submit each month, or at longer intervals, if it so desires, an invoice covering work performed for which it believes payment, under the Contract terms, is due. The submission shall be to the DDA's Accounts Payable. The Supervising Professional will, within 10 days following submission of the invoice, prepare a certificate for payment for the work in an amount to be determined by the Supervising Professional as fairly representing the acceptable work performed during the period covered by the Contractor's invoice. To insure the proper performance of this Contract, the DDA will retain a percentage of the estimate in accordance with Act 524, Public Acts of 1980. The DDA will then, following the receipt of the Supervising Professional's Certificate, make payment to the Contractor as soon as feasible, which is anticipated will be within 15 days.

An allowance may be made in progress payments if substantial quantities of permanent material have been delivered to the site but not incorporated in the completed work if the Contractor, in the opinion of the Supervising Professional, is diligently pursuing the work under this Contract. Such materials shall be properly stored and adequately protected. Allowance in the estimate shall be at the invoice price value of the items. Notwithstanding any payment of any allowance, all risk of loss due to vandalism or any damages to the stored materials remains with the Contractor.

In the case of Contracts which include only the Furnishing and Delivering of Equipment, the payments shall be; 60% of the Contract Sum upon the delivery of all equipment to be furnished, or in the case of delivery of a usable portion of the equipment in advance of the total equipment delivery, 60% of the estimated value of the portion of the equipment may be paid upon its delivery in advance of the time of the remainder of the equipment to be furnished; 30% of the Contract Sum upon completion of erection of all equipment furnished, but not later than 60 days after the date of delivery of all of the equipment to be furnished; and payment of the final 10% on final completion of erection, testing and acceptance of all the equipment to be furnished; but not later than l80 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

With each invoice for periodic payment, the Contractor shall enclose a Contractor's Declaration - Section 43, and an updated project schedule per Order of Completion - Section 2.

Section 17 - Deductions for Uncorrected Work

If the Supervising Professional decides it is inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made.

Section 18 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials condemned by the Supervising Professional as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the DDA and shall bear the expense of making good all work of other contractors destroyed or damaged by the removal or replacement.

If the Contractor does not remove the condemned work and materials within l0 days after written notice, the DDA may remove them and, if the removed material has value, may store the material

at the expense of the Contractor. If the Contractor does not pay the expense of the removal within 10 days thereafter, the DDA may, upon 10 days written notice, sell the removed materials at auction or private sale and shall pay to the Contractor the net proceeds, after deducting all costs and expenses that should have been borne by the Contractor. If the removed material has no value, the Contractor must pay the DDA the expenses for disposal within 10 days of invoice for the disposal costs.

The inspection or lack of inspection of any material or work pertaining to this Contract shall not relieve the Contractor of its obligation to fulfill this Contract and defective work shall be made good. Unsuitable materials may be rejected by the Supervising Professional notwithstanding that the work and materials have been previously overlooked by the Supervising Professional and accepted or estimated for payment or paid for. If the work or any part shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good the defect in a manner satisfactory to the Supervising Professional. The judgment and the decision of the Supervising Professional as to whether the materials supplied and the work done under this Contract comply with the requirements of the Contract shall be conclusive and final.

Section 19 - Acceptance and Final Payment

Upon receipt of written notice that the work is ready for final inspection and acceptance, the Supervising Professional will promptly make the inspection. When the Supervising Professional finds the work acceptable under the Contract and the Contract fully performed, the Supervising Professional will promptly sign and issue a final certificate stating that the work required by this Contract has been completed and is accepted by the DDA under the terms and conditions of the Contract. The entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the DDA within 30 days after the date of the final certificate.

Before issuance of final certificates, the Contractor shall file with the DDA:

(1) The consent of the surety to payment of the final estimate;
(2) The Contractor's Affidavit in the form required by Section 44.

In case the Affidavit or consent is not furnished, the DDA may retain out of any amount due the Contractor, sums sufficient to cover all lienable claims.

The making and acceptance of the final payment shall constitute a waiver of all claims by the DDA except those arising from:

(1) unsettled liens;
(2) faulty work appearing within 12 months after final payment;
(3) hidden defects in meeting the requirements of the plans and specifications;
(4) manufacturer's guarantees.

It shall also constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

Section 20 - Suspension of Work

The DDA may at any time suspend the work, or any part by giving 5 days notice to the Contractor in writing. The work shall be resumed by the Contractor within 10 days after the date fixed in the

written notice from the DDA to the Contractor to do so. The DDA shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of the suspension.

If the work, or any part, shall be stopped by the notice in writing, and if the DDA does not give notice in writing to the Contractor to resume work at a date within 90 days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work suspended and will be entitled to the estimates and payments for all work done on the portions abandoned, if any, plus 10% of the value of the work abandoned, to compensate for loss of overhead, plant expense, and anticipated profit.

Section 21 - Delays and the DDA's Right to Terminate Contract

If the Contractor refuses or fails to prosecute the work, or any separate part of it, with the diligence required to insure completion, ready for operation, within the allowable number of consecutive calendar days specified plus extensions, or fails to complete the work within the required time, the DDA may, by written notice to the Contractor, terminate its right to proceed with the work or any part of the work as to which there has been delay. After providing the notice the DDA may take over the work and prosecute it to completion, by contract or otherwise, and the Contractor and its sureties shall be liable to the DDA for any excess cost to the DDA. If the Contractor's right to proceed is terminated, the DDA may take possession of and utilize in completing the work, any materials, appliances and plant as may be on the site of the work and useful for completing the work. The right of the Contractor to proceed shall not be terminated or the Contractor charged with liquidated damages where an extension of time is granted under Extension of Time - Section 14.

If the Contractor is adjudged a bankrupt, or if it makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of its insolvency, or if it persistently or repeatedly refuses or fails except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if it fails to make prompt payments to subcontractors or for material or labor, or persistently disregards laws, ordinances or the instructions of the Supervising Professional, or otherwise is guilty of a substantial violation of any provision of the Contract, then the DDA, upon the certificate of the Supervising Professional that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor 3 days written notice, terminate this Contract. The DDA may then take possession of the premises and of all materials, tools and appliances thereon and without prejudice to any other remedy it may have, make good the deficiencies or finish the work by whatever method it may deem expedient, and deduct the cost from the payment due the Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the expense of finishing the work, including compensation for additional managerial and administrative services exceeds the unpaid balance of the Contract Sum, the Contractor and its surety are liable to the DDA for any excess cost incurred. The expense incurred by the DDA, and the damage incurred through the Contractor's default, shall be certified by the Supervising Professional.

Section 22 - Contractor's Right to Terminate Contract

If the work should be stopped under an order of any court, or other public authority, for a period of 3 months, through no act or fault of the Contractor or of anyone employed by it, then the Contractor may, upon 7 days written notice to the DDA, terminate this Contract and recover from the DDA payment for all acceptable work executed plus reasonable profit.

Section 23 - DDA's Right To Do Work

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the DDA, 3 days after giving written notice to the Contractor and its surety may, without prejudice to any other remedy the DDA may have, make good the deficiencies and may deduct the cost from the payment due to the Contractor.

Section 24 - Removal of Equipment and Supplies

In case of termination of this Contract before completion, from any or no cause, the Contractor, if notified to do so by the DDA, shall promptly remove any part or all of its equipment and supplies from the property of the City/DDA, failing which the DDA shall have the right to remove the equipment and supplies at the expense of the Contractor.

The removed equipment and supplies may be stored by the DDA and, if all costs of removal and storage are not paid by the Contractor within 10 days of invoicing, the DDA upon 10 days written notice may sell the equipment and supplies at auction or private sale, and shall pay the Contractor the net proceeds after deducting all costs and expenses that should have been borne by the Contractor and after deducting all amounts claimed due by any lien holder of the equipment or supplies.

Section 25 - Responsibility for Work and Warranties

The Contractor assumes full responsibility for any and all materials and equipment used in the construction of the work and may not make claims against the DDA for damages to materials and equipment from any cause except negligence or willful act of the DDA. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the project (except for any part covered by Partial Completion and Acceptance - Section 26). The Contractor shall make good all work damaged or destroyed before acceptance. All risk of loss remains with the Contractor until final acceptance of the work (Section 19) or partial acceptance (Section 26). The Contractor is advised to investigate obtaining its own builders risk insurance.

The Contractor shall guarantee the quality of the work for a period of one year. The Contractor shall also unconditionally guarantee the quality of all equipment and materials that are furnished and installed under the contract for a period of one year. At the end of one year after the Contractor's receipt of final payment, the complete work, including equipment and materials furnished and installed under the contract, shall be inspected by the Contractor and the Supervising Professional. Any defects shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. Any defects that are identified prior to the end of one year shall also be inspected by the Contractor and the Supervising Professional and shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. The Contractor shall assign all manufacturer or material supplier warranties to the DDA prior to final payment. The assignment shall not relieve the Contractor of its obligations under this paragraph to correct defects.

Section 26 - Partial Completion and Acceptance

If at any time prior to the issuance of the final certificate referred to in Acceptance and Final Payment - Section 19, any portion of the permanent construction has been satisfactorily completed, and if the Supervising Professional determines that portion of the permanent construction is not required for the operations of the Contractor but is needed by the DDA, the Supervising Professional shall issue to the Contractor a certificate of partial completion, and immediately the DDA may take over and use the portion of the permanent construction described in the certificate, and exclude the Contractor from that portion.

The issuance of a certificate of partial completion shall not constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates if the Contractor has failed to complete it in accordance with the terms of this Contract. The issuance of the certificate shall not release the Contractor or its sureties from any obligations under this Contract including bonds.

If prior use increases the cost of, or delays the work, the Contractor shall be entitled to extra compensation, or extension of time, or both, as the Supervising Professional may determine.

Section 27 - Payments Withheld Prior to Final Acceptance of Work

The DDA may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any certificate to the extent reasonably appropriate to protect the DDA from loss on account of:

(1) Defective work not remedied;

(2) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor;

(3) Failure of the Contractor to make payments properly to subcontractors or for material or labor;

(4) Damage to another Contractor.

When the above grounds are removed or the Contractor provides a Surety Bond satisfactory to the DDA which will protect the DDA in the amount withheld, payment shall be made for amounts withheld under this section.

Section 28 - Contractor's Insurance

(1) The Contractor shall procure and maintain during the life of this Contract, including the guarantee period and during any warranty work, such insurance policies, including those set forth below, as will protect itself and the DDA from all claims for bodily injuries, death or property damage that may arise under this Contract; whether the act(s) or omission(s) giving rise to the claim were made by the Contractor, any subcontractor, or anyone employed by them directly or indirectly. Prior to commencement of any work under this contract, Contractor shall provide to the DDA documentation satisfactory to the DDA, through City of Ann Arbor-approved means (currently myCOI), demonstrating it has obtained the required policies and endorsements. The certificates of insurance

endorsements and/or copies of policy language shall document that the Contractor satisfies the following minimum requirements. Contractor shall add registration@mycoitracking.com to its safe sender's list so that it will receive necessary communication from myCOI. When requested, Contractor shall provide the same documentation for its subcontractor(s) (if any).

Required insurance policies include:

(a) Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

Bodily Injury by Accident - $500,000 each accident
Bodily Injury by Disease - $500,000 each employee
Bodily Injury by Disease - $500,000 each policy limit

(b) Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 04 13 or current equivalent. The DDA and City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements specifically for the following coverages: Products and Completed Operations, Explosion, Collapse and Underground coverage or Pollution. Further there shall be no added exclusions or limiting endorsements that diminish the City's and DDA's protections as an additional insured under the policy. The following minimum limits of liability are required:

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined.
$2,000,000	Per Project General Aggregate
$1,000,000	Personal and Advertising Injury
$2,000,000	Products and Completed Operations Aggregate

(c) Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 10 13 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The DDA and City of Ann Arbor shall be named as additional insured. There shall be no added exclusions or limiting endorsements that diminish the DDA's and City's protections as an additional insured under the policy. Further, the limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

(d) Umbrella/Excess Liability Insurance shall be provided to apply excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

(2) Insurance required under subsection (1)(b) and (1)(c) above shall be considered primary as respects any other valid or collectible insurance that the DDA or City may possess, including any self-insured retentions the DDA or City may have; and any other insurance the DDA or City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the DDA and City for any insurance listed herein.

(3) Insurance companies and policy forms are subject to approval of the DDA Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and un-qualified 30-day written notice of cancellation in favor of the DDA and City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company(s); name and address of the agent(s) or authorized representative(s); name(s), email address(es), and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which may be approved by the DDA, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the DDA with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) and all required endorsements to the DDA. If any of the above coverages expire by their terms during the term of this Contract, the Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.

(4) Any Insurance provider of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the DDA.

(5) DDA reserves the right to require additional coverage and/or coverage amounts as may be included from time to time in the Detailed Specifications for the Project.

(6) The provisions of General Condition 28 shall survive the expiration or earlier termination of this contract for any reason.

Section 29 - Surety Bonds

Bonds will be required from the successful bidder as follows:

(1) A Performance Bond to the Ann Arbor DDA for the amount of the bid(s) accepted;
(2) A Labor and Material Bond to the Ann Arbor DDA for the amount of the bid(s) accepted.

Bonds shall be executed on forms supplied by the DDA in a manner and by a Surety Company authorized to transact business in Michigan and satisfactory to the DDA Attorney.

Section 30 - Damage Claims

The Contractor shall be held responsible for all damages to property of the DDA, City or others, caused by or resulting from the negligence of the Contractor, its employees, or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. The Contractor must restore all property injured including sidewalks, curbing, sodding, pipes, conduit, sewers or other public or private property to not less than its original condition with new work.

Section 31 - Refusal to Obey Instructions

If the Contractor refuses to obey the instructions of the Supervising Professional, the Supervising Professional shall withdraw inspection from the work, and no payments will be made for work performed thereafter nor may work be performed thereafter until the Supervising Professional shall have again authorized the work to proceed.

Section 32 - Assignment

Neither party to the Contract shall assign the Contract without the written consent of the other. The Contractor may assign any monies due to it to a third party acceptable to the DDA.

Section 33 - Rights of Various Interests

Whenever work being done by the DDA's or City's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Supervising Professional, to secure the completion of the various portions of the work in general harmony.

The Contractor is responsible to coordinate all aspects of the work, including coordination of, and with, utility companies and other contractors whose work impacts this project.

Section 34 - Subcontracts

The Contractor shall not award any work to any subcontractor without prior written approval of the DDA. The approval will not be given until the Contractor submits to the DDA a written statement concerning the proposed award to the subcontractor. The statement shall contain all information the DDA may require.

The Contractor shall be as fully responsible to the DDA for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.

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

Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the DDA.

Section 35 - Supervising Professional's Status

The Supervising Professional has the right to inspect any or all work. The Supervising Professional has authority to stop the work whenever stoppage may be appropriate to insure the proper execution of the Contract. The Supervising Professional has the authority to reject all work and materials which do not conform to the Contract and to decide questions which arise in the execution of the work.

The Supervising Professional shall make all measurements and determinations of quantities. Those measurements and determinations are final and conclusive between the parties.

Section 36 - Supervising Professional's Decisions

The Supervising Professional shall, within a reasonable time after their presentation to the Supervising Professional, make decisions in writing on all claims of the DDA or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.

Section 37 - Storing Materials and Supplies

Materials and supplies may be stored at the site of the work at locations agreeable to the DDA unless specific exception is listed elsewhere in these documents. Ample way for foot traffic and drainage must be provided, and gutters must, at all times, be kept free from obstruction. Traffic on streets shall be interfered with as little as possible. The Contractor may not enter or occupy with agents, employees, tools, or material any private property without first obtaining written permission from its owner. A copy of the permission shall be furnished to the Supervising Professional.

Section 38 - Lands for Work

The Contractor shall provide, at its own expense and without liability to the DDA, any additional land and access that may be required for temporary construction facilities or for storage of materials.

Section 39 - Cleaning Up

The Contractor shall, as directed by the Supervising Professional, remove at its own expense from the City's property and from all public and private property all temporary structures, rubbish and waste materials resulting from its operations unless otherwise specifically approved, in writing, by the Supervising Professional.

Section 40 - Salvage

The Supervising Professional may designate for salvage any materials from existing structures or underground services. Materials so designated remain DDA property and shall be transported or stored at a location as the Supervising Professional may direct.

Section 41 - Night, Saturday or Sunday Work

No night or Sunday work (without prior written DDA approval) will be permitted except in the case of an emergency and then only to the extent absolutely necessary. The DDA may allow night work which, in the opinion of the Supervising Professional, can be satisfactorily performed at night. Night work is any work between 8:00 p.m. and 7:00 a.m. No Saturday work will be permitted unless the Contractor gives the Supervising Professional at least 48 hours but not more than 5 days notice of the Contractor's intention to work the upcoming Saturday.

Section 42 - Sales Taxes

Under State law the DDA is exempt from the assessment of State Sales Tax on its direct purchases. Contractors who acquire materials, equipment, supplies, etc. for incorporation in DDA projects are not likewise exempt. State Law shall prevail. The Bidder shall familiarize itself with the State Law and prepare its Bid accordingly. No extra payment will be allowed under this Contract for failure of the Contractor to make proper allowance in this bid for taxes it must pay.

Section 43

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period _____, 20___, to _____, 20 , performed any work, furnished any materials, sustained any loss, damage or delay, or otherwise done anything in addition to the regular items (or executed change orders) set forth in the Contract titled _____, for which I shall ask, demand, sue for, or claim compensation or extension of time from the DDA, except as I hereby make claim for additional compensation or extension of time as set forth on the attached itemized statement. I further declare that I have paid all payroll obligations related to this Contract that have become due during the above period and that all invoices related to this Contract received more than 30 days prior to this declaration have been paid in full except as listed below.

There is/is not (Contractor please circle one and strike one as appropriate) an itemized statement attached regarding a request for additional compensation or extension of time.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Past due invoices, if any, are listed below.

Section 44

CONTRACTOR'S AFFIDAVIT

The undersigned Contractor,_____, represents that on _____, 20___, it was awarded a contract by the Ann Arbor DDA, Michigan to_____ under the terms and conditions of a Contract titled _____. The Contractor represents that all work has now been accomplished and the Contract is complete.

The Contractor warrants and certifies that all of its indebtedness arising by reason of the Contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and others for labor and material used in accomplishing the project, as well as all other claims arising from the performance of the Contract, have been fully paid or satisfactorily settled. The Contractor agrees that, if any claim should hereafter arise, it shall assume responsibility for it immediately upon request to do so by the DDA.

The Contractor, for valuable consideration received, does further waive, release and relinquish any and all claims or right of lien which the Contractor now has or may acquire upon the subject premises for labor and material used in the project owned by the DDA.

This affidavit is freely and voluntarily given with full knowledge of the facts.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Subscribed and sworn to before me, on this _____ day of _____, 20__
_____ , _____ County, Michigan
Notary Public
_____ County, MI
My commission expires on:

STANDARD SPECIFICATIONS

All work under this contract shall be performed in accordance with the Public Services Department Standard Specifications in effect at the date of availability of the contract documents stipulated in the Bid. All work under this Contract which is not included in these Standard Specifications, or which is performed using modifications to these Standard Specifications, shall be performed in accordance with the Detailed Specifications included in these contract documents.

Standard Specifications are available online:

http://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx

CITY OF ANN ARBOR DOWNTOWN DEVELOPMENT AUTHORITY

Catherine and Miller Bikeway Project

RFP No. DDA 2022-05

DETAILED SPECIFICATIONS

Issued for Proposals
May 6, 2022

Prepared by:

SMITHGROUP

201 Depot Street, 2nd Floor
Ann Arbor, Michigan 48104

WADE TRIM

25251 Northline Road
Taylor, MI 48180

DETAILED SPECIFICATIONS
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DETAILED SPECIFICATION
FOR
COORDINATION AND COOPERATION WITH OTHERS
AND
WORK BY OTHERS

The Contractor is reminded as to the requirements of article 104.08 of the 2020 edition of the MDOT Standard Specifications, "Cooperation by the Contractor."

The Contractor shall directly coordinate his/her work with the DDA and the City of Ann Arbor.

The Contractor is hereby notified that other work may be underway in the project area by other private entities, the City of Ann Arbor, or the DDA.

No additional compensation will be paid to the Contractor, and no adjustments to contract unit prices will be made, due to delays and/or the failure of others in the performance of their work, nor for delays due to the encountering of existing utilities that are, or are not, shown on the Plans.

The following Utility Owners may have overhead and/or underground facilities located within the Right-of-Way:

The City of Ann Arbor
DTE - MichCon (Michigan Consolidated Gas Company)
DTE - Edison (Detroit Edison Company)
Comcast
MCI/Verizon Business
Other private communications firms
Michigan Department of Transportation

On all projects:
"3 Working Days before you Dig - Call MISS DIG - Toll Free" Phone No. 1-800-482-7171.

The Owners of public or private utilities which will not interfere with the completed project and which do not present a hazard to the public or an extraordinary hazard to the Contractor's operations will not be required to move their facilities on or from the street right-of-way.

Stoppages created solely by the operations of the utility companies which delay utility revisions on any portion of this project may be considered as a basis of claim for an extension of time for project completion.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
DISPOSING OF EXCAVATED MATERIAL

The Contractor shall dispose of, at the Contractor's expense, all excavated material. Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
INSURANCE REQUIREMENTS

In addition to the insurance requirements noted in Section 28 of the General Conditions, the following agencies must be listed as additional insured:

"Ann Arbor Downtown Development Authority"

DETAILED SPECIFICATION
FOR
PROTECTION OF UTILITIES

Damages to utilities by the Contractor's operations shall be repaired by the utility owner at the Contractor's expense.

Delays to the work due to utility repairs are the sole responsibility of the Contractor.

The Contractor shall keep construction debris out of utilities at all times. The Contractor shall be back charged an amount of $50.00 per day for each manhole/inlet/utility pipe that contains construction debris caused as a result of the Contractor's (including subcontractors and suppliers) work.

The Contractor is solely responsible for any damages to the utilities or abutting properties due to construction debris.

Certain sanitary and storm sewers within the influence of construction may have been cleaned and videotaped prior to construction. The City may also choose to videotape utility line(s) during or after the work of this Contract to inspect them for damages and/or construction debris. If such inspection shows damage and/or debris, then all costs of such inspection, cleaning, repairs, and etc, shall be the Contractor's sole responsibility. If such inspection is negative, the City will be responsible for the costs of such inspection.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
SOIL EROSION CONTROL

The Contractor shall maintain and remove soil erosion and sedimentation control measures, including but not limited to, fabric filters at all drainage structures, all in accordance with all applicable City (and other governmental agencies) codes and standards, as directed by the Engineer, Supervising Professional, as detailed in the Standard Specifications, and as shown on the Plans.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
VACUUM TYPE STREET AND UTILITY STRUCTURE CLEANING EQUIPMENT

The Contractor shall furnish and operate throughout the construction period, vacuum type street cleaning and utility structure cleaning equipment (Vac-All, Vactor, etc.) approved by the Engineer, as and when directed by the Engineer for dust control, for dirt/debris control, and for street cleaning immediately prior to, and for street and utility structure cleaning after any and all paving. The cleaning equipment shall be of sufficient power to remove dust, dirt, and debris from the pavement and from utility structures in and adjacent to the construction area.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
SITE CLEAN-UP

Immediately after completion of construction on each block, the Contractor shall clean the entire area within the influence of construction, including but not limited to all pavement, sidewalks, lawn areas, and underground utility structures, of all materials which may have accumulated prior to or during the construction.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
MATERIALS AND SUPPLIES CERTIFICATIONS

The following materials and supplies shall be certified by the manufacturer or supplier as having been tested for compliance with the Specifications:

HMA materials
Hot-poured Joint Sealants
Cements, coatings, admixtures and curing materials
Sands and Aggregates
Steel and Fabricated metal
Portland Cement Concrete Mixtures
Reinforcing Steel for Concrete
Reinforcing Fibers for Concrete
Pre-cast Concrete products
Sanitary Sewer Pipe
Storm Sewer Pipe
Water Main Pipe
Corrugated Metal Pipe
High Density Polyethylene Pipe
Timber for retaining walls
Modular Concrete Block for retaining walls
Edge Drain and Underdrain Pipe
Geotextile Filter Fabric and Stabilization Fabric/Grids

The Contractor shall submit all certifications to the Engineer for review and approval a minimum of three business days prior to any scheduled delivery, installation, and/or construction of same.

Costs for this work will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

DETAILED SPECIFICATION
FOR
CONTRACT DRAWINGS/PLANS

The Contractor shall carefully check and review all Drawings/Plans and advise the Engineer of any errors or omissions discovered. The Drawings/Plans may be supplemented by such additional Drawings/Plans and sketches as may be necessary or desirable as the work progresses. The Contractor shall perform all work shown on any additional or supplemental Drawings/Plans issued by the Engineer.

DETAILED SPECIFICATION
FOR EXISTING
SOIL BORING AND PAVEMENT SECTION DATA

Data pertaining to existing soil borings and pavement sections which may be included in these Contract Documents are provided to help the Engineer and Contractor determine the soil conditions existing within the construction area. The DDA in no way guarantees existing conditions to be the same as shown in the data. The Contractor is solely responsible for any and all conclusions he/she may draw from the data.

DETAILED SPECIFICATION
FOR
WORKING IN THE RAIN

The Contractor shall not work in the rain unless authorized in writing by the Engineer.

The Engineer may delay or stop the work due to threatening weather conditions.

The Contractor shall not be compensated for unused materials or downtime due to rain, or the threat of rain.

The Contractor is solely responsible for repairing all damages to the work and to the site, including road infrastructures, road subgrades, and any adjacent properties, which are caused as a result of working in the rain.

DETAILED SPECIFICATION
FOR
WORKING IN THE DARK

The Contractor shall not work in the dark except as approved by the Engineer and only when lighting for night work is provided as detailed elsewhere in this contract.

The Engineer may stop the work, or may require the Contractor to defer certain work to another day, if, in the Engineer's opinion, the work cannot be completed within the remaining daylight hours, or if inadequate daylight is present to either properly perform or inspect the work.

The Contractor will not be compensated for unused materials or downtime, when delays or work stoppages are directed by the Engineer for darkness and/or inadequate remaining daylight reasons.

The Contractor is solely responsible for repairing all damages to the work and to the site, including road infrastructures, road subgrades, and any adjacent properties, which are caused as a result of working in the dark.

DETAILED SPECIFICATION
FOR
QUANTITIES AND UNIT PRICES

Quantities as given are approximate and are estimated for bidding purposes. Quantities are not guaranteed and may vary by any amount. While it is the DDA's intent to complete the project substantially as drawn and specified herein, quantities may be changed or reduced to zero for cost savings or other reasons. **The DDA reserve the right to change the quantities and no adjustment in unit price will be made for any change in any quantity.**

DETAILED SPECIFICATION
FOR
GENERAL CONSTRUCTION NOTES

The following notes pertain to all Plan sheets issued as part of this Contract, and these notes shall be considered part of each Plan sheet or Detailed Information Sheet.

1. All work shall conform to latest revision of the City Standard Specifications.

2. The Contractor shall maintain access to all drives throughout the course of construction. Drives shall never be closed during non-working hours, unless otherwise authorized in writing by the Engineer.

3. The Contractor shall completely restore all existing site features to better than, or equal to, their existing condition.

4. The Contractor shall be aware that there are above-ground and below-ground utilities existing in and on these streets which include, but are not limited to: gas mains and service leads; water mains and service leads; storm sewer mains and service leads; sanitary sewer mains and service leads; telephone poles, wires, cables and conduits; electrical poles, wires, cables and conduits; cable television wires, cables and conduits, and other various utilities. The Contractor shall conduct all of its work so as not to damage or alter in any way, any existing utility, except where specified on the Plans or where directed by the Engineer. The City has videotaped and cleaned all sanitary and storm sewers, including storm sewer inlet leads, and has found all of these facilities to be in good condition, with the exception of those shown on the Plans for repairs or replacement.

5. The Contractor is solely responsible for any delays, damages, costs and/or charges incurred due to and/or by reason of any utility, structure, feature and/or site condition, whether shown on the Plans or not, and the Contractor shall repair and/or replace, at its sole expense, to as good or better condition, any and all utilities, structures, features and/or site conditions which are impacted by reason of the work, or damaged by its operations, or damaged during the operations of its subcontractors or suppliers.

6. No extra payments or adjustments to unit prices will be made for damages, delays, costs and/or charges due to existing utilities, structures, features and/or site conditions not shown or being incorrectly shown or represented on the Plans.

7. The Contractor is solely responsible for furnishing the appropriate equipment and qualified personnel for the size and condition of the site and the requirements of the proposed work. Damage to buildings, amenities, utilities, paving, and facilities within and adjacent to the work area, and to work already performed by the Contractor shall be the responsibility of the Contractor to repair as needed, at no cost to the project.

DETAILED SPECIFICATION
FOR
CONCRETE DURABILITY

DESCRIPTION

The Contractor shall furnish a Portland cement concrete mixture for this project that has been tested under this specification and shown to be resistant to excessive expansion caused by alkali-silica reactivity (ASR) and provides adequate air entrainment for freeze thaw durability. The Contractor shall construct the project with practices outlined in this specification.

MATERIALS

Submit a job mix formula (JMF) to the Engineer for approval prior to concrete work commencing.

The materials provided for use on this project shall conform to the following requirements:

Portland cement	ASTM C 150
Fine Aggregate	ASTM C 33*
Coarse Aggregate	ASTM C 33*
Fly Ash, Class F	ASTM C 618
Slag Cement, Grade 100, 120	ASTM C 989
Silica Fume	ASTM C 1240
Blended Cements	ASTM C-595
Air Entraining Admixtures	ASTM C-260
Chemical Admixtures	ASTM C-494
White Membrane Cure	ASTM C-309 Type 2

* Fine and coarse aggregates shall consist of natural aggregates as defined in the 2020 MDOT Standard Specifications Section 902.02.A.

The Contractor shall provide documentation that all materials to be incorporated into proposed mixed designs meet the requirements of this section.

Portland Cement

Furnish Type IL Portland cement in accordance with section 901 of the MDOT Standard Specifications for Construction meeting the chemical and physical requirements specified in ASTM C595/C595M, Standard Specifications for Blended Hydraulic Cements. Ensure the Type IL Portland cement proposed for substitution is from the same Approved Manufacturer as the Type I Portland cement in the approved JMF.

At least 7 days prior to concrete production, the concrete producer must provide test data (specified below) generated from a four cubic yard (minimum) trial batch of concrete using Type IL Portland cement for the Engineer's review and approval. The trial batch must represent a current approved JMF for either a standard MDOT Grade 3500, Grade 3500HP, Grade 4500, or Grade 4500HP concrete mixture produced using Type I Portland cement, as described in section 1004 of the Standard Specifications for Construction. Ensure the materials and mixture proportions for the Type IL JMF are the same as those documented in the above-mentioned JMF using Type I Portland cement. Minor adjustments to chemical admixture dosages are permitted in efforts to achieve the specified fresh concrete properties. Trial batch compliance

for applications other than Portland cement concrete mixtures will be in accordance with the contract.

The Engineer will review the trial batch test data to determine if the fresh and hardened concrete properties of the Type IL JMF meet specification requirements for the respective MDOT Grade o concrete represented by the trial batch. If the Engineer determines that the trial batch test data are in conformance with specification requirements, then the Type IL Portland cement will be permitted to be substituted in lieu of the Type I Portland cement for all approved concrete mixtures generated at the concrete production facility for the project. If the Engineer determines that the trial batch test data do not meet specification requirements for the respective MDOT Grade of concrete, the Contractor will not be permitted to substitute Type IL Portland cement in lieu of Type I Portland cement. Mix design and JMF documentation for concrete mixtures using Type IL Portland cement will then be required in accordance with subsection 1003.03.C of the Standard Specifications for Construction or the contract, where applicable.

Once Type IL Portland cement is approved for use on the project, reinstatement of Type I Portland cement into the JMF is not permitted. Substitution of other material types or sources, including admixtures, as documented in the initial Type I JMF is not permitted.

Alkali-Silica Reactivity

The Contractor shall supply to the Engineer preliminary concrete mix designs including a list and location of all suppliers of concrete materials. The Contractor shall evaluate the mixtures for the potential for excessive expansion caused by ASR and provide documentation to the Engineer. The Contractor's evaluation shall include a review of any previous testing of the material sources intended to be used for both the fine and coarse aggregates for the concrete mixtures. The previous testing may be from other projects or records provided by the material suppliers.

Aggregates shall be tested under ASTM C-1260. If the expansion of the mortar bars is less than 0.10%, at 14 days, the aggregates shall be considered innocuous and there are no restrictions for ASR mitigation required with this material.

Previous aggregate test data may be used. If no previous test data is available, for the concrete mix, that shows that it is resistant to ASR, a concrete mixture that will mitigate the potential for ASR must be designed using either method 1 or 2 as described below.

Method 1. Substitution of a portion of the cement with Class F Fly Ash, Slag Cement Grade 100 or 120 or a ternary mix (blended cement) containing a blend of Portland cement and slag cement, or Class F fly ash, or silica fume.

The maximum substitution of cement with the fly ash permitted shall be 25% by weight of total cementitious material (cement plus fly ash). Additional requirements for the Fly Ash, Class F are that the Calcium Oxide (CaO) percent shall be less than 10 % and the available alkalis shall not exceed a maximum of 1.5%. A copy of the most recent mill test report shall be submitted to verify. Note: a Class C fly ash with a minimum total oxides ($SiO_2 + Al_2O_3 + Fe_2O_3$) of 66% and a minimum SiO_2 of 38% may be used in lieu of Type F fly ash.

The maximum substitution of cement with the Slag Cement permitted shall be 40% by weight of total cementitious material (cement plus Slag Cement). The minimum replacement rate with Slag Cement shall be 25%.

For a ternary blend the total replacement of supplementary cementitious materials is 40% with a blend

consisting of a maximum of 15% type F fly ash, and/or 8% silica fume and/or slag cement.

For method 1, the effectiveness of the proposed mix combination to resist the potential for excessive expansion caused by ASR shall be demonstrated using current or historic data. To demonstrate the effectiveness of the proposed mix the Contractor shall construct and test mortar bars per ASTM C1567 (14 day test) using both the fine and coarse aggregate along with the proposed cementitious material for the concrete mixture. If a mortar bar constructed of these materials produces an expansion of less than 0.10%, concrete mixture will be considered to be resistant to excessive expansion due to ASR.

If a mortar bar constructed produces an expansion of 0.10% or greater, concrete mixtures containing these materials shall not be considered resistant to the potential for excessive expansion due to ASR and shall be rejected. Additional testing, including alternate proportions or different materials will be required.

Method 2. Use low alkali cement and maintain the total alkali content from the cementitious at no more than 3.0 lbs/cyd (Na2Oeq). The total alkali contribution is calculated by the quantity contained in the Portland cement only.

Requirements for Low Alkali Cement are that the alkali content does not exceed 0.60% expressed as Na2O equivalent. Equivalent sodium oxide is calculated as: (percent Na2O + 0.658 x percent K2O).

For either method 1 or 2, if the Contractor intends to change any component material supplied after the mix design has been approved all concrete work will be suspended with no cost to the project or extensions of time, unless approved, until evaluation of the new mixtures and testing of the new materials demonstrates that it is resistant to excessive expansion due to ASR.

The Engineer and Contractor shall monitor the concrete that is delivered to the project site so as to insure that the approved mix design is being followed. The supplier shall include on the delivery ticket for each batch of concrete delivered to the job, the identification and proportions of each material batched.

When concrete is placed during cold weather, defined for the purposes of this Detailed Specification to be, air temperatures below 40° F, the use of accelerators, heated aggregates, silica fume and/or additional forms of cold weather protection will be required. Cold weather will not eliminate the requirement for furnishing and placing a concrete mix that is considered resistant to ASR attack.
Prior to cool weather placement, defined for the purposes of this detailed specification to be, air temperatures between 40° and 60° F, the set time of the proposed mix shall be verified under anticipated field conditions. This information shall be used when scheduling pours and saw crews.

Air Entrainment

Air entrainment shall be accomplished by addition of an approved air entraining agent. Air content as determined by ASTM C 231 or ASTM C 173, shall be determined on each day of production as early and as frequently as necessary until the air content is consistently acceptable. If during the period of time while adjustments are being made to the concrete to create a mixture that is consistently acceptable, concrete is produced that does not meet the requirements of this Detailed Specification, the Engineer may reject the material and direct it to be removed from the jobsite. Any rejected material shall be removed from the jobsite at the Contractor's sole expense. Quality Control testing performed by the Contractor to ensure compliance with the project specifications shall be performed on the grade ahead of the placement operation.

Paver placement: During production, the plastic concrete material shall be tested for acceptance at a point ahead of the paver. The air content of the concrete mixture that the Contractor shall provide shall

be known as the Acceptance Air Content (AAC). The Contractor shall also provide additional entrained air in the concrete mixture to account for the air loss which occurs in the concrete mixture experienced during transportation, consolidation and placement of the concrete. The "air loss" shall be added to the air content of the concrete mixture as established on the approved concrete mix design. The AAC for the project will be 6.0% plus an amount equal to the air loss.

For up to the first four loads, the air content measured on-site prior to placement shall be at least 8.0% and no more than 12.0%. To establish the initial AAC on the first day of paving, the air content of the first load shall be tested at the plant. After initial testing at the plant the Contractor shall provide at least two sample sets to determine the actual air loss during placement. A sample set shall consist of two samples of concrete from the same batch, one taken at the point of discharge and the other from the in-place concrete behind the paver. The air loss from the two sample sets shall be averaged and added to 6.0% to establish the AAC (rounded to the next higher 0.5%). After the testing and adjustment procedure(s) have been completed, the project acceptance air tests shall be taken prior to placement. The Contractor shall provide concrete to the jobsite that has an air content of plus 2.0%, or minus 1.0%, of the AAC.

After the AAC has been established, it shall be verified and/or adjusted through daily checks of the air loss through the paver. The Contractor shall check the air loss through the paver a minimum of two times a day. A Revised AAC shall be required to be established by the Contractor if the average air loss from two consecutive tests deviates by more than 0.5% from the current accepted air loss. The testing operations performed by the Contractor to establish a revised AAC shall be performed to the satisfaction of the Engineer. The Contractor shall be solely responsible for any delays and/or costs that occur to the project while establishing revised AACs.

Hand placed concrete: The air content for non-slip-form paving shall be 7.0% plus 1.5%, or minus 1.0%, at the point of placement.

CONSTRUCTION METHODS

Aggregate Control

Gradation control – The supplier shall provide a detailed stockpile management plan, describing their process control procedure for shipping, handling, and stockpiling of each aggregate including workforce training.

Moisture control – All aggregate materials must be conditioned to a moisture content of not less than saturated surface dry (SSD) prior to batching. A watering process using an effective sprinkler system designed and operated by the Contractor shall be required on all coarse aggregate material stockpiles.

The Contractor shall provide verification that these processes have been performed by the supplier. The Engineer reserves the right to independently verify that the supplier has complied with these standards.

Mixing

Central mix plants - The total volume of the batch shall not exceed the designated size of the mixer or the rated capacity as shown on the manufacturer's rating plate.

Drum Mix Plants: After all solid materials are assembled in the mixer drum; the mixing time shall be a minimum of 60 seconds and a maximum of 5 minutes. The mixing time may be decreased if the ASTM C-94 11.3.3 mixer efficiency tests show that the concrete mixing is satisfactory. The Engineer

may require an increase in the minimum mix time if the mixer efficiency test determines that the concrete is not being mixed satisfactorily. The minimum mixing time shall start after the mixer is fully charged. Mixers shall be operated at the speed recommended by the manufacturer as mixing speed. The mixer shall be charged so that a uniform blend of materials reached the mixer throughout the charging cycle. Any additional slump water required shall be added to the mixing chamber by the end of the first 25% of the specified mixing time. Mixers shall not be used if the drum is not clean or if the mixing blades are damaged or badly worn

Ribbon mixers: After all solid materials are assembled in the mixer; the mixing time shall be a minimum of 30 seconds and a maximum of 2.5 minutes. The mixing time may be decreased if the ASTM C-94 11.3.3 mixer efficiency tests show that the concrete mixing is satisfactory. The Engineer may require an increase in the minimum mix time if the mixer efficiency test determines that the concrete is not being mixed satisfactorily. The minimum mixing time shall be indicated by an accurate timing device which is automatically started when the mixer is fully charged. Mixers shall be operated at the speed recommended by the manufacturer as mixing speed. The mixer shall be charged so that a uniform blend of materials reached the mixer throughout the charging cycle. After any additional slump water is added to the mixing chamber the mixing shall continue for a minimum of 10 seconds. Mixers shall not be used if the mixer is not clean or if the mixing blades are damaged or badly worn.

Truck Mixers -The capacities and mixing capabilities shall be as defined in ASTM C 94, and each unit shall have an attached plate containing the information described therein. The plate may be issued by the Truck Mixer Manufacturer. The mixer capacity shall not be exceeded, and the mixing speeds shall be within the designated limits. Truck mixers shall be equipped with a reliable reset revolution counter. If truck mixers are used for mixing while in transit, the revolution counter shall register the number of revolutions at mixing speed.

An authorized representative of the concrete producer shall certify that the interior of the mixer drum is clean and reasonably free of hardened concrete, that the fins or paddles are not broken or worn excessively, that the other parts are in proper working order, and that the unit has been checked by the representative within the previous 30 calendar day period to substantiate this certification. The current, signed certification shall be with the unit at all times.

The required mixing shall be between 70 and 90 revolutions. The mixing shall be at the rate designated by the manufacturer and shall produce uniform, thoroughly mixed concrete.

The Engineer may inspect mixer units at any time to assure compliance with certification requirements, and removal of inspection ports may be required. Should the Engineer question the quality of mixing, the Engineer may check the slump variation within the batch. Should the slump variation between two samples taken, one after approximately 20% discharge and one after approximately 90% discharge of the batch, show a variation greater than 3/4 inch (20 mm) or 25% of the average of the two, whichever is greater, the Engineer may require the mixing to be increased, the batch size reduced, the charging procedure be modified or the unit removed from the work.

The practice of adding water on the site shall be discouraged. After the slump of the concrete in the first round of trucks has been adjusted on-site, the amount of water added at the plant shall be adjusted accordingly for that day's work. All additions of water on site shall be approved by the Engineer.

Curing

Apply liquid curing compound in a fine atomized spray to form a continuous, uniform film on the horizontal surface, vertical edges, curbs and back of curbs immediately after the surface moisture has disappeared, but

no later than 30 minutes after concrete placement. With approval of the Engineer, the timing of cure application may be adjusted due to varying weather conditions and concrete mix properties.

The cure system shall be on site and tested prior to concrete placement.

Apply a curing compound at a rate of application not less than 2 gallons per 25 square yards. The Contractor shall keep the material thoroughly mixed per the Manufacturer's recommendations. The curing compound shall not be diluted.

The finished product shall appear as a uniformly painted solid white surface. Areas exhibiting a blotchy or spotty appearance shall be recoated immediately.

COMPLIANCE WITH STANDARDS

The Engineer will review and approve all material test reports and mix designs supplied by the Contractor before any placement of concrete. The Engineer will visually inspect the placed concrete and review the concrete test reports prior to final acceptance.

Acceptance sampling and testing will be performed using the sampling method and testing option selected by the Engineer. Acceptance testing will be performed at the frequency specified by the Engineer. Quality control measures to insure job control are the responsibility of the Contractor. The Engineer's testing and/or test results will not relieve the Contractor from his/her responsibilities to produce, deliver, and place concrete that meets all project requirements. The Engineer's test results are for acceptance purposes only.

If the results of the testing are not in compliance with the project specifications, the Engineer shall determine appropriate corrective action(s). Time extensions will not be granted to the Contractor during the time that the Engineer is determining the necessary corrective actions.

If, in the Engineer's judgment, the rejected material must be replaced, the material in question will be removed and replaced at the Contractor's sole expense. The removal costs will be deemed to include all relevant and associated costs including, but not limited to; re-mobilization, traffic control, re-grading the aggregate base course, if required, placement of material meeting the project specifications, and all other expenses. Time extensions will not be granted to the Contractor for any required repair work to meet the requirements of this specification.

If the Engineer decides that the material in question can remain in place, an adjustment to the contract unit price(s) may be made of up to 100% of the bid price(s) for the affected items of work.

MEASUREMENT AND PAYMENT

The cost associated with complying with the requirements as described herein, including any required remedial action(s), shall be included in the cost of other items of work and shall not be paid for separately.

CITY OF ANN ARBOR

NOTICE TO BIDDERS

EXISTING IN SITU SOILS

AA:MN:JKA Page 1 of 1 10/25/2019

The Contractor shall be aware that soils within the City of Ann Arbor and Washtenaw County contain levels of naturally-occurring, regulated, elemental metals.

The City of Ann Arbor is unaware of any previous activities that would have contaminated the existing soils by a hazardous substance as a result of human activity.

In accordance with the applicable project requirements, all excavated material shall become the property of the Contractor. Any excavated material that cannot be incorporated into the project work, in accordance with the material requirements of the work being performed, must be properly disposed of off-site by the Contractor. Consequently, in-situ excavated soils that do not exhibit odors, discoloration, or other indications of contamination are not required to be disposed of in a landfill and may be disposed of by the Contractor by the method of their choice. The City of Ann Arbor suggests a disposal method that minimizes future human contact with the soil or the soil's contact with a water course or ground water sources. The Contractor shall ultimately be responsible for any disposal method they choose.

The Contractor's submittal of a bid for this project shall be considered prima fascie evidence that they have considered these facts and have included all necessary resources to perform all work of this project and to properly dispose of excavated soils from this project off-site.

DETAILED SPECIFICATION
FOR
PROGRESS CLAUSE

PROGRESS CLAUSE: The Contract Award is expected on July 6th, 2022. In no case shall any work be commenced prior to receipt of formal notice to proceed by the City Ann Arbor Downtown Development Authority (DDA).

The work shall be completed in a methodical sequence of activity moving through the project site, as indicated on the *Traffic Maintenance Plans*; and as noted on the plans and herein. The Contractor may propose alternative ideas to the phasing and scheduling of the work for consideration by the DDA. If, after consideration, the Engineer believes that the alternative proposed is beneficial to the DDA, they may opt to accept the proposed alternative.

During the work, disruption to intersections shall be minimized and no work will be allowed during the dates and event listed herein.

The Project takes place within a heavy merchant and pedestrian environment. The Contractor is required to work with the DDA to sequence work to minimize merchant disruptions as much as possible.

Pedestrian access to all buildings must be maintained throughout the construction period. Pedestrian ramp crossings at intersections shall always be maintained at three of four corners. Only one corner of an intersection can be closed at a time. All pedestrian access shall be ADA compliant.

Vehicular, solid waste, and pedestrian access must be provided to parking lots, service areas, and alleys at all times. Work in these areas will be coordinated to provide at a minimum, partial width and temporary access as needed. The Contractor will be required to coordinate and communicate with property owners and tenants that may be impacted.

The Contractor may propose to adjust the limits or sequencing of construction in order to complete the work more efficiently. Changes to the recommended construction sequence must be approved in writing by the Engineer prior to construction and must assure all required coordination with other projects and timelines.

The Contractor for the work covered by this proposal will be required to meet with the Engineer to work out a detailed Progress Schedule. The schedule for this meeting will be set within two weeks after the approved contractor is determined. Prior to this meeting the contractor will also submit for review and approval a Project Schedule consisting of sequence of operations and staging plan to complete the work by the specified completion date.

The named subcontractor(s) for Specialty and/or Designed Items (if such items are designated in the proposal) which materially affect the work schedule shall also be present at the scheduled meeting, and they will be required to sign the Progress Schedule to indicate their approval of the scheduled dates of work set forth in the Progress Schedule.

The Engineer will arrange the time and place for the meeting.

The Plans and Detailed Specifications describe logistics, coordination and scheduling requirements of the Project which shall be included in the Progress Schedule and otherwise conformed to. Work will be allowed from 7am – 8pm, Monday – Saturday. Exceptions to work outside those hours are made on a case-by-case basis only and require city administration approval.

No work may be performed on Memorial Day, Independence Day, Labor Day or on the event dates shown below:

2022

- Mon 5/30 Memorial Day
- Mon 7/4 Independence
- Mon 7/18 - Sat 7/23 Art Fairs
- Sat 9/3 - Mon 9/5 UM home football, Labor Day
- All other home football Saturdays.

Ann Arbor Art Fair: No work is allowed between the Monday prior to Art Fair and the Monday following it. Prior to this work stoppage all businesses shall have pedestrian access in place, all equipment and stored materials will be relocated off site, all street surfaces shall have a drivable and walkable temporary surface (as deemed acceptable to the Engineer), and all unnecessary barricades removed. The site will be left in a clean and orderly condition.

Project Stages Description:

As this project impacts a key commercial corridor that is an important link in the vehicular street network of the downtown, serves as a bus route for the AAATA, and experiences high volumes of pedestrian traffic, it is vital that its completion be coordinated, efficient, and timely to ensure that roadway operations are safe to travel for all users.

Time is of the essence in the performance of the work of this contract. The Contractor is expected to mobilize sufficient personnel and equipment, and work within authorized hours in order to complete the project by the final completion date. Costs for the Contractor to organize, coordinate, and schedule all of the work of the project, will not be paid for separately, but shall be included in the bid price of the Contract Item "General Conditions."

The construction of the project is described in this detailed specification, other detailed specifications, and on the plans.

Construction for the entire project must be substantially complete by **October 14, 2022**, unless approved otherwise by the DDA, and reach final completion by **November 4, 2022**. Substantial Completion includes the installation and functioning completion of:

1) Final sidewalk and roadway paving
2) Lighting and electrical work
3) Landscape installation
4) Site furnishings
5) Storm water system
6) Watermains, appurtenances, and services
7) Signalization improvements
8) Road and Bikeway Striping

9) Removal of detours and traffic controls and barricades

Liquidated Damages in the amount of $2,500 per calendar day will be charged for delays beyond the completion date for Substantial Completion and for Final Completion, charged separately until each stage has been successfully accomplished. This includes delays to pedestrian access as specified above.

If the Contractor shall fail to Substantially Complete the Work within the Contract Time, or extension of time granted by the DDA, then the Contractor will pay to the DDA the amount for liquidated damages as specified in the Agreement for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents. The liquidated damages charged shall be deducted from the Contractor's progress payments.

The Contractor shall 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 the City of Ann Arbor or Engineer.

A. To any preference, priority or allocation order duly issued by the City of Ann Arbor or DDA.

B. 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 City of Ann Arbor or DDA, acts of another Contractor in the performance of a Contract with the DDA, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

C. To any delays of Subcontractors occasioned by any of the causes specified in Items A and B of this section.

Should the Engineer approve a request for extension of time and revise any contract completion date(s), the Liquidated Damages will be based on the revised date(s) for which the time extensions specifically apply.

Liquidated Damages will be assessed until all required work is completed for each stage as defined herein. There is no maximum limit on the Liquidated Damages amounts that may be charged to the Contractor. There will be no seasonal suspension of Liquidated Damages except as otherwise provided for herein.

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
Item 140: Vertical Exploratory Excavation

WT:VCM 1 of 2 01/12/22

a. Description. The use of this special provision is to compensate the Contractor to locate underground infrastructure, such as culverts, sewers, utilities, and/or to expose the existing pavement section. Use must only be as directed and approved by the Engineer. This special provision is not to compensate the Contractor for the responsibilities in subsection 107.12 of the 2020 MDOT Standard Specifications for Construction.

This work consists of conducting a vertical exploratory investigation to expose an existing culvert, sewer, utility/utility service, or the existing pavement section in order to verify the location, condition, size, material, alignment and/or composition; allowing the Engineer to document the necessary information; and backfilling the excavation. It includes providing necessary lane, shoulder and/or sidewalk closures required to perform the work.

The intent of "Exploratory Excavation" is not to provide a means for the Contractor to locate each existing utility throughout the project, but for those that appear to be in conflict with the proposed work and their location is unclear or unknown. The Contractor is responsible for "using reasonable care to establish the precise location of the underground facilities in advance of construction" (Public Act 174 of 2013 - Miss Dig Law) as a part of the overall project contract.

b. Materials. Use Granular Material Class III in accordance with section 902 of the 2020 MDOT Standard Specifications for Construction for backfill. Use material removed during exploratory investigation for backfill only if approved by of the Engineer.

c. Construction. The owner of any sewer or utility to be exposed will not take the facilities out of service during the exploratory investigation. Contact utility owners in accordance with subsection 107.12 of the 2020 MDOT Standard Specifications for Construction.

Establish necessary lane, shoulder and/or sidewalk closures required to perform work.

Advance the exploratory excavation using vacuum excavation, hand digging, conventional machine excavation, or a combination thereof subject to approval of the Engineer. Allow the Engineer access to document the necessary information. If the technique used to advance the excavation causes any damage to the existing facilities, immediately contact the utility owner and cease all work until Engineer approves of an alternate method.

Take care to protect the exposed culvert, sewer or utility from damage during construction. Repair or replace culvert, sewer or utility, damaged during exploratory excavation, in accordance with the standard specifications and as approved by the Engineer.

Obtain the Engineer's approval before backfilling the excavation. Complete backfilling no later than 24 hours after approval. Backfill in accordance with subsection 204.03.C of the 2020 MDOT Standard Specifications for Construction. Dispose of excess material in accordance with the standard specifications.

The Contractor is responsible for all costs associated with the repair work and out of service time of all broken or damaged existing culverts, sewers or utilities resulting from any action by the Contractor. If the exploratory investigation results in damage to utilities, contact the owner of such utility to coordinate the repair.

d. Measurement and Payment. Measure and pay for the completed work, as described, at the contract unit price for the following pay item:

Pay Item	**Pay Unit**
Item 140: Exploratory Excavation, (0-10 ft. deep) (Trench Det 1, Modified)	Each

Exploratory Investigation, Vertical will be paid for per each excavation a maximum of 10-feet deep for a 4-foot maximum diameter hole, or as approved by the Engineer. Measure and pay for each 4-foot maximum diameter hole separately. One paid excavation may include multiple utility verifications if the utilities are close in proximity.

Exploratory Investigation, Vertical includes all cost for labor, equipment and materials necessary to complete the work, including all costs associated with repair or replacement resulting from the Contractor's activities.

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
ITEM: 210-01: **AUDIO-VISUAL RECORDING**

WT:VCM 1 of 4 01/17/19

a. Description. - This work shall include providing a recording of the physical, structural, and aesthetic conditions of the construction site and adjacent areas as provided herein.

The audio-visual recording shall be:

1. Of professional quality, providing a clear and accurate audio and visual record of existing conditions.
2. Prepared during the three (3) week period immediately prior to the preconstruction meeting.
3. Furnished to the Engineer a minimum of two (2) weeks prior to bringing any materials or equipment within the areas described in this special provision.
4. Furnished to the Engineer either at, or prior to, the preconstruction meeting.
5. Carried-out under the supervision of the Engineer.

The Contractor shall furnish two (2) copies of the completed recording to the Engineer at, or prior to, the preconstruction meeting. An index of the recording, which will enable any area of the project to be easily found on the recording, shall be included. The Contractor shall retain a third copy of the recording for his/her own use.

Any portion of the recording determined by the Engineer to be unacceptable for the documentation of existing conditions shall be recorded again, at the Contractor's sole expense, and submitted to the Engineer prior to mobilizing onto the site.

b. Production. - The audio-visual recording shall be completed in accordance with the following minimum requirements:

1. DVD Format / No Editing. - The audio-visual recording shall be performed using equipment that allows audio and visual information to be recorded simultaneously and in color. The recording shall be provided on compact discs in DVD format. The quality of the recording shall be equal to or better than the standard in the industry. The recording shall not be edited.

2. Perspective / Speed / Pan / Zoom. - To ensure proper perspective, the distance from the ground to the camera lens shall not be less than 12 feet and the recording must proceed in the general direction of travel at a speed not to exceed 48 feet per minute (0.55 miles per hour). Pan and zoom rates shall be controlled sufficiently so that playback will ensure quality of the object viewed.

3. Display. - The recording equipment shall have transparent time, date stamp and digital annotation capabilities. The final copies of the recording shall continuously and simultaneously display the time (hours:minutes:seconds) and the date (month/date/year) in the upper left-hand corner of the frame. Accurate project stationing shall be included in the lower half of the frame in standard station format (i.e., 1+00). Below the stationing periodic information is to be shown, including project name, name of area shown, direction of travel, viewing direction, etc.

   On streets or in areas where there is no project stationing, assumed stationing shall be used, starting with 0+00 and progressing from west to east or from north to south.

4. Audio Commentary / Visual Features. Locations relative to project limits and landmarks must be identified by both audio and video means at intervals no longer than 100 feet along the recording route. Additional audio commentary shall be provided as necessary during the recording to describe streets, buildings, landmarks, and other details, which will enhance the record of existing conditions.

5. Visibility / Ground Cover. - The recording shall be performed during a time of good visibility. The recording shall not be performed during periods of precipitation or when snow, leaves, or other natural debris obstruct the area being recorded.

c. Coverage. - The audio-visual recording coverage shall include the following:

1. General Criteria. - These general criteria shall apply to all recording and shall include all areas where construction activities will take place or where construction vehicles or equipment will be operated or parked and/or where materials will be stored or through which they will be transported. The recording shall extend an additional 50 feet outside of all areas. The recording shall include all significant, existing man-made and natural features such as driveways, sidewalks, utility covers, utility markers, utility poles, other utility features, traffic signal structures and features, public signs, private signs, fences, landscaping, trees, shrubs, other vegetation, and other similar or significant features.

2. Private Property. - Record all private property that may be utilized by the Contractor in conjunction with this project. These project areas must be disclosed by the Contractor prior to using them for the work of this project.

3. Road Construction Area. - The recording coverage shall:
   a. Extend to 50 feet outside of the right-of-way and easements area as shown on the plans.
   b. Extend 50 feet outside the construction limits on all streets, including side streets.

   Both sides of each street shall be recorded separately.

4. Detour Route / Maintenance of Traffic Areas. The entire detour route, if one is

provided for on the project plans, and maintenance of traffic areas shall be recorded as indicated in this special provision except as follows:

a. The recording must proceed in the general direction of travel at a speed not exceeding 176 feet per minute (2 miles per hour).
b. The coverage area shall include the street and not go beyond the curb except in areas where there is a fair possibility that the detoured traffic will drive over the curb, such as at intersections.
c. The recording shall focus in particular at sidewalk ramps and other features likely to have been damaged or likely to be damaged as a result of existing traffic, temporary detoured traffic and or construction traffic. In these areas, recording may need to proceed much more slowly.

Only the side of street with the detoured traffic must be recorded. However, the Contractor is advised that portions of the detour routes may operate in opposite directions at different times. In these cases, both sides of the street shall be recorded separately.

5. Private Property bordering the project limits or work areas. Record all areas bordering the project where work is scheduled to occur or where construction traffic could damage the private property. This is to include buildings, driveways, decks, landscaping, trees, lawns, and all other similar features.

6. Other Areas. - The Contractor shall record at his sole expense other areas where, in his/her opinion, the establishment of a record of existing conditions is warranted. The Contractor shall notify the Engineer in writing of such areas.

The Engineer may direct the recording of other minor areas not specified herein at the Contractor's sole expense.

d. Audio-Visual Recording Services. - The following companies are known to be capable of providing the recording services required by this special provision and shall be utilized unless the Contractor receives prior written approval from the Engineer to utilize another company of comparable or superior qualifications.

Construction Video Media
Midwest Company
Topo Video, Inc.
Video Media Corp.
Paradigm 2000, Inc.
Finishing Touch Photo and Video

e. Measurement and Payment. - The completed work shall be paid for at the contract unit price for the following contract item (pay item):

Contract Item (Pay Item)	Pay Unit
Item 210-01: Audio-Visual Recording	Lump Sum

Audio-visual Recording shall include all labor, equipment, and materials required to perform the recording and to provide the finished recording the Engineer.

Payment will be made for Audio-visual Recording following the review and acceptance of the recording by the Engineer. Within 21 days following the receipt of the recording, the Engineer will either accept it and authorize payment or require that any discrepancies in the recording be addressed prior to making payment.

DETAILED SPECIFICATION
FOR
ITEM #210-02 - Certified Payroll Compliance and Reporting

DESCRIPTION

This specification covers all administrative requirements, payroll reporting procedures to be followed by Contractors performing work on City-sponsored public improvements projects (including work paid for the DDA), and all other miscellaneous and incidental costs associated with complying with the applicable sections of the City of Ann Arbor Code of Ordinances with regard to payment of prevailing wages and its Prevailing Wage Compliance policy.

This specification is **not** intended to include the actual labor costs associated with the payment of prevailing wages as required. Those costs should be properly incorporated in all other items of work bid.

GENERAL

The Contractor is expected to comply with all applicable sections of Federal and State prevailing wage laws, duly promulgated regulations, the City of Ann Arbor Code of Ordinances, and its Prevailing Wage Compliance Policy as defined within the contract documents. The Contractor shall provide the required certified payrolls, city-required declarations, and reports requested elsewhere in the contract documents within the timeline(s) stipulated therein.

The Contractor shall also provide corrected copies of any submitted documents that are found to contain errors, omissions, inconsistencies, or other defects that render the report invalid. The corrected copies shall be provided when requested by the Supervising Professional.

The Contractor shall also attend any required meetings as needed to fully discuss and ensure compliance with the contract requirements regarding prevailing wage compliance. The Contractor shall require all employees engaged in on-site work to participate in, provide the requested information to the extent practicable, and cooperate in the interview process. The DDA will provide the needed language interpreters in order to perform wage rate interviews or other field investigations as needed.

Certified Payrolls may be submitted on DDA-provided forms or forms used by the Contractor, as long as the Contractor's forms contain all required payroll information. If the Contractor elects to provide their own forms, the forms shall be approved by the Supervising Professional prior to the beginning of on-site work.

UNBALANCED BIDDING

The DDA will review the submitted cost for this item of work prior to contract award. If the City determines, in its sole discretion, that the costs bid by the Contractor for complying with the contract requirements are not reasonable, accurately reported, or may contain discrepancies, the DDA reserves the right to request additional documentation that fully supports and justifies the price as bid. Should the submitted information not be determined to be reasonable or justify the costs, the DDA reserves the right to pursue award of the contract to the second low bidder without penalty or prejudice to any other remedies that it may have or may elect to exercise with respect to the original low-bidder.

The Contract Completion date will not be extended as a result of the DDA's investigation of the as-bid amount for this item of work, even if the anticipated contract award date must be adjusted. The only

exception will be if the Contractor adequately demonstrates that their costs were appropriate and justifiable. If so, the DDA will adjust the contract completion date by the number of calendar days commensurate with the length of the investigation, if the published Notice to Proceed date of the work cannot be met. The contract unit prices for all other items of work will not be adjusted regardless of an adjustment of the contract completion date being made.

MEASUREMENT AND PAYMENT

The completed work as measured for this item of work will be paid for at the Contract Unit Price for the following Contract (Pay) Item:

Contract Item (Pay Item)	Pay Unit
Item 210-2: Certified Payroll Compliance and Reporting	Lump Sum

The unit price for this item of work shall include all supervisory, accounting, administrative, and equipment costs needed to monitor and perform all work related to maintaining compliance with the tasks specified in this Detailed Specification, the City of Ann Arbor Code of Ordinances, its Prevailing Wage Compliance policy and the applicable Federal and State laws.

Payment for this work will be made with each progress payment, on a pro-rata basis, based on the percentage of construction completed. When all of the work of this contract has been completed, the measurement of this item shall be 1.0 times the Lump Sum bid amount. This amount will not be increased for any reason, including extensions of time, extra work, and/or adjustments to existing items of work.

DETAILED SPECIFICATION
FOR
ITEM #210-03- GENERAL CONDITIONS, MAX $100,000

DESCRIPTION

This item shall include all work described and required by the Plans and Specifications for which no item of work is listed in the Bid Form, including but not limited to:

- Scheduling and organization of all work, subcontractors, suppliers, testing, inspection, surveying, and staking
- Coordination of, and cooperation with, other contractors, agencies, departments, and utilities
- Protection of Utilities
- Placing, maintaining, and removing all soil erosion and sedimentation controls
- Maintaining drainage
- Maintaining drives, drive openings, sidewalks, pedestrian building access, mail deliveries, and solid waste/recycle pick-ups
- Storing all materials and equipment off lawn areas
- Coordination efforts to furnish various HMA mixtures as directed by the Engineer
- Furnishing and operating vacuum-type street cleaning equipment
- Furnishing and operating vacuum-type utility structure cleaning equipment
- Furnishing and operating both vibratory plate and pneumatic-type ("pogo-stick") compactors
- Furnishing and operating all equipment required to complete the proposed work activities as specified
- Noise and dust control
- Furnish and install temporary barricades and fencing at excavation areas to protect workers and people in the work area.
- Mobilization(s) and demobilization(s)
- Furnishing submittals and certifications for materials and supplies
- Disposing of excavated materials and debris
- All miscellaneous and incidental items such as overhead, insurance, and permits.
- Interim and final site cleanup, including, but not limited to removal and disposal of excess materials, removal of all dirt and deleterious materials, power washing pavements, removal of all packing materials and labels, etc.
- Scheduling and organization of all work, subcontractors, suppliers, testing, inspection, and construction surveying and staking;
- coordination of, and cooperation with, other contractors, agencies, departments, and utilities;
- Coordination with City forces to stockpile and load used castings on City vehicles;
- Protection and maintenance of all existing utilities, including support, protection, capping, repair, replacement, connection or re-connection of existing pipes, and utilities damaged by the Contractor's operations;
- Maintaining and removing al soil erosion and sedimentation controls (as specified herein or as shown on project plans) for which no pay item exists;
- Maintaining the site, and all areas within the Construction Influence Area, in a well-graded and drained state at all times during the course of the project. De-watering and drainage of all excavations as required to maintain a stable. Open hole;
- The continuous maintenance of the temporary road surface with the Construction Influence Area throughout the duration of the construction. This includes any needed grading to maintain the surface in a smooth condition free of potholes, ruts, bumps, or other objectionable conditions;

- Temporary sheeting, bracing, and shoring of excavations in accordance with the applicable MIOSHA Standards;
- Maintaining driveway openings. Sidewalks, bike paths, mail deliveries, and solid waste/recycle pick-ups. This includes the placement and maintenance of maintenance aggregate in driveway opening and across sidewalk ramps all as needed and as directed by the Engineer;
- Using quantities of dust palliative, maintenance aggregate, and hot patching mixture for use as temporary base, surfacing, and dust control at utility crossings, side roads, and driveways;
- Storing all materials and equipment off lawn areas;
- Temporary removal/re-location, storage, and re-installation/re-setting of existing street name, guide, and regulatory signs, mailboxes, newspaper tubes, etc. which conflict with the proposed construction;
- Site clean-up on a daily basis during the course of the project's construction.
- Coordination efforts to furnish the various required HMA mixtures as directed by the Engineer;
- Coordination efforts to furnish and operate various-size vehicles/equipment as directed by the engineer;
- Furnishing and operation vacuum-type street cleaning equipment a minimum of once per week, or more frequently, if directed by the engineer;
- Furnishing and operating vacuum-type utility structure cleaning equipment;
- Furnishing and operating both vibratory plate and pneumatic-type ("pogo-stick") compactors;
- Furnishing and operating a backhoe during all work activities;
- Furnishing and operating a jackhammer and air compressor during all work activities;
- Noise and dust control in accordance with the applicable City of Ann Arbor Ordinances;
- Mobilization(s) and demobilization(s) of all needed materials. Equipment, and personnel;
- Furnishing all required shop drawing, information submittals, and material certifications for all needed materials and supplies incorporated into the project;
- The proper off-site disposal of all excavated materials and debris;
- Removal of shrubs, brush, and trees less than 8" diameter (DBH) as shown on the plan sheets or as directed by the engineer;
- Trimming of trees and brush to accommodate intersection sight distance as shown on plans;
- Fencing to protect excavation over 1' in depth during non-work hours. The fencing must be a minimum of 36" high, be constructed of orange HDPE material, and reasonably secured to prevent unwarranted access;
- Submittal of Close-Out Documents at the conclusion of work and prior to final payment, including as-built documentation of field changes and manufacturer's product warrantee and maintenance instructions;
- All miscellaneous and incidental items such as overhead, insurance, and permits; and,
- Meeting all requirements relating to Debarment Certification, David Bacon Act, and Disadvantaged Business Enterprise, and providing the necessary documentation.

MEASUREMENT AND PAYMENT

This item of work will be paid for on a pro rata basis at the time of each progress payment. Measurement will be based on the ratio between work completed during the payment period and the total contract amount. When all of the work of this Contract has been completed, the measurement of this item shall be 1.0 Lump Sum.

The completed work as measured for this item of work will be paid for at the Contract Unit Price for the following Contract (Pay) Item:

PAY ITEM	PAY UNIT
Item 210-03 General Conditions, Max $100,000	Lump Sum

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the City Standard Specifications and as modified by this Detailed Specification.

DETAILED SPECIFICATION
FOR
ITEM #210-04 - PROJECT SUPERVISION, MAX $75,000

DESCRIPTION

The Contractor shall designate a full-time Project Supervisor to act as the Contractor's agent/representative, and to be responsible for scheduling and coordination of all subcontractors, suppliers, other governmental agencies, and all public and private utility companies. The Project Supervisor shall also be responsible for communicating the work schedule with all impacted businesses.

The Project Supervisor shall not be an active crew member of the Contractor, shall not be an active member or employee of any subcontractor's work force, and shall not perform general or specialized labor tasks.

Prior to the pre-construction meeting, the Contractor shall designate a proposed Project Supervisor by name and shall furnish the DDA with a current, thorough, detailed summary of the proposed Project Supervisor's work history, outlining all previous supervisory experience on projects of a similar size and nature. The detailed work history shall include personal and professional references (names and phone numbers) of persons (previous owners or agents) who can attest to the qualifications and work history of the proposed Project Supervisor. Proposed candidates for Project Supervisor shall have a demonstrated ability to work harmoniously with the City, DDA, the public, subcontractors, and all other parties typically involved with work of this nature. The Project Supervisor shall be able to demonstrate that they have filled a supervisory role on at least three projects of similar scope and size within the last 5 years. The Supervising Professional, Engineer, and DDA will have the authority to reject a proposed Project Supervisor whom he/she considers unqualified.

The Project Supervisor shall be available 24 hours-per-day to provide proper supervision, coordination and scheduling of the project for the duration of the Contract. The Contractor shall furnish the DDA with telephone numbers of the Project Supervisor in order to provide 24 hour-per-day access during business and non-business hours, including weekends and holidays.

The Project Supervisor shall be equipped by the Contractor with a mobile telephone to provide the DDA with 24 hour- per-day access to him/her during daily construction activities, during transit to and from the construction site, and during all non-business hours including weekends and holidays.

The Project Supervisor shall be equipped with assistants as necessary to provide project supervision as specified herein, and in accordance with the Contract.

DUTIES AND RESPONSIBILITIES

The Project Supervisor work harmoniously with the City, DDA, the public, subcontractors, and all other parties typically involved with work of this nature.

The Project Supervisor shall have a thorough, detailed understanding and working knowledge of all construction practices and methods specified elsewhere herein, as well as the handling, placement, testing and inspection of aggregates, aggregate products, landscape materials, electrical equipment, pre-cast unit pavers, HMA concrete, and Portland cement concrete materials.

The Project Supervisor shall be responsible for all of the work of all of the Contractor's, subcontractors' and

suppliers' work forces.
The Project Supervisor shall be responsible for proper and adequate maintenance (emissions, safety, and general operation) of all of the Contractor's, subcontractors' and suppliers' equipment and vehicles.

The Project Supervisor is responsible to assure that mail delivery, solid waste, and recycling pick-ups are uninterrupted by the construction.

The Project Supervisor is responsible to coordinate deliveries to the local businesses.

The Project Supervisor shall be responsible for the legal, proper and safe parking/storage of all of the Contractor's, subcontractors' and suppliers' equipment, work vehicles, and employee's vehicles.

The Project Supervisor shall schedule and coordinate the work of all parties involved in the project, including utility companies, testing agencies, governmental agencies, all City departments (such as Utilities and Transportation), the DDA and/or City inspectors, and the impacted businesses.

The Project Supervisor shall coordinate and schedule the work of any independent survey crews that may be retained by the DDA to witness and reset existing and new geographic/benchmark monuments. Failure to have existing monuments witnessed and reset may result in delays to the Contractor's work. Costs for such delays will be the Contractor's sole responsibility.

The Project Supervisor shall coordinate and schedule both testing inspectors and City and DDA inspectors in a timely manner, to assure proper and timely testing and inspection of the work.

The Project Supervisor shall review the Inspector's Daily Reports (IDRs) for accuracy and shall sign all IDRs on a daily basis as the representative of the Contractor. Items to be reviewed include descriptions, locations and measurements of quantities of performed work, workforce, equipment, and weather. The Project Supervisor shall also be responsible for its subcontractors' review and initialing of IDRs containing work items performed by each respective subcontractor.

The Project Supervisor shall submit to the Engineer, an updated, detailed schedule of the proposed work on a weekly basis, and an update of all proposed changes on a daily basis, all in accordance with the Detailed Specification for Project Schedule contained elsewhere herein.

The Project Supervisor shall schedule and chair a weekly progress meeting with the Engineer and all subcontractors to discuss the work. Upon the completion of each meeting, the Project Supervisor shall prepare and distribute to all present, a written summary of the meeting's minutes. Those in attendance shall review the minutes and, if necessary, comment on any deficiencies or errors prior to or at the next scheduled progress meeting.

The Project Supervisor shall engage with the affected businesses to communicate expectations for the work and to adjust the construction methods and/or times to best accommodate the local businesses.

ADDITIONAL PERFORMANCE REQUIREMENTS

If, in the sole opinion of the Supervising Professional, the Project Supervisor is not adequately performing the duties as outlined in this Detailed Specification, the following system of notices will be given to the contractor with the associated penalties:

First Notice – A warning will be issued in writing to the contractor detailing the deficiencies in the Project Supervision. The contractor must respond within 7 calendar days in

writing with a plan to correct the stated deficiencies. Failure to respond within 7 calendar days will result in the issuing of a second notice.

Second Notice – A second warning will be issued in writing to the contractor further detailing the deficiencies in the Project Supervision. The contractor must respond within 7 calendar days in writing with a plan to correct the stated deficiencies. Failure to respond within 7 calendar days will result in the issuing of a third notice. A deduction of 10% will be made from the original Project Supervision contract amount. At this time, the DDA reserves the right to meet with personnel with the necessary authority within the Contractor's organization to discuss the deficiencies in the Project Supervision.

Third Notice – An additional deduction of 25% will be made from the original Project Supervision contract amount, and the Project Supervisor shall be removed from the project and replaced immediately with another individual to be approved by the Supervising Professional.

Should, in the sole opinion of the Supervising Professional, the Project Supervisor fail to perform his/her duties and responsibilities as described herein to such a degree that the successful completion of the project is put in jeopardy, the above system of notices may be foregone, and the Contractor shall immediately replace the Project Supervisor upon receipt of written notice. Failure to provide adequate project supervision, as determined by the Engineer, shall be considered basis for the Supervising Professional to suspend work without extension of contract time or additional compensation.

MEASUREMENT AND PAYMENT

This item of work will be paid for on a pro rata basis at the time of each progress payment. Measurement will be based on the ratio between work completed during the payment period and the total contract amount. When all the work of this Contract has been completed, the measurement of this item shall be 1. 0 Lump Sum, minus any deductions incurred for inadequate performance as described herein. This amount will not be increased for any reason, including extensions of time, extras, and/or additional work.

The completed work as measured for this item of work will be paid for at the Contract Unit Price for the following Contract (Pay) Item:

PAY ITEM	PAY UNIT
Item 210-04 Project Supervision, Max $75,000	Lump Sum

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the City Standard Specifications and as modified by this Detailed Specification.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
MAINTAINING TRAFFIC
AND
CONSTRUCTION SEQUENCING

221-01 Minor Traffic Devices, Max $75,000
221-02 Traf Regulator Control, Max $35,000
221-03 Barricade, Type III, High Intensity, Double Sided, Lighted, Furn & Oper
221-04 Plastic Drum, Fluorescent, Furn & Oper
221-08 Sign, Portable, Changeable Message, Ntcip-Compliant, Furn & Oper
221-09 Sign Cover
221-10 Sign, Type B, Temp, Prismatic, Furn & Oper
221-11 Sign, Type B, Temp, Prismatic, Special, Furn & Oper
221-14 Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White, Temp
221-15 Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow, Temp

WT:BNB: CGT 1 of 8 05/05/22

General.- Traffic shall be maintained in accordance with Sections 104.11, 810, 811, 812, 919, and 920 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, the 2011 edition of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) as amended, applicable supplemental specifications, as directed by the Engineer, except as herein provided.

The following, and herein included Michigan Department of Transportation (MDOT) Maintaining Traffic Typicals and Work Zone Device Details apply to the project: 101-GEN-SPACING-CHARTS, 102-GEN-NOTES, 101-TR-NFW-2L, WZD-100-A, and WZD-125-E.

These maintaining traffic provisions are subject to change in the event of special community activities.

The Contractor shall furnish, erect, maintain and upon completion of the work remove all traffic control devices and warning lights within the project and around the perimeter of the project for the safety and protection of through and local traffic. This includes, but is not limited to; advance, regulatory, and warning signs; barricades and channeling devices at intersecting streets on which traffic is to be maintained; barricades at the ends of the project and at right-of-way lines of intersecting streets, temporary concrete barriers, temporary pedestrian paths and ramps, and moving traffic control devices for construction operations.

Materials.- The materials and equipment shall meet the requirements specified in the sections designated of the MDOT 2020 Standard Specifications for Construction, the MMUTCD, and all Special Provisions contained in these Contract Documents.

All signs shall be of sizes shown on the plans, unless otherwise directed by the Engineer. Install temporary signs that are to remain in the same place for 14 days or more on driven posts. Install all other temporary signs on portable supports. All signs shall have a minimum bottom height of 7.0 feet.

Channelizing devices required for all lane closures shall be plastic drums. 42 inch channelizing devices are permissible for other work with approval from the Engineer.

Cold Patching Material shall meet the requirements of the City of Ann Arbor Standard Specifications for Construction and as approved by the Engineer.

Permits.- Prior to the start of construction, the Contractor shall obtain a "Right-of-Way" Permit from City of Ann Arbor Planning and Development Services and a "Lane Closure" Permit from City of Ann Arbor Project Management Services Unit. The fees for these permits will be waived. The lane closure permit must be obtained at least 48 hours in advance of any proposed street or lane closing.

Work Restrictions.-
During non-working periods, any area with uncompleted work shall have plastic drums at specific locations and protective fencing, as directed by the Engineer, and at no additional cost to the project.

Do not impact traffic on major streets between the hours of 7:00 a.m. to 9:00 a.m. and from 3:30 p.m. to 6:00 p.m. unless otherwise approved by the Engineer or as specified on the Lane Closure Permit. Do not make any traffic control changes between 7:00 a.m and 9:00 a.m. and 3:30 p.m. to 6:00 p.m. in order to minimize interference with rush hour traffic. All traffic controls must be in place and ready for traffic each day by 7:00 a.m. and 3:30 p.m. The Engineer will permit temporary obstruction of traffic for loading and unloading of trucks if the Contractor provides traffic regulators (flag persons) in conformance with Part VI of the MMUTCD. During temporary obstructions, a minimum of two traffic regulators are required.

Maintain access to businesses, residences, and side street(s) within the CIA for the duration of the project. The Contractor shall make every effort to coordinate its operations to minimize interruptions that may impact this access. The Contractor shall notify the Engineer forty-eight (48) hours in advance of any work planned on or near business or residential driveways, and stage work so that it is part-width when it is necessary to work in these areas. The Engineer will not allow the Contractor to prohibit access to businesses and residences during any phase of construction, unless agreed upon with the property owner(s). The Engineer may require traffic regulator (flag) control at its discretion, and will direct the Contractor to provide it when necessary to maintain safe access to businesses, residences, and side street(s).

Construction Influence Area (CIA).- The CIA shall include the area from POB to POE within the Right-of-way of First Street, Ashley Street, Main Street, Fourth Avenue, Detroit Street, Fifth Avenue, Division Street, Miller Avenue and Catherine Street and all

other intersecting streets. The CIA shall also include the affected portions of the driveways along and contiguous with these roadways.

In addition, the CIA shall include the rights-of-way of all roadway segments used for detours and all locations that contain advance warning and/or regulatory signs, pavement markings, plastic drums, traffic delineators, and all other project related traffic maintenance items.

Police and Fire.- The Contractor shall notify local police, fire departments and emergency response units a minimum of three business days (72 hours) prior to the closure of any roads, or traffic shifts causing restricted movements of traffic or restricted access.

Work Performed by City of Ann Arbor Signs and Signals Unit.- No additional or extra compensation will be paid for any delays caused by City of Ann Arbor Signs and Signals.

Signal Modifications

Signal timing and phasing modifications are anticipated for construction at the Miller/Catherine Street and Fifth Avenue, North Main Street, Ashley Street, and First Street intersections. Modifications may also be required at adjacent intersections. Contractor shall coordinate work with the City ahead of changes in the traffic control.

Sign Reinstallation

As necessary during construction, the Contractor shall be responsible for logging the legend and location of any signs that:

1. Must be removed to facilitate the construction process;
2. Are to be permanently removed, or;
3. Are to be permanently relocated.

City of Ann Arbor Signs and Signals will remove and store the signs. After construction is complete, but before opening any roadway to traffic, Signs and Signals will reinstall all signs in their proper, permanent location. To coordinate sign removal and installation/reinstallation, the Contractor shall notify the Signs and Signals Unit at least five (5) working days (Monday-Friday) in advance of when the sign work will need to be completed. It is the responsibility of the Contractor to ensure that City of Ann Arbor Signs and Signals Unit is scheduled, kept apprised of the progress of construction, and notified a second time immediately (4 working hours) prior to the need to complete the sign work. The removal and installation/reinstallation of all signs shall be completed by the City of Ann Arbor Signs and Signals Unit.

Maintenance of Traffic, General.- Unless otherwise indicated on the drawings, residential side streets shall not be closed to through traffic except during construction operations of short duration and only with written approval of the Engineer.

The Contractor shall maintain at least one 10 ft lane for emergency/local traffic along each street during the course of the Project's construction. Contractor shall schedule work in order to maintain traffic flow and under no circumstances stop traffic for prolonged periods as determined by the Engineer. The Contractor shall suspend work within the CIA during peak traffic hours and/or when construction activities are unduly hampering or delaying traffic flow as determined by the Engineer.

Mailboxes requiring relocation due to construction shall be removed and reset immediately by the Contractor in a temporary location approved by the Engineer and meeting the requirements of the United States Postal Service. This work shall be included in the contract pay item "General Conditions, Max. $__(see pay item)___".

The Contractor shall coordinate his operations with all Utilities, Contractors and/or sub-Contractors performing work on this and other projects within, or adjacent to, the Construction Influence Area (CIA). The contractor shall avoid conflicts in maintaining traffic operations, signing, and orderly progress of other contract work.

Maintenance.- A minimum of one (1) driveway shall be maintained at all times to all residences and businesses. Walks, driveways, and entrances to houses shall not be blocked. Vehicular and pedestrian access shall be maintained to all properties.

Exploratory Excavations, utility crossings, and all other openings created by the Work over which vehicular traffic will be maintained shall receive a minimum cover of 3 inches of Cold-Patching material that is thoroughly compacted in place.

Signs and Pavement Markings.- When lane closures are in place, the Contractor shall completely cover all conflicting warning, regulatory and guide signs in accordance with Section 812.03.D.2 of the Standard Specifications for Construction, 2020 edition, and all applicable details therein.

Construction.- This provision does not detail all the project work. It is intended to indicate major project requirements and assist the Contractor in developing, for the review and approval of the Engineer, the Progress Schedule for the project.

The Contractor shall notify the Engineer a minimum of 5 working days prior to the implementation of any detours, road closures, ramp or lane closures, and major traffic shifts. The Contractor shall also notify City of Ann Arbor Signs and Signals regarding signal work as specified in the section entitled "Work Performed by City of Ann Arbor Signs and Signals Unit."

Contractor required to perform dewatering required to construct utilities. All storm sewer on mainline systems shall be reconnected prior to leaving the work site each day to

maintain drainage flows. If contractor cannot reconnect the piping system at the end of each day, then the Contractor shall provide, install, and maintain bypass pumping equipment, operations and related supervision at no additional cost.

Miller Avenue/Catherine Street Work & Detour Routes:
Miller Avenue and Catherine Street will be closed from south of First Street to north of Division Street. The eastbound detour will be First Street to Huron Street to Division Street. The westbound detour will be Fifth Avenue to Huron Street to First Street. One WB lane of State Street will be maintained for emergency vehicles. For a period of time, the intersection ofMain Street will be closed part width. The northbound Main Street detour will be Ann Street to Ashley Street to Kingsley Street. The southbound Main Street detour will be Kingsley Street to Ashley Street to Ann Street. For a period of time, the intersection of Fourth Avenue will be closed. The northbound Fourth Avenue detour will be Ann Street to Main Street to Kingsley Street. The southbound Fourth Avenue detour will be Kingsley Street to Fifth Avenue to Ann Street.

Pedestrians and Bicyclists
If the work involves closing a bicycle lane, BICYCLE (sym) W11-1 and SHARE THE ROAD W16-1P will be used to direct bicycle traffic into the vehicular lane.

For work affecting pedestrian crossings, use the included typical details to maintain pedestrian traffic.

Major Work Tasks - The following major work tasks are included in each stage of work:

1. Implement the traffic control as shown on the project plans, and as directed by the Engineer for this stage of the construction. Coordinate with the City of Ann Arbor Signs and Signals Unit as needed.

2. Install all needed soil erosion and sedimentation control measures. The Contractor shall install only those devices necessary to perform the work of this particular stage or to meet the appropriate Federal, State, or Local regulations.

3. Remove only road and sidewalk surfaces necessary to facilitate utility construction. Maintain HMA road surface for local travel and pedestrian sidewalk access.

4. Install water main, test, accept, connect to system and install leads. The Contractor shall provide reasonable access for vehicles and pedestrians to all residences at all times during construction.

5. Install water services. The Contractor is to maintain traffic at all times. The lead trench shall be backfilled and compacted to asphalt surface and maintained.

6. Install storm water sewer and manholes.

7. Place and compact aggregate base course as directed by the Engineer.

8. Fine grade aggregate base course.

9. Construction of concrete curbing and sidewalk.

10. Construction of bituminous base course. Place HMA material as shown on the plans and as directed by the Engineer. Provide the needed traffic control devices to perform this work and maintain traffic as approved by the Engineer.

11. Completion of restoration and all other construction activities, except as indicated in the following line item.

12. Coordinate with City and install all signing. Temporarily cover signs in conflict with construction maintenance of traffic.

13. Construction of the bituminous wearing course:

    a. Immediately prior to paving the wearing course, adjust structure covers.
    b. Place bituminous wearing course. Provide the needed traffic control devices to perform this work and maintain traffic as approved by the Engineer.
    c. Place any required pavement markings.

14. Install pavement markings.

15. Reasonable access to all side streets and driveways shall be maintained at all times. The Contractor is to coordinate construction in front of driveways, and the actual driveway construction (where applicable), with affected property owners as detailed elsewhere herein.

Bituminous Paving.- The Contractor shall perform the work of this Contract while maintaining traffic in accordance with Contract Documents as specified herein. No traffic shall be allowed on newly placed asphalt surfaces until rolling has been satisfactorily completed and the surface has cooled sufficiently to prevent damage from traffic. This is to be accomplished by traffic regulators (flag persons) and by relocating traffic control devices to prevent traffic from entering the work area until such time that traffic can be safely maintained without damaging the new construction. The Contractor shall provide traffic regulators in sufficient number to maintain traffic as described herein, and to keep traffic off sections being surfaced, and provide for safe travel at all times as directed by the Engineer.

Each pressure distributor, paver and roller shall be equipped with at least one approved flasher light which shall be mounted on the equipment so as to give a warning signal ahead and behind.

The paving of the top course shall be conducted under traffic by utilizing traffic regulators (flag persons), channelizing devices and signs in accordance with Part VI of the current edition of the Michigan Manual of Uniform Traffic Control devices (MMUTCD) as amended. The installation and removal of minor traffic control devices needed for the maintenance of traffic during the paving of final wearing course and the furnishing of traffic regulators shall be paid as "Minor Traffic Devices" and "Traffic Regulator Control" as appropriate.

Traffic Regulator Control,- Contractor will provide for Traffic Regulator Control as noted herein, and as directed by the Engineer. Flag Persons performing this work must have adequate professional experience and safety training to perform the work of directing and managing the movement of pedestrians, vehicles, and other sidewalk and street users in a manner that protects the safety of all those present on the job site. Contractor is to coordinate with the Engineer on the timing and need for Traffic Regulator Control operations.

Measurement and Payment.- The estimated quantities for maintaining traffic is based on the maintenance of traffic plans. Any additional signing, traffic control devices, pavement markings, or the like required to expedite the construction, beyond that which is specified, shall be at the Contractor's sole expense.

Payment for Traf Regulator Control will be made on an hourly basis for each flag person actively managing traffic. Minimum daily hours paid will be 4 for each flag person. The use of construction team staff, supervisors, and operators for incidental, short term Traf Regulator Control is not included in this pay item and will not be compensated for separately from the work being undertaken.

The completed work as measured shall be paid at the contract unit price for the following contract pay items:

Contract Pay Item	**Pay Unit**
Item 221-01: Minor Traffic Devices, Max $75,000	LSUM
Item 221-02: Traf Regulator Control, Max $35,000	LSUM
Item 221-03: Barricade, Type III, High Intensity, Double Sided, Lighted, Furn & Oper	Each
Item 221-04: Plastic Drum, Fluorescent, Furn & Oper	Each
Item 221-08: Sign, Portable, Changeable Message, NTCIP-Compliant, Furn & Oper	Each
Item 221-09: Sign Cover	Each
Item 221-10: Sign, Type B, Temp, Prismatic, Furn & Oper	Square Foot
Item 221-11: Sign, Type B, Temp, Prismatic, Special, Furn & Oper	Square Foot
Item 221-14 Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, White, Temp	Lft
Item 221-15 Pavt Mrkg, Wet Reflective, Type R, Tape, 4 inch, Yellow, Temp	Lft

The unit price for this item of work shall include all labor, material, and equipment costs required to perform the work specified herein and includes both furnishing and operating the devices.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 221-20: No Parking Sign

WT:VCM/CEW 1 of 2 11/20/19

a. Description. This work shall consist of installing, maintaining, and removing of "No Parking" signs and posts as outlined herein and as referenced on the plans. "No Parking" signs shall be installed in accordance with the section 812 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction Standard Specifications and the 2011 Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

b. Materials. The City will furnish "No Parking" signs to the Contractor at no cost. The Contractor shall furnish the sign support and mounting hardware materials, which materials shall be in accordance with those specified in section 919 of the MDOT 2020 Standard Specifications for Construction.

c. Construction. Prior to the commencement of any construction activity, the Contractor shall place "No Parking" signs as directed by the Engineer. The Contractor shall obtain a permit for "Temporary Permission of Reserve Parking Lane for Work Related Purposes" from the City's Project Management Services Unit. This permit shall be obtained a minimum of 5 business days prior to the posting of "No Parking" signs.

The Contractor shall securely bolt the signs to the sign supports as directed by the Engineer. The Contractor shall imbed the sign supports at least two feet into the ground, and there shall be a minimum of six feet and maximum of seven feet of clearance maintained between the bottom of the sign and the ground. The signs are to be placed at intervals no more than 75 feet, and as necessary to eliminate parking in the construction area.

The installation of "No Parking" signs shall be in accordance with the permit. "No Parking" signs shall be installed by the Contractor, as directed by the Engineer, at least 48 hours prior to the proposed start-of-work/enforcement date. "No Parking" signs shall be covered by the Contractor, thereby allowing on-street parking, until between 48 and 24 hours prior to the start of the work. "No Parking" signs shall be covered by the Contractor whenever there is no work being performed for a period of time longer than 72 hours. "No Parking" signs shall be returned to the City upon the completion of work. The cost of unreturned signs will be back charged to the Contractor.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price for the following pay item:

Pay Item	**Pay Unit**
Item 221-20: No Parking Sign	Each

The item **No Parking Sign** will be measured as the maximum number of signs installed on the project at any one time. The unit price includes the removal and return of "No Parking" signs to the City upon completion of the project. The Contractor shall be back charged for the replacement costs for damaged or unreturned signs.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 221-31: Pedestrian Path, Temp

WT:VCM/CEW 1 of 2 11/20/19

a. Description. This work consists of furnishing, installing, maintaining, and removing a temporary pedestrian path as identified in the proposal or on the plans. Temporary pedestrian paths, or segments thereof, will be repaired or replaced as directed by the Engineer.

b. Materials. Provide materials to construct a temporary pedestrian path in accordance with the contract, the *Public Right of Way Accessibility Guidelines (PROWAG)*, the *MMUTCD*, as directed by the Engineer, and the following requirements:

1. Ensure the materials used to construct the temporary pedestrian path yields a continuous hard surface that is firm, stable and skid resistant. Ensure the path does not warp, buckle or otherwise become uneven, and materials support the weight of pedestrians as well as motorized scooters and wheelchairs. Suitable materials to construct the path include asphalt materials, Oriented Strand Board (OSB), plywood, dimensional lumber, reclaimed, or other as approved by the Engineer. Compacted soils, aggregate and sand are prohibited.

2. If asphalt materials are not used to construct the path, provide an antiskid coating, or surface treatment as directed by the Engineer.

c. Construction. Construct the temporary pedestrian path in accordance with *PROWAG*, the *MMUTCD*, the contract, the direction of the Engineer, and the following:

1. The useable surface of the path must be a minimum of 48 inches wide, additional width may be provided to preclude the use of Temporary Pedestrian Passing Spaces (paid for separately). A minimum width of 60 inches is required if Temporary Pedestrian Passing Spaces are not provided as part of the temporary facility. The maximum cross slope for the path is 2 percent. The path, including transitions to the adjacent surface at both ends, must be free of vertical discontinuities greater than 1/4 inch. Eliminate any vertical discontinuities greater than 1/4 inch up to 1/2 inch or bevel with a slope not steeper than 1:2. If a vertical discontinuity greater than 1/2 inch or a running slope greater than 1:20 occurs on the project, a Temporary Pedestrian Ramp (paid for separately) is required.

A. Ensure an anti-skid surface treatment is applied to the surface of the path, if not constructed with asphalt materials, as directed by the Engineer.

B. If the surface of the path is constructed from OSB, plywood, or dimensional lumber securely connect all sections with appropriate fasteners to ensure a continuous, uniform, and flat surface.

C. The use of rubber mats is allowed. The materials under the mats must be graded smooth and uniform. Gaps between mats greater than ½ inch will not be allowed. Mats should not overlap one another creating lips or bumps.

2. Ensure all debris and construction materials is cleared from the path throughout its use. Ensure snow and ice is removed; the use of an approved de-icing agent may be required.

3. Repair or replace the path, or segments thereof, if it becomes uneven, unstable, or displaces due to weather events, construction activities, or other causes as directed by the Engineer.

4. Following the use of the temporary path, the Contractor must remove and dispose all materials used to construct the path, and restore the area as directed by the Engineer.

d. Measurement and Payment. The completed work, as described, will be measured, and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Item 221-31: Pedestrian Path, Temp	Foot

Pedestrian Path, Temp will be measured along the centerline of the path. **Pedestrian Path, Temp** includes all costs related to installation, maintenance, restoration, and removal of the path and disposal of all associated materials throughout the life of the contract.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 221-32: Pedestrian Ramp, Temp

WT:VCM/CEW 1 of 3 11/20/19

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing a temporary pedestrian ramp as identified in the proposal or on the plans. Use temporary pedestrian ramps to facilitate pedestrian travel on accessible facilities over curbs or other uneven terrain features with a vertical difference of 1/2 inch or greater. Damaged pedestrian ramps will be replaced as directed by the Engineer.

b. Materials. Provide materials to construct a temporary pedestrian ramp in accordance with the *Americans with Disabilities Act (ADA)*, the standard specifications, and the following:

1. Ensure the material used to construct the temporary pedestrian ramp is firm, stable, skid resistant, and forms a continuous hard surface. Ensure the surface does not warp, buckle or otherwise become uneven, and materials support the weight of pedestrians as well as motorized scooters and wheelchairs. Suitable materials to construct the surface of the ramp include asphalt materials, Oriented Strand Board (OSB) or plywood, dimensional lumber, certain reclaimed or other materials as approved by the Engineer. Compacted soils, aggregate and sand are prohibited.

2. Provide a handrail on both sides of the ramp if the ramp is not exposed to vehicle traffic and has a total rise greater than 6 inches, and a length greater than 72 inches. Ensure the handrail is between 1.25 and 1.5 inches wide and configured to be a "graspable" cross-section. See construction subsection 2.A for additional details. When the ramp is exposed to traffic, in lieu of handrails, use a protective edge 2.5 inches minimum height above the ramp surface or 1:10 flare on both sides of the ramp.

3. Ensure the surface of the ramp is free draining; in addition, provide features that allow drainage to move past the ramp installation (i.e. along the gutter pan underneath the ramp if the ramp is installed on a curb).

4. Provide materials to construct detectable edging along open sides of the ramp if required.

5. If asphalt materials are not used to construct the surface of the ramp, provide an antiskid coating or surface treatment approved by the Engineer.

c. Construction. Construct the temporary pedestrian ramp in accordance with the manufacturer's recommendations (if applicable), *ADA*, the plans, and the following:

1. Ensure the useable surface of the ramp is 48 inches wide and does not deflect due to pedestrian traffic. Ensure an anti-skid surface treatment is applied to the useable area of the ramp if it is not made from asphalt materials. The maximum cross

slope of the ramp is 2 percent. Ensure both ends of the ramp smoothly transitions to the adjacent surface, with 1/4 inch or less vertical difference.

Construct the ramp to maintain a longitudinal slope from 1:10 to 1:12 where possible. Otherwise, a longitudinal slope from 1:8 to 1:10 may be used for a maximum rise of 3 inches. Temporary pedestrian ramps with longitudinal slopes greater than 1:8 are prohibited.

A. Provide a handrail on both sides of the ramp if required as stated herein. Ensure the top of the handrail is between 34 and 38 inches above the surface of the ramp. Ensure a minimum width of 36 inches is maintained between the handrails, with a minimum clearance of 1.5 inches behind and 18 inches above.

Construct the handrail such that the bending stress applied by a bending moment created by a 250-pound force is less than the allowable stress for the materials and the construction of the handrail. Construct the handrail to withstand the shear stress induced by a 250-pound force. Ensure all fasteners, mounting devices and support structures are also able to withstand shear stress induced by a 250-pound force.

2. Construct a detectable edging anytime a handrail is required, and anytime the path changes direction. This includes a turn onto the ramp from the path. Detectable edging must begin a maximum of 2.5 inches above the ramp surface and extend at least 6 inches above the ramp surface.

3. Ensure a clear space (minimum 48 inches by 48 inches) is provided above and below the ramp.

4. Avoid locating ramps in areas of drainage collection, ponding or running water, which can produce slippery or unsafe conditions. If the ramp is located over a gutter pan or other drainage structure, provide features to facilitate water movement around or under the ramp as approved by the Engineer.

5. Ensure all debris and construction material is cleared from the surface of the ramp throughout its use. Ensure snow and ice is removed; the use of an approved de-icing agent may be required. Repair or replace the ramp if it becomes uneven, unstable, or displaces due to weather events, construction activities, or other causes as directed by the Engineer.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Item 221-32: Pedestrian Ramp, Temp	Each

Pedestrian Ramp, Temp includes all labor, equipment, and materials to furnish, install and remove a temporary pedestrian ramp at the locations shown on the plans, as well as all costs for maintaining, clearing debris, deicing, reconfiguring, and relocating the temporary pedestrian ramp throughout the life of the contract.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 221-33: Pedestrian Type II Barricade, Temp

WT:VCM/CEW 1 of 2 11/20/19

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing a temporary pedestrian Type II barricade section as identified in the proposal or on the plans. Use temporary pedestrian Type II barricades to close non-motorized facilities including sidewalks, bicycle paths, pedestrian paths, and shared use paths that are not part of the roadway. One pedestrian Type II barricade is defined as a barricade section at least 43 inches wide, including all supports, ballast, and hardware.

b. Materials. Provide a temporary pedestrian Type II barricade that meets the requirements of *National Cooperative Highway Research Program Report 350 (NCHRP 350)* or *Manual for Assessing Safety Hardware* (MASH), in addition to meeting the following requirements:

1. Provide barricade sections at least 43 inches wide, designed to interconnect to ensure a continuous *Americans with Disabilities Act (ADA)* compliant tactile barrier. Ensure the connection includes provisions to accommodate non-linear alignment as well as variations in elevation at the installation area.

2. Ensure the top surface of the barricade is designed to function as a hand-trailing edge, and has a height between 32 and 38 inches. Ensure the lower edge of the barricade is no more than 2 inches above the surface of the non-motorized facility. Ensure the top edge of the bottom rail of the barricade is a minimum of 8 inches above the surface of the non-motorized facility. The barricade may have a solid continuous face. Finally, all features on the front face of the barricade (the face in contact with pedestrians) must share a common vertical plane.

3. Equip both sides of the barricade with bands of alternating 6-inch wide orange and white vertical stripes of reflective sheeting. Two bands of sheeting 6 inches tall and a minimum of 36 inches long containing at least two orange and two white stripes each are required. One band placed near the top and one near the bottom if the barricade section has a solid face. If the barricade consists of two rails, affix one band of sheeting to each rail. Ensure the stripes of reflective sheeting are aligned vertically. Ensure this sheeting meets or exceeds the requirements of *ASTM D 4956* Type IV sheeting.

c. Construction. Construct the temporary pedestrian Type II barricade in accordance with the manufacturer's recommendations, Michigan Manual on Uniform Traffic Control Devices (MMUTCD), the plans, and the following requirements:

1. Install the barricade as shown on the plans and as directed by the Engineer. Interconnect all barricade sections using hinge components if necessary to ensure a continuous detectable edge for the entire installation. Ensure the barricade is

ballasted according to the manufacturer's recommendations to ensure stability during wind events and contact with pedestrians.

2. When the barricade is installed near motor vehicle traffic, ensure reflective sheeting is visible to motorists.

3. When pedestrian Type II barricades are used to close a non-motorized facility, ensure a sufficient number of barricade sections are used to block the entire width of the facility. The barricade may extend outside the edge of the non-motorized facility but must not be less than the full width of the facility.

4. If sections of multiple colored barriers are used (i.e. safety orange and white) install the sections such that the colors alternate to increase conspicuity.

5. Ensure pedestrian Type II barricades are not used to close a motor vehicle facility. Ensure these barricades are not used to guide pedestrian traffic on a motor vehicle facility in the presence of active traffic. This prohibition includes bicycle/shared use lanes or shoulders in the presence of active traffic.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Item 221-33: Pedestrian Type II Barricade, Temp	Each

Pedestrian Type II Barricade, Temp, includes all labor, equipment, and materials to furnish, install, maintain, relocate, and remove one barricade section that is at least 43 inches wide. Additional payment will not be made if wider sections are provided. This includes all rails, supports, ballast, hinge points, reflective sheeting, and miscellaneous hardware needed to install and maintain a barricade section.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 221-34: Pedestrian Type II Channelizer, Temp

a. Description. This work consists of furnishing, installing, maintaining, relocating, and removing temporary pedestrian channelizers as identified in the proposal or on the plans. Use temporary pedestrian channelizers to guide pedestrians along a temporary non-motorized facility, and to create separation of pedestrians from construction areas near existing facilities. Replace damaged temporary pedestrian Type II channelizers as directed by the Engineer.

b. Materials. Provide a temporary pedestrian channelizer that is crashworthy according to the *National Cooperative Highway Research Program Report 350* (NCHRP 350) or *Manual for Assessing Safety Hardware* (MASH), in addition to meeting the following requirements:

1. Ensure the channelizer is designed to interconnect to maintain continuous delineation along the entire installation. This includes provisions to accommodate non-linear alignment as well as variations in elevation.

2. Ensure the top surface of the channelizer is designed to function as a hand-trailing edge and have a height between 32 and 38 inches. Ensure this top surface is designed to have a 2-inch horizontal gap between the top edge and the support (if so equipped), to allow for continuous hand-trailing without obstructions. Ensure the lower edge of the channelizer is no more than 2 inches above the surface of the non-motorized facility. Ensure the top edge of the bottom rail of the channelizer is a minimum of 8 inches above the surface of the non-motorized facility or the channelizer may have a solid continuous face. Finally, all features on the front face of the channelizers (the face in contact with pedestrians) must share a common vertical plane.

3. Equip both sides of the channelizer with bands of alternating 6-inch wide orange and white vertical stripes of reflective sheeting. Two bands of sheeting 6 inches tall and a minimum of 36 inches long containing at least two orange and two white stripes each are required. One band placed near the top and one near the bottom if the channelizer section has a solid face. If the channelizer consists of two rails, affix one band of sheeting to each rail. Ensure the stripes of reflective sheeting are aligned vertically. Ensure this sheeting meets or exceeds the requirements of *ASTM D 4956* Type IV sheeting.

c. Construction. Deploy the temporary pedestrian Type II channelizer in accordance with the manufacturer's recommendations, the Michigan Manual on Uniform Traffic Control Devices (MMUTCD), the plans, and the following requirements:

1. Install the channelizer as shown on the plans and as directed by the Engineer. Interconnect all channelizers using hinge components if necessary to ensure a

continuous detectable edge for the entire installation. Ensure the channelizers are ballasted according to the manufacturer's recommendations to ensure stability during wind events and contact with pedestrians.

2. When the channelizers are installed near motor vehicle traffic, ensure reflective sheeting is visible to motorists providing appropriate delineation for the pedestrian path.

3. If sections of multiple colored barriers are used (i.e. safety orange and white), install the sections such that the colors alternate to increase conspicuity.

4. Ensure temporary pedestrian Type II channelizers are not used to guide pedestrian traffic on a motor vehicle facility in the presence of active traffic. This prohibition includes bicycle/shared use lanes or shoulders in the presence of active traffic. Ensure temporary pedestrian channelizers are not used to channelize motor vehicle traffic, or separate motor vehicle and pedestrian traffic.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Item 221-34: Pedestrian Type II Channelizer, Temp	Foot

Pedestrian Type II Channelizer, Temp includes all labor, equipment, and materials to furnish, install, maintain, relocate and remove rails or wall sections, supports, ballast, and hinge points at the locations shown on the plans. This includes all rails or wall sections, supports, ballast, hinge points, and miscellaneous hardware needed to construct the channelizer or system of channelizers.

DETAILED SPECIFICATION
FOR

ITEM #222-01 CURB AND GUTTER, ANY TYPE OR SIZE, REM
ITEM #222-02 SIDEWALK AND DRIVE, ANY TYPE OR THICKNESS, REM
ITEM #222-03 PAVEMENT, REM
ITEM #222-04 BRICK PAVERS, REM, SORT AND SALVAGE

DESCRIPTION

This work shall consist of removing asphalt and concrete road pavement, composite road pavement, concrete curb, gutter, curb and gutter, integral curb, sidewalk (concrete and brick), sidewalk ramps, drive openings and drives, brick pavers and trolley track foundations, as shown on the Plans, as detailed in the Specifications, and as directed by the Engineer, in accordance with Section 204 of the 2020 MDOT Standard Specifications for Construction, except as specified herein, and as directed by the Engineer.

CONSTRUCTION METHOD

Prior to the start of removals, the Engineer and Contractor together shall field measure all removals.

The Contractor shall perform full-depth saw cutting at removal limits, including those necessary to construct 2-foot wide MDOT Type M drive openings, and including those necessary to provide for the partial removal of existing drive approaches, sidewalks, and curbs as shown on the Plans, as directed by the Engineer, and as marked for removal. The Contractor shall cut steel reinforcement bars as directed by the Engineer at all areas of removal.

The Contractor shall remove all brick pavers where noted on the plans. Reasonable care should be taken to limit damage to brick pavers as they are removed. Brick pavers which are considered sound and dimensionally useful by the Engineer will be stockpiled off site and salvaged to the City of Ann Arbor and DDA. Coordinate with Engineer for relocation of brick pavers. Brick paver materials not salvaged will be removed and disposed of by the contractor at no additional expense to the project.

The Contractor shall excavate, cut, remove stumps, remove brush, remove trench drain and clean out, grade, and trim as needed and as directed.

The Contractor shall coordinate with the City Forester prior to the removal of any tree roots.

The Engineer may direct aggregate base materials to be either removed from or added to the job-site, to properly complete the work. Where the Engineer directs the addition of such materials, they shall be paid for as either the Item of Work: "AGGREGATE BASE COURSE, 21AA, MODIFIED" or "SAND SUBBASE COURSE, CLASS II – C.I.P." as directed by the Engineer. Where the Engineer directs such materials to be removed, they will not be paid for separately, but shall be included in "MACHINE GRADING, MODIFIED".

Where existing concrete curb & gutter is to be replaced on a street with a concrete (or brick) base, the Engineer may direct the Contractor to remove a 1-to-2-foot wide, full-depth section of pavement and pavement base from immediately in front of the curb & gutter. As part of this pavement/base removal, the Contractor shall perform additional (double) full-depth saw-cutting along the entire removal limits, and

shall take sufficient care so as not to damage and/or disturb any adjacent pavement, pavement base, and/or any other site feature, all as directed by the Engineer. The removals shall be to a sufficient width and depth to allow for the placement and removal of the curb & gutter formwork. Such removals will be paid for as "PAVEMENT, REM". After the removal of the formwork, the Contractor shall replace the concrete base to its original thickness and elevation(s), or as directed by the Engineer.

Excavated/removal areas shall be adequately protected with barricades or fencing at all times; paid for as part of "GENERAL CONDITIONS".

Removed or excavated materials which are not incorporated into the work shall become the property of the Contractor and shall be immediately removed and properly disposed of off-site. Removed or excavated materials may not be stockpiled overnight on, or adjacent to, the site.

MEASUREMENT AND PAYMENT

Sidewalk ramp, concrete walk, brick not designated for salvage by the Engineer, and subgrade, and related removals shall be measured and paid for as "Sidewalk and Drive, Any Type or Thickness, Rem".

Once the existing brick has been removed from the site ("Brick Pavers, Rem, Sort and Salvage"), the contractor will remove any remaining pavement found below the brick and base material, which shall not be paid for separately.

"Pavement, Rem" includes the removal and disposal of all paving to the full depth of the pavement, regardless of the depth or material encountered. Pavement materials are anticipated to include asphalt, concrete, brick, and possible composite pavement sections.

All removal of curb, gutter, and curb and gutter, regardless of type or size, shall be paid for as "Curb & Gutter, Any Type or Size, Rem".

All saw cutting required for removals shall be included in the appropriate item of work, and will not be paid for separately.

Concrete removal items shall be field measured and paid for at the Contract Unit Prices for their respective Contract (Pay) Items as follows:

PAY ITEM	PAY UNIT
Item 222-01: Curb & Gutter, Any Type or Size, Rem	Linear Foot
Item 222-02: Sidewalk and Drive, Any Type or Thickness, Rem	Square Yard
Item 222-03: Pavement, Rem	Square Yard
Item 222-04: Brick Pavers, Rem, Sort and Salvage	Square Yard

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 223-01: Dr Structure, Any Size or Depth, Rem
Item 223-02: Sewer, Any Size or Depth, Rem

WT:VCM/CEW 1 of 1 11/20/19

a. Description. - This work shall consist of furnishing all labor, tools, equipment, and material to remove, and dispose of off-site, sewers, and/or drainage structures, in accordance with Section 203 of the 2020 Michigan Department of Transportation Standard Specifications for Construction, and as specified herein.

b. Materials. -

Granular Material, Class II .....Section 902

c. Construction Methods. - Sewers, manholes, and drainage structures shall be removed, and disposed of off-site, in such a manner as not to damage any new work, or work or material which is to remain in-place. The hole or trench resulting from the removal of the manhole, sewer, or drainage structure shall be backfilled with Granular Material, Class II, in maximum lifts of 12 inches, and be compacted to 95% of its maximum unit weight, if located within the public rights-of-way, railroad rights-of-way, or within the influence paved surfaces or structures. Otherwise, backfill shall be Engineer approved native material, compacted to 90% of its maximum unit weight, in lifts of 12 inches or less, unless otherwise noted on the plans. Backfill material will not be paid for separately and is included in this pay item. The resulting hole left in a structure from a sewer to be removed shall be bulkheaded with bricks and mortar to provide a watertight seal and constructed such that the remaining flow in the manhole is not impeded.

As directed by the Engineer and within two days of their removal, the Contractor shall stockpile on-site, in a location that is mutually agreeable to the Engineer and Contractor, the existing structure covers. The City of Ann Arbor's forces will pick-up the structure covers at a time that is convenient to them and mutually agreeable to the Contractor. The Contractor shall provide the equipment and manpower to load the castings on the City's vehicle(s) so that they can be removed from the site by the City.

d. Measurement and Payment. - The completed work shall be paid for at the Contract Unit Price for the following Contract Items:

Contract Item (Pay Item)	**Pay Unit**
Item 223-01: Dr Structure, Any Size or Depth, Rem	Each
Item 223-02: Sewer, Any Size or Depth, Rem	Foot

Payment for the above items shall include all labor, material, and equipment to complete the work of removing sewers and drainage structures of any size or depth as detailed herein.

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
Item 227: Erosion Control, Inlet Filter

WT: VCM/CEW 1 of 1 11/20/19

a. Description. - This work consists of installing and maintaining inlet filters in accordance with Section 208 of the 2020 Michigan Department of Transportation Standard Specifications for Construction and as shown on the plans. Filters shall be installed in existing and proposed inlets in order to minimize the erosion of soil and the sedimentation of water courses. The related work includes the installation, maintenance and removal of the filter cloth, cleaning as required during the performance of the project work, removing, and disposing of accumulated sediment, and replacement of filters if required by the Engineer so as to provide a properly working inlet filter and a well-drained site.

b. Materials. - The inlet filters shall be in accordance with the REGULAR FLOW SILTSACK® manufactured by ACF Environmental (800) 448-3636; FLEXSTORM® Style FX manufactured by Advanced Drainage Systems, Inc. (800) 821-6710; CATCH-ALL® manufactured by Price & Company (866) 960-4300, or Engineer approved equal.

The Contractor shall submit product data sheets and a sample of the filter material for inlet filters for Engineer approval prior to ordering materials.

c. Methods of Construction. - The Contractor shall install, maintain, clean, and re-install and/or replace inlet filters in accordance with the manufacturer's specifications and as directed by the Engineer. The Contractor shall dispose of debris off-site.

d. Measurement and Payment. - The completed work of Soil Erosion Control Inlet Filter will be paid for at the contract unit price for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Item 227: Erosion Control, Inlet Filter	Each

"Erosion Control, Inlet Filter" will be measured by the unit installed and will be paid for at the contract unit price per each, for which price shall be payment in full for all labor, equipment, and materials needed to furnish, install, maintain, clean, and remove the inlet filter, and re-install and/or replace the inlet filter as needed.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 240: Non-Hazardous Contaminated Material Handling and Disposal (LM)

WT:VCM 1 of 3 01/12/22

a. Description. This work shall include all labor, equipment, and materials necessary to handle, transport, and dispose of non-hazardous contaminated material as described herein, as directed by the Engineer.

An area within the project limits has been identified as a potential site of soils which include non-hazardous contaminated material. Should the City determine that soils in the project site include non-hazardous contaminated material these materials shall not be used elsewhere or disposed of in a manner inconsistent with this special provision, or applicable federal, state, or local regulations unless otherwise directed by the Engineer.

b. Method of Construction. This work shall be performed in accordance with Sections 204 and 205 of the MDOT 2020 Standard Specifications for Construction, except as modified herein or as directed by the Engineer.

The Contractor shall have all manifests signed by its representative, the Engineer's representative, the authorized representative of the waste hauler and the waste disposal facility.

c. Excavation of Non-Hazardous Contaminated Material. Non-Hazardous contaminated material shall be excavated as directed by the Engineer.

d. Temporary Storage of Non-Hazardous Contaminated Material. Excavated non-hazardous contaminated material which is to be temporarily stockpiled shall be placed on plastic sheeting or tarps having a minimum thickness of 6 mils or in trucks, roll-off boxes, or other containers, such that no liquid may escape from the containment. At the end of each work day, the non-hazardous contaminated material shall be covered securely with plastic sheeting of 6 mils thickness or greater.

Excavated non-hazardous material shall be disposed of as soon as approval is received from the disposal site. In no case shall this material be stockpiled for longer than 30 days prior to disposal.

The Contractor is responsible for the necessary coordination such that his/her work activities are not adversely impacted by the stockpiling of contaminated soil. Stockpiled soil shall not impair sight distance or drainage.

e. Sampling and Analysis of Non-Hazardous Contaminated Material. City staff and the Engineer shall be notified of excavation in the identified area of concern. Should the city determine that the materials being excavated potentially contain non-

hazardous contaminated material, the Contractor shall excavate soils in the area, stock pile materials and/or leave the materials in-situ, as directed by the Engineer.

During the period following excavation and stockpiling, and prior to loading and removal of the soils, the Contractor will be directed to proceed with work in other areas of the project, should other areas be available for work within the project area and in compliance with the project schedule and Progress Clause. Any downtime related to the discovery, excavation, stockpiling, testing, loading and hauling of the non-hazardous contaminated material will not be paid for separately.

The City will be responsible for the costs associated with testing of the soils to determine the nature and extent of the contamination. Reports related to any testing will be provided to the Contractor.

The information contained in this report shall be utilized to secure a Type II disposal facility for disposal of the non-hazardous contaminated material. The contractor shall be responsible for preparing any forms or applications required by the disposal facility prior to their acceptance of the non-hazardous contaminated material for disposal.

The contractor shall also be responsible for familiarizing themselves with the information contained in the report and adjusting their operations accordingly to meet the safety and health requirements as set forth in Section 104.07.B of the MDOT 2020 Standard Specifications for Construction.

f. Disposal of Non-Hazardous Contaminated Material. Disposal of non-hazardous contaminated material shall be at a licensed Type II sanitary landfill. The Contractor shall submit at the preconstruction meeting the name of the Type II landfill to be used for disposal, the sampling and analysis requirements of the landfill, and verification that the use of the proposed landfill will meet the requirements of the County solid waste plan.

g. Measurement and Payment. The completed work as described will be paid for at the contract unit price for the following contract item (pay item):

PAY ITEM	**PAY UNIT**
Non-Hazardous Contaminated Material Handling and Disposal (LM)	Cubic Yard

Non-Hazardous Contaminated Material Handling and Disposal will be measured by volume in cubic yards, loose measure, as contained in the hauling unit. Under no circumstance will the Contractor be paid for quantities of this material that have not been approved for payment by the Engineer and as measured and tracked by the Engineer and the Contractor. The Contractor will not be paid "standard amounts" that have been determined by the disposal facility; only measured volumes as computed by the Engineer will be paid. Prior to payment, the Engineer shall be given receipts from the disposal facility for the number of cubic yards disposed of at that facility. Payment

shall include all costs for materials, labor and equipment needed for storage, loading, transportation, and disposal of the non-hazardous contaminated material. Disposal costs shall include all documentation required by the landfill. Payment for this item shall be the same, regardless of whether or not the Contractor temporarily stores the contaminated material; the Contractor shall not be paid for re-handling of the material due to construction staging, stockpiling, or other related activities.

Payment for excavation of non-hazardous contaminated materials shall be included with the related items of work.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 250-03: Aggregate Base Course, 21AA, Modified

WT:CEW 1 of 2 11/20/19

a. Description. - This work shall consist of constructing aggregate base courses, on either a prepared subgrade or subbase as indicated on the Plans or where directed by the Engineer. This work shall be performed in accordance with Sections 301, 302, and 307 of the 2020 MDOT Standard Specification for Construction except as specified herein.

b. Materials. - The material used for this work shall meet the requirements of Sections 301, 302, 307, and 902 of MDOT 2020 Standard Specification for Construction, except that the aggregate base shall be either 21AA limestone (permanent and temporary applications) with a maximum loss by washing of 8%.

c. Construction Method. - Aggregate base courses shall not be placed when there are indications that the mixture may become frozen before the maximum unit weight is obtained, and in no case shall they be placed on a frozen subbase or subgrade.

The subbase and subgrade shall be shaped to the crown and grade specified on the plans and maintained in a smooth condition. The top of the subbase shall be placed to within ½ inch below and ½ inch above plan grade. The top of the aggregate base shall be placed to within ½ inch below and ¼ inch above plan grade. Variations within this tolerance shall be gradual. If in the opinion of the Engineer, the Contractor's equipment is causing or will cause any ruts in or damage to the subbase or subgrade, the equipment shall not be permitted on the subbase or subgrade.

Should the subgrade, subbase or aggregate base become damaged due to the Contractor's equipment or by local traffic, the subgrade, subbase, or aggregate base course shall be restored to the condition required by the Specifications without additional compensation to the Contractor.

No pavement course, concrete curb and gutter, or concrete driveway opening shall be placed until the subbase has been compacted to not less than 95 percent, and aggregate base course to not less than 98 percent of their respective maximum dry densities and until a "Permit to Place" has been issued by the Engineer.

Base course aggregate shall be handled and/or stockpiled on-site in a manner that minimizes segregation. Base course aggregate shall be deposited from trucks or through a spreader in a manner that will minimize segregation of material and that is approved by the Engineer. The re-handling of base course aggregate by the Contractor will not be considered sufficient cause to allow the material to become segregated. The Contractor may be required to wet the materials prior to and/or during placement to minimize segregation and to aid in compaction of the material should it be necessary.

All structures, including manholes, valve boxes, inlet structures and curbs shall be protected from damage and contamination by debris and construction materials. Structures

shall be maintained clean of construction debris and properly covered at all times during the construction.

The Contractor may be charged for the cleaning by others of accumulated construction debris in the utility structures, and damages resulting from the uncleaned structures.

d. Measurement and Payment. - The completed work as measured will be paid for at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Item 250-03: Aggregate Base Course, 21AA, Modified	Cubic Yard

"Aggregate Base Course, 21AA, Modified" will be measured in cubic yards based on plan installation. The item of work will be paid for at the contract unit price, which shall be payment in full for all labor, material and equipment needed to accomplish this work.

The provisions of Section 306.04 regarding excess moisture content, moisture corrections, and pay weights shall apply to this item of work.

DETAILED SPECIFICATION
FOR
ITEM #250-04 – MACHINE GRADING, MODIFIED

DESCRIPTION

This work shall consist of constructing earth grades by excavating, cutting, filling, trimming, and grading; general restoration, removal and salvage of miscellaneous site amenities, and maintaining the work in a finished condition until such time that it is accepted by the Engineer. This work shall be done as shown on the Plans, as detailed in the Specifications, and as directed by the Engineer, and in accordance with Section 205 of the 2020 MDOT Standard Specification for Construction, except as specified herein.

The drawings indicate work to be completed outside of the right of way on property owned by private parties. This work is an extension of the right of way work and will be paid for based on the applicable unit prices. Machine Grading, Modified will be extended to the limits of grading as shown on the plans where work includes property adjacent to the right of way.

MATERIALS

All materials shall meet the requirements as specified in Section 205 of the MDOT 2020 Standard Specifications for Construction, except as specified herein.

CONSTRUCTION METHOD

Machine Grading:
The Contractor shall construct earth grades as required to develop the typical and/or detailed cross-section(s) as shown on the Plans, as detailed in the Specifications, and as directed by the Engineer. This shall include, but not be limited to, the excavation of soil, rocks of any size, stumps, logs, and bricks; the removal and proper disposal off-site of surplus excavated material; the scarifying, plowing, disking, moving and shaping of earth; the trimming, grading, compaction and proof-rolling of the prepared subgrade; the importing, furnishing, placement and compaction of embankment and/or fill materials; the full depth saw-cutting of pavement at the removal limits; the grading of side slopes; general restoration in accordance with the detailed Specifications elsewhere herein and the general items of the work as specified herein. Road subbase and base materials shall be paid for separately. The subgrade shall be constructed in accordance with Section 205.03.G (Earth Excavation) and Section 205.03 H (Roadway Embankment) of the MDOT 2020 SSC, as shown on the plans, and as specified herein.

The Contractor shall remove, add to, re-shape, re-grade, and re-compact the existing roadbed materials, and shall construct the roadway and sidewalk area to the cross-section(s) as indicated on the Plans, as detailed in the Specifications, and as directed by the Engineer.

The existing site includes irrigation system that is to be abandoned. As part of Machine Grading the Contractor is to ensure that the system is no longer active with water pressure, then remove any remaining irrigation equipment uncovered during the work, and properly dispose of all materials off site.

As part of Machine Grading the Contractor shall remove other surface features, including, but not limited to, signs, concrete filled steel bollards, and bicycle parking hoops located within the grading limits and not otherwise identified, as directed by the Engineer. Signs shall be salvaged and provided to City as directed by the Engineer.

The Contractor shall move excavated and/or imported materials longitudinally and/or transversely where

necessary, and as directed by Engineer.

The Contractor shall keep the project site well graded and drained at all times. Foundation, roadway or sidewalk embankment or subgrade that becomes damaged by rain shall be undercut and backfilled, or otherwise remedied, by the Contractor, at his/her sole expense, as directed by the Engineer.

The Contractor shall not use rubber-tired equipment on the subgrade, when its use causes or may cause, in the opinion of the Engineer, damage to the subgrade. The Contractor shall conduct its operation(s), and provide all necessary equipment, to ensure the satisfactory completion of the work without damaging the subgrade. This includes the transporting, stockpiling, re-handling, and movement of materials over additional distances, in lieu of driving on an unprotected, or partially unprotected, subgrade.

The Contractor is solely responsible for the maintenance and protection of the subgrade. Further, any damage to the subgrade which, in the opinion of the Engineer, is caused as a result of the Contractor's operation(s), or its subcontractors' or suppliers' operation(s), shall be repaired by the Contractor at the Contractor's expense. This includes any additional earthwork and/or maintenance materials as directed by the Engineer, for the purposes of the Contractor's maintenance and protection of the subgrade. The Contractor shall not be entitled to any additional compensation for the implementation of these procedures.

The Contractor shall perform all rough and/or finish grading and compaction in the right of way to the grades shown on the Plans, as detailed in the Specifications, and as directed by the Engineer. The finished subgrade shall be placed to within 1 inch below and ¾ inch above plan grade. Variations within this tolerance shall be gradual.

The subgrade shall be compacted to a minimum of 95% of its maximum unit weight, as measured by the AASHTO T-180 method, to a depth of 10 inches. The Contractor shall proof roll all graded and compacted surfaces in the presence of the Engineer as detailed in the Specifications. The Engineer will monitor the proof rolling operation to locate deleterious and/or uncompacted materials, and will direct undercuts as necessary.

The Contractor shall take any and all steps necessary to avoid interruption in the mail delivery, and solid waste, recycling, and compostable pick-up within the project limits. This shall include the temporary relocation of mailboxes, where required by the Engineer, as well as moving of all solid waste/recycling/compost containers to the nearest cross street.

The Contractor shall coordinate with the City Forester prior to the removal of any tree roots 2 inches or larger in size.

Machine Grading includes reviewing the condition of existing sand base in sidewalk areas with the Engineer, and grading and compacting the subgrade and sand to meet grade requirements for the sidewalk zone. If the existing sand base must be removed due to poor condition, the removal will be paid for as part of Machine Grading, Modified, and the replacement sand base paid as Sand Subbase Course, Class II - C.I.P.

The Contractor shall restore all disturbed areas to better than or equal to their original condition. This includes the placement and compaction of 5 inches of topsoil, followed by the placement of grass seed, followed by the placement of 0.5 inches of topsoil at all turf restoration locations, and at locations where concrete items are removed and turf is to be established. All restoration work and materials shall be in accordance with the City Standard Specifications. Restoration work must be performed within one week of the placement of the wearing course for each street. Such restoration will be considered part of Machine Grading, Modified.

Pavement Sawcutting
The work shall include the full-depth saw-cutting of pavement at the construction limits, and elsewhere as required, if not paid for as part of another item of work. Pavement sawcutting will not be paid for separately.

Removal of Trees and Vegetation
The Contractor shall remove and properly dispose of off-site all vegetation; brush; roots; and trees and stumps less than 6 inch in diameter, as shown on the plans, and as directed by the Engineer as required to complete the project.

Removing and Salvaging Topsoil
The removal, salvaging and stockpiling of topsoil, and all related work, shall be performed in accordance with Section 205.03.A.1 (Removing and Salvaging Topsoil) of the MDOT 2020 SSC.

Protection of Utilities
Utility lines may become exposed at, above, or below, the foundation or subgrade elevation during machine grading or subgrade undercutting operations. If this occurs, the Contractor shall excavate around, above and/or below the utility lines, as directed, to complete the machine grading or subgrade undercutting operations. Payment, at contract unit prices, for "Machine Grading, Modified ___" or "Subgrade Undercutting, Type __," whichever applies, will be considered as payment in full for this work.

Protection of Trees to Remain
Trees to remain shall be protected from damage due to mechanical equipment, tree root compaction and cutting, and removal of bark and branches.

MEASUREMENT AND PAYMENT

Measurement for payment for the item "Machine Grading Modified" shall be the computed by road station (as further described below). Embankment, fill, compaction, proof rolling, subgrade protection/maintenance, and drainage maintenance will not be paid for separately, and are included in this item of work.

The completed work as measured for this item of work will be paid for at the Contract Unit Price for the following Contract (Pay) Item:

PAY ITEM	PAY UNIT
Machine Grading, Modified	Station

"Station" in the **Machine Grading, Modified** pay unit is defined as a one hundred foot length of street as stationed on the plans; each "Station" pay unit is measure longitudinally for every 100 feet or fraction thereof, and is measure from the center line of the right of way to the edge of the right of way (that being one half of the right of way).

The pay item "Machine Grading, Modified" shall include all the work specified herein, including, but not limited to, the removal and offsite disposal of any surplus or unsuitable materials and the furnishing from off-site any additional Engineer approved fill materials necessary to construct the embankment and subgrade to the contours and cross-sections shown on the plans.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 250-05: Subgrade Undercutting, Type II

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a. Description. This work shall include the removal of unsuitable subgrade material(s) which may be susceptible to frost heaving or differential frost action in the areas and limits identified by the Engineer and backfilling to replace these material(s) and remedy unstable soil conditions. This work shall be done in accordance with section 205 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, as directed by the Engineer, and as modified herein.

b. Materials. Provide materials in accordance with Granular Material Class II and 21AA dense-graded aggregate as specified in section 902 of the MDOT 2020 Standard Specifications for Construction.

c. Construction. Construction methods shall be as described in subsection 205.03.E of the Standard Specifications for Construction, and as directed by the Engineer.

After the pavement has been removed, and/or after rough/finish grading, and/or at the time of proof rolling, the Engineer may inspect the grade to determine the need for, and the limits of, undercuts. After undercut areas are excavated to the depths as directed by the Engineer, the areas shall be trimmed, shaped, evenly graded and re-compacted to not less than 95% of the soils maximum unit weight as determined by the AASHTO T-180 test. The Contractor shall properly dispose of all excess materials.

Backfill areas of Subgrade Undercutting, Type II with Granular Material Class II or such other such material as directed by the Engineer.

d. Measurement and Payment. The completed work, as described, will be measured, and paid for at the contract unit price for the following pay item:

Pay Item	**Pay Unit**
Item 250-05: Subgrade Undercutting, Type II	Cubic Yard

Basis of payment shall be as described in subsection 205.04 of the Standard Specifications for Construction except as herein modified.

DETAILED SPECIFICATION
FOR
ITEM #250-06 - SAND SUBBASE COURSE, CLASS II

DESCRIPTION

This work shall consist of constructing an aggregate subbase on an existing aggregate surface, or on a prepared subgrade in accordance with Sections 301, 302 and 307 of the 2020 MDOT Standard Specifications for Construction, except as specified herein.

MATERIAL

The materials used for this work shall be MDOT Class II granular material meeting the requirements of the City Standard Specifications.

CONSTRUCTION METHOD

Sand or aggregate courses shall not be placed if, in the opinion of the Engineer, there are any indications that they may become frozen before their specified densities are obtained.

Sand or aggregate courses shall not be placed on a frozen base, subbase or subgrade.

The Contractor shall not use rubber-tired equipment on the grade, when its use causes, or may cause, in the opinion of the Engineer, damage to the grade. The Contractor shall conduct his/her operation(s), and provide all necessary equipment, to ensure the satisfactory completion of the work without damaging the grade. This includes the transporting, stockpiling, re-handling, and movement of materials over additional distances, in lieu of driving on an unprotected, or partially unprotected, grade.

The Contractor is solely responsible for the maintenance and protection of the grade. Further, any damage to the grade which, in the opinion of the Engineer, is caused as a result of the Contractor's operation(s), or his/her subcontractors' or suppliers' operation(s), shall be repaired by the Contractor at the Contractor's expense. This includes any additional earthwork and/or maintenance materials as directed by the Engineer, for the purposes of the Contractor's maintenance and protection of the grade.

The Contractor shall shape the base, subbase and subgrade to the elevations, crowns, and grades as specified on the Plans and as directed by the Engineer. This may include re-grading the subbase to provide different crown grades than those existing prior to the construction.

The Contractor shall remove, add to, re-shape, re-grade, and re-compact the existing roadbed materials (including the base bed under sidewalks), and shall construct the roadway and sidewalks to the cross-section(s) as indicated on the Plans, as detailed in the Specifications, and as directed by the Engineer. The Contractor shall use blade graders, maintainers, vibratory rollers, and/or other equipment as necessary, and as directed by the Engineer, for this work. Use of each specific piece of equipment is subject to the approval of the Engineer.

The Contractor shall maintain the base, subbase, and subgrade in a smooth, well drained condition at all times.

Sand and aggregate courses shall be placed in uniform layers such that when compacted, they have the thicknesses shown on the Plans, or as directed by the Engineer. The loose measure of any layer shall not be

more than 9-inches nor less than 4-inches.

Sand subbase and aggregate base courses shall be compacted to not less than 98% of their respective maximum unit weights, as determined by the AASHTO T-180 test.

All granular materials shall be deposited from trucks or through a spreader in a manner that will minimize segregation of material.

Manholes, valve boxes, inlet structures and curbs shall be protected from damage. Manholes & inlet structures shall be continuously cleaned of construction debris and properly covered at all times during the construction. Upon completion of each day's work, manholes, water valve boxes, inlets and catch basins shall be thoroughly cleaned of all extraneous material.

MEASUREMENT AND PAYMENT

Where granular materials are used as base, as subbase, or as fill for excavations in Machine Grading areas, item of work "Sand Subbase Course CL II " shall be measured and paid accordingly.

The completed work as measured for these items of work will be paid for at the Contract Unit Prices for the following Contract (Pay) Items:

PAY ITEM	PAY UNIT
Item 250-06: Sand Subbase Course Class II	Cubic Yard

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

DETAILED SPECIFICATION
FOR

ITEM #251-01 CURB AND GUTTER, CONC, 24 INCH, ANY TYPE
ITEM # 251-02 INTEGRAL CURB
ITEM #251-03 STRAIGHT CURB
ITEM # 251-04 BIKE CURB
ITEM #251-05 CURBED ISLAND
ITEM #251-06 PLANTER CURB
ITEM #252-01 CONCRETE PAVEMENT, 6 INCH
ITEM #251-02 CONCRETE PAVEMENT, 8 INCH
ITEM #252-03 DRIVEWAY OPENING, CONC, 8 INCH, TYPE M
ITEM #252-04 RAMP
ITEM #252-06 SIDEWALK RAMP, CONCRETE, 8 INCH

DESCRIPTION

This work shall consist of constructing concrete items including concrete curb, gutter, curb and gutter, sidewalks, road concrete pavement base and crosswalks, steel reinforcement, mechanical anchors and hook bolts, all of any type and/or dimensions, all of either regular, fibermesh reinforced, and/or high-early concrete, in accordance with Sections 601, 602, 603, 802, and 803 of the 2020 MDOT Standard Specifications for Construction, except as specified herein, as shown on the Plans, as shown in this Detailed Specification, and as directed by the Engineer.

The Contractor is responsible to construct all sidewalks, sidewalk ramps, drives, curbs, and all other concrete items within ADAAG compliance. All sidewalks and curb ramps must be constructed in accordance with MDOT Standard Detail R-28-J (version in place at time of the bid letting).

Please note that the project includes concrete paving collars around utility structures in brick paving areas as noted in the Detailed Specification for Brick Pavers.

MATERIALS

Refer to the Detailed Specification for Concrete Durability for additional requirements.

Concrete mixtures shall be as follows (or as directed by the Engineer), and concrete materials shall meet the requirements specified in the referenced sections of the MDOT Standard Specifications:

Concrete Item	Concrete Mixture	MDOT Section
Curb, Any Type	P-NC, P1, 6-sack	601
Pavement, Any Type	Fibermesh Reinforced P1, 6 sack	601
	Fibermesh Reinforced P-NC	
	Fibermesh Reinforced P-NC	

Fibermesh reinforced concrete shall have a polypropylene fibrillated fibers added at a rate of 1.5 pounds per cubic yard. The fibers shall meet the requirements of ASTM C116-89 "Specification for Fiber Reinforced Concrete and Shotcrete" Classification 4.1.3 Type III. The concrete shall be thoroughly mixed for a minimum of 5 minutes after the addition of the fibers to assure uniform distribution throughout the concrete.

CONSTRUCTION METHODS

General

Concrete items, including sidewalk, road pavement, non-integral curb/gutter, drives, and structure adjustments shall be completed prior to the placement of bituminous asphalt pavement and precast unit pavers.

All subgrade work shall be completed prior to placing concrete items, unless directed or approved by the Engineer.

The subbase shall be trimmed to final elevation before placing curb. Curb shall not be placed on a pedestal or mound.

The Contractor is responsible for any damage to concrete items, including but not limited to vandalism; vehicular, pedestrian and/or miscellaneous structural damage; surface texture damage; and rain damage. Such damaged work will be removed and replaced at no additional cost.

The Contractor shall maintain on-site at all times, a sufficient quantity of adequate materials to protect concrete items. The Engineer may suspend or defer concrete placement if rain protection is not available. The Contractor shall not be entitled to any additional compensation due to work suspension or deferral resulting from a lack of adequate rain protection.

The subbase and adjacent concrete shall be sufficiently wet-down with water prior to placing concrete, to prevent water loss from the new concrete, and to form a better bond between old and new concrete. If a cold-joint becomes necessary, (the) existing concrete surface(s) shall be cleaned with compressed air to expose the aggregate in the concrete.

Where concrete items are placed adjacent to existing pavement that is within areas scheduled for subsequent pavement removal and/or milling, the adjacent pavement area shall, within 48-hours of the removal of concrete formwork, be backfilled with MDOT 21AA, Modified aggregate compacted in place to 95% up to the elevation of the bottom of the adjacent pavement and paid for as "Aggregate Base Course - 21AA - C.I.P."

Prior to compacting backfill in front of curb and gutter, the back of curb shall be backfilled with approved material and compacted by mechanical means to 95%.

Concrete surfaces are to have the finishes noted on the plans. Where no finish is noted, a Light Broom finish perpendicular to the street (for sidewalks), and a Medium Broom finish perpendicular to the street for the Concrete Crosswalks.

Reinforcement

All steel reinforcement, mechanical anchors and hook bolts, dowels, and all of any type and/or dimensions shall be provided and installed per the Engineer and plans. All costs associated with reinforcement, anchors, and hook bolts is considered incidental to the concrete work.

Pavements shall utilize fiber mesh reinforcing, made of 100 percent virgin homopolymer polypropylene

graded multifilament fiber. Blend with concreate mix at the rate specified by the manufacturer for the depth of pavements and concrete mix specified.

Control Joints

Control joints shall be as located and detailed on the plans. The method of forming joints and spacing shall be approved by the Engineer prior to construction. Joints shall be evenly spaced, forming the pattern indicated on plans, and shall be perpendicular to the building face or curb line unless otherwise directed by the engineer.

Expansion Joints

¾-inch wide expansion joints shall be placed through concrete pavements in line with the extension of all property lines or at the longitudinal ends of each block as directed by Engineer; at all expansion joints in the abutting curb, gutter, and combination curb and gutter, and as directed by the Engineer. Transverse expansion joints shall be placed through the sidewalks at uniform intervals of not more than 300- feet, or at a minimum, the center of each block.

½-inch wide expansion joints shall be placed between the sidewalk and road pavement and abutting curb or gutter, at the juncture of two sidewalks, between the sidewalk and buildings and other rigid structures, and as directed by the Engineer.

Expansion Joints in Curb and Gutter

¾-inch wide expansion joints shall be placed at all street returns, at all expansion joints in an abutting pavement, at each side of all driveways (at radius points), elsewhere at 300-foot maximum intervals, and as directed by the Engineer.

Expansion joint material shall extend to the full depth of the joint. After installation, the top shall not be above the concrete nor be more than ½-inch below it. No reinforcing steel shall extend through expansion joints.

Plane of Weakness Joints in Curb and Gutter

Intermediate plane of weakness joints shall be placed to divide the structure into uniform sections, normally 10-feet in length, with a minimum being 8-feet in length, and shall be placed opposite all plane of weakness joints in the abutting concrete base course.

Plane of weakness joints shall be formed by narrow divider plates, which shall extend 3-inches into the exposed surfaces of the curb or curb and gutter. Plates shall be notched, if necessary, to permit the steel reinforcement to be continuous through the joint.

Project Mock-Up

Prior to concrete work commencing, the contractor will coordinate a review meeting with the Engineer and consultant team to discuss jointing details and layout, finishes, and logistics of the pour. Further, the Contractor will coordinate with the Engineer and consultant team so that the appropriate owner's representatives can observe the initial concrete pouring, jointing, and finishing for each concrete pavement and curb type to review and approve the work. These initial concrete installations will act as project

mockups which the remaining work shall match in finishing, jointing, and quality.

MEASUREMENT AND PAYMENT

The work of furnishing and installing mechanical anchors and hook bolts will be considered incidental to the work item.

A deduction in length for catch basins and inlet castings will be made to measurements of Curb and Gutter.

Curb and Gutter, 24 inch, Any Type, Curbed Island, and Bike Curb shall be measured at the center of the complete cross section.

Planter Curb, Straight Curb, and Integral Curb shall be measured at the face of curb and paid for at the same unit price for any width. Pavement outside of the face of the integral curb will be paid for as one of the pavement pay items.

All miscellaneous hand work is considered included in the pay items of work and shall not be paid for separately.

Concrete paving underneath the Brick Pavers will be paid for as Item 251-02: Concrete Sidewalk, 8 Inch.

Completed work as measured for these items of work will be paid for at Contract Unit Price for the following Contract (Pay) Items:

PAY ITEMS	PAY UNIT
Item 251-01: Curb and Gutter, Conc, 24 Inch, Any Type	Linear Foot
Item 251-02: Integral Curb	Linear Foot
Item 251-03: Straight Curb	Linear Foot
Item 251-04: Bike Curb	Linear Foot
Item 251-05: Curbed Island	Linear Foot
Item 251-06: Planter Curb	Linear Foot
Item 252-01: Concrete Pavement, 6 Inch	Square Foot
Item 252-02: Concrete Pavement, 8 Inch	Square Foot
Item 252-03: Driveway Opening, Conc, 8 inch, Type M	Square Foot
Item 252-04: Ramp	Square Foot
Item 252-06: Sidewalk Ramp, 8 Inch	Square Foot

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

DETAILED SPECIFICATION
FOR
ITEM #253-01: DETECTABLE WARNING SURFACE
ITEM #253-02: DETECTABLE DIRECTIONAL GUIDEWAY

DESCRIPTION

This work shall consist of furnishing and installing cast in place detectable warning units in compliance to the Americans with Disability Act (ADA). All work shall be in accordance with MDOT Standard Detail R-28 (version in place at time of the bid letting).

MATERIALS AND CONSTRUCTION METHODS

The detectable warning tiles shall be ceramic cement or composite polymer concrete (CRC), colored as Federal Number 22144 (frequently referred to as "Colonial Red" or "Brick Red"). The detectable warning tiles shall meet the following dimensions and tolerances:

1. Dimensions: Cast In Place Detectable/tactile Warning Surface Tiles shall be held within the following dimensions and tolerances:

   Length: 24"
   Width: The full width of the approaching walk (60"
   for typical sidewalk), or as indicated on plans.
   Depth: 1.375 (1-3/8") (+/-) 5% max.
   Face Thickness: 0.1875 (3/16") (+/-) 5% max. Warpage of Edge: 0.5%
   max. Embedment Flange Spacing: shall be no greater than 3.1"

2. Water Absorption of Tile when tested by ASTM D 570-98 not to exceed 0.05%.
3. Slip Resistance of Tile when tested by ASTM C 1028-96 the combined Wet and Dry Static Co-Efficient of Friction not to be less than 0.80 on top of domes and field area.
4. Compressive Strength of Tile when tested by ASTM D 695-02a not to be less than 28,000 psi.
5. Tensile Strength of Tile when tested by ASTM D 638-03 not to be less than 19,000 psi.
6. Flexural Strength of Tile when tested by ASTM D 790-03 not to be less than 25,000 psi.
7. Chemical Stain Resistance of Tile when tested by ASTM D 543-95 (re approved 2001) to withstand without discoloration or staining - 10% hydrochloric acid, urine, saturated calcium chloride, black stamp pad ink, chewing gum, red aerosol paint, 10% ammonium hydroxide, 1% soap solution, turpentine, Urea 5%, diesel fuel and motor oil.
8. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM D 2486-00 with reciprocating linear motion of 37± cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallite sandpaper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block is to be 3. 2 lb. Average wear depth shall not exceed 0.060 after 1000 abrasion cycles when measured on the top surface of the dome representing the average of three measurement locations per sample.
9. Resistance to Wear of Unglazed Ceramic Tile by Taber Abrasion per ASTM C501-84 (re approved 2002) shall not be less than 500.
10. Fire Resistance of Tile when tested to ASTM E 84-05 flame spread shall be less than 15.
11. Gardner Impact to Geometry "GE" of the standard when tested by ASTM D 5420-04 to have a mean failure energy expressed as a function of specimen thickness of not less than 550 in. Ibf/in. A failure is noted when a crack is visible on either surface or when any brittle splitting is observed on the bottom plaque in the specimen.

12. Accelerated Weathering of Tile when tested by ASTM G 155-05a for 3000 hours shall exhibit the following result –E<4.5, as well as no deterioration, fading or chalking of surface.
13. Accelerated Aging and Freeze Thaw Test of Tile and Adhesive System when tested to ASTM D 1037-99 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other detrimental defects.
14. Salt and Spray Performance of Tile when tested to ASTM B 117-03 not to show any deterioration or other defects after 200 hours of exposure.
15. AASHTO HB-17 single wheel HS20-44 loading "Standard Specifications for Highways and Bridges". The Cast In Place Tile shall be mounted on a concrete platform with a ½" airspace at the underside of the tile top plate then subjected to the specified maximum load of 10,400 lbs., corresponding to an 8000 lb individual wheel load and a 30% impact factor. The tile shall exhibit no visible damage at the maximum load of 10,400 lbs.
16. Embedment flange spacing shall be no greater than 3.1" center to center spacing as illustrated on the product Cast In Place drawing.

The Detectable Directional Guideway shall be sound amplifying detectable /tactile warning, polymer composite surface tiles, in the dimensions noted on the plans, as manufactured by Armor Tile; model number ADD-C504-2-YW, with embedment anchors and hardware as noted on the plans. Color shall be Federal Yellow, #33538.

CONSTRUCTION METHODS

The contractor shall follow manufacturer specifications for installation, except where they conflict with MDOT Standard Detail R-28-J (version in place at time of the bid letting).

MEASUREMENT AND PAYMENT

The completed work as measured for this item of work will be paid for at the Contract Unit Prices for the following Contract (Pay) Item:

PAY ITEM	PAY UNIT
Item 253-01: Detectable Warning Surface	Square Foot
Item 253-02: Detectable Directional Guideway	Linear Foot

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification.

DETAILED SPECIFICATION
FOR
ITEM #254 BRICK, INSTALL SALVAGED BRICK

DESCRIPTION AND MATERIALS

This work includes supplying and installing pre-cast concrete pavers laid with hand-tight joints over a fine aggregate bedding, to be placed on a separately paid for concrete slab. All work must be conducted in accordance with the plans and specifications, the 2012 MDOT Standard Specification for Construction, and the City Standard Specifications.

Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, City Standard Specification, and MDOT 2012 Standard Specifications for Construction (as well as applicable Special Provisions as referenced herein) apply to this Section

Submittals

A. Samples: Submit one sample of each shape and color of paver for approval. Where necessary submit additional pavers showing extreme range of color and texture for specified items.

B. Certification Reports: Submit product certification materials for each type of new brick pavers, demonstrating compliance for the following:
   1. Compressive Strength
   2. Flexural Strength
   3. Absorption
   4. Freeze/Thaw Resistance

Quality Control/Quality Assurance

A. Employ one installing entity to be responsible for the finished pavement surface, including installation of the paver containment, setting bed, joint filler and setting of unit pavers, who has, in the past three years, installed at least three projects of this size or larger.

B. Job Mock-Up:

   Review the salvaged pavers and determine the range of dimensions. Adjust depth of concrete base from surface grade as needed to meet sand bed requirements and ensure a smooth surface grade connection where the salvage pavers meet existing grades.

   Construct a mock-up sample of the brick paving for review and approval by the Engineer. The mock-up will be 40 square feet minimum in size, utilizing the pattern and joints required for the project. Approximately half of the mock-up will be made of new brick, and the other half of salvaged brick. The Mock-up may be two separate areas, 20 square foot in size each. Consider the selected mock-up a minimum standard of workmanship when accepted, to be matched or bettered throughout the Project. The mock-up may be constructed as part of the Project and, if approved, will be accepted as part of the Work. However, should the Mock-up fail to meet the Engineer's approval, remove and reconstruct it until approved.

C. Protect the Work completed under this section, adjacent work and materials against damage during progress of the Work until complete.

Delivery, Storage and Handling

A. Deliver materials to the job site in a timely manner so as not to delay progress of the Work.

B. Deliver materials to the job site in their original unopened containers bearing labels clearly identifying the manufacturer's name.

C. Suitably store materials, if necessary, in a location agreeable to the Owner and Contractor.

D. Store the materials under cover, clear of the ground, and protected from the weather and damage during storage.

Materials

A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

B. Fine Aggregate Bed. Sand shall be well graded, washed sharp sand conforming to ASTM c33, and meeting the following sieve analysis gradations:

Sieve	Percent Passing
3/8 inch	100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	20-30
No. 200	0-5

Use of masonry sand will not be permitted.

C. Jointing Sand. Clean, fine, sharp sand, in compliance with ASTM C144 (gradation for 1/8 inch joints). The jointing sand shall be free of organics and soluble salts or other contaminants likely to cause efflorescence. The jointing sand shall be in compliance with the following grading limits:

Sieve	Percent Passing
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35

D. Brick Pavers: The Contractor shall use the bricks salvaged from the project site for the restored brick paving areas. Coordinate with Engineer to supplement salvaged brick, if required, with brick that is currently in City of Ann Arbor/DDA stockpiles. The contractor shall be responsible for loading, delivering, and unloading all bricks, whether salvaged by the contractor or available in existing stockpiles.

E. Paving Jointing:
   1. Paving jointing material to be a polymeric sand specifically manufactured and mixed for traffic applications.
   2. Color: stone grey (similar in color to that of Rompox®-D1 by Romex®, or as approved by Engineer.)

CONSTRUCTION METHODS

A. Sand Setting Bed
   1. The sand shall be of uniform moisture content when screeded and shall be **protected against rain when stockpiled on site prior to screeding.** For installation, the moisture content shall be in the range of 4 to 8 percent.
   2. Spreading: The bedding sand shall be spread loose in a uniform layer to give a depth after compaction of the paving units of a maximum 3/4 inch thickness and as required to achieve designed grades.

B. Screeding of Paver Setting Bed:
   1. The spread sand shall be carefully maintained in a loose condition and protected against pre-compaction by traffic or rain both prior to and following screeding. Sand shall be lightly screeded in a loose condition to predetermined depth. Under no circumstances shall the sand be screeded in advance of the laying face to an extent to which paving will not be completed on that day. Any screeded sand which is pre-compacted prior to laying of paving unit shall be brought back to profile in a loose condition. Neither pedestrian nor vehicular traffic shall be permitted on the screeded sand.
   2. The Contractor shall screed the bedding sand using either an approved mechanical spreader or by the use of screed guides and boards.

C. Utility Collars
   1. All water and gas valves, curb boxes and related at grade obstructions located in the brick paver areas are to have a cast in place concrete collar installed integral to the slab of concrete below the pavers, which is square or rectangular in shape, at least 4 inches wider than the perimeter of the utility cover in all directions. Where feasible, the utility collar should be dimensioned to minimize the cutting of pavers and the use of cut slivers of pavers. Review collar and utility conditions with Engineer before completion of sidewalk formwork.
   2. Utility collars shall be poured with the concrete road and walk supporting the pavers, and will be paid for as part of the concrete paving pay items.

D. Placing Brick Pavers
   1. Pavers chips, cracks, voids, discolorations or other defects shall not be installed.
   2. Pattern: The pavers shall be laid in the pattern to match adjacent pavers, or as shown on drawings.
   3. Color Blending: Paving units shall be installed from a minimum of three bundles simultaneously drawing the paver vertically rather than horizontally.
   4. Joints: Joint spacing shall be consistent and of approximately 1/8 inch unless noted otherwise. The spacing must be a minimum of 1/8 inch to accept the paving jointing mortar. This spacing must also be provided for the first row abutting the edge restraint and/or concrete sidewalk.
   5. Alignment: String lines or chalk lines on bedding sand should be used to hold all pattern lines true.

E. Cutting of Pavers
   1. Contractor shall make all efforts to use full bricks to the maximum extent possible. Where cutting of brick is required to achieve the desired pattern, brick shall be cut to leave a clean edge to the traffic surface using a mechanical hydraulic, or guillotine cutter or masonry saw.
   2. Discontinuities in patterns will not be permitted. Lay out pavers in all areas so as to eliminate slivers at edges.
   3. Carefully place the pavers by hand in straight courses with hand-tight joints and uniform top surface. Maintain good alignment and provide the pattern indicated.
   4. Protect newly laid pavers at all times by panels of plywood, on which the installer stands, which can be advanced as work progresses. However, keep the plywood protection in areas which will be subjected to continued movement of materials and equipment. Take these precautions to avoid depressions and protect paver alignment.
   5. If additional leveling of the pavers is required, and before sweeping in joint filler, roll with a power roller after sufficient heat has built up in the surface from several days of hot weather.
   6. Inspection of Installed Pavers: After sweeping and prior to compaction, the paved area shall be inspected by the Owner and the Engineer to ensure satisfactory color blending. Areas deemed poorly blended shall be removed and re-installed in order to achieve satisfactory color distribution.

F. Compaction of Pavers
   1. After inspection of the pavers, they shall be compacted to achieve consolidation of the sand bedding and brought to design levels and profiles by not less than three passes of a suitable plate compactor.
   2. Compaction shall be accomplished by the use of a plate compactor capable of a minimum of 5,000 pound compaction force.
   3. Initial compaction should proceed as closely as possible following installation of the paving units and prior to acceptance of any traffic or application of jointing sand.
   4. Care shall be taken not to damage pavers or surface finish during compaction.

G. Initial Joint Treatment for Pavers
   1. Jointing sand shall be spread over the pavement after initial compaction has been completed. The jointing sand shall be spread as soon as is practical after initial compaction and prior to the termination of work on that day. The Contractor shall not use wet sand.
   2. The jointing sand shall be broomed to fill the joints. Excess sand shall then be removed from the pavement surface and the pavers shall be compacted again to settle the jointing sand.
   3. Repeat this operation a minimum of two times.

H. Final Compaction for Pavers
   1. After jointing sand has been installed and the pavement surface swept clean, final compaction shall be accomplished by not less than two passes of the plate compactor.
   2. Final compaction should proceed as closely as possible following installation of jointing sand and prior to the acceptance of any traffic.

I. Proof Rolling
   1. Proof roll the completed installation with pneumatic tire equipment which replicates anticipated service traffic. Subject each individual paver to at least one passage of load.
   2. Equipment and procedures are subject to approval by the Owner and Engineer and proof rolling will be observed and recorded by the Engineer.
   3. Remove and replace units cracked or otherwise damaged by proof rolling, including inspection and repair of setting bed.

J. Paving jointing mortar
   1. Preparation: Clean out joints to a depth of at least 1 3/16" (3 cm). The surface to be joint-fixed should be cleaned of all impurities before work commences. Adjoining surfaces that are not to be joint-fixed are taped off.
   2. Pre-wet: Pre-wet the surface. Porous surfaces as well as higher surface temperatures, require more intense pre-wetting.
   3. Mix: Pour the 55.1 lbs (25 kg) filler components into a powered mixing tub and start the mixing process. While mixing, slowly add the separately packaged components completely into the mixture. After mixing for 3 minutes add water according to the product package and continue mixing well for at least 3 minutes.
   4. Application: Apply the mixed paving jointing mortar onto the well moistened surface and work it carefully into the joints using a squeegee/rubber slider. The mortar is poured out at three or four spots within the jointing area in order to make best use of the fluidity of the paving jointing mortar. Application time at 68 °F (20 °C) is approx. 20 – 30 minutes.
   5. Final cleaning: After approx. 10 – 15 minutes the excess mortar on the surface of the stones can be swept off carefully with a large, coarse broom. Then use a soft, hair broom to do a final cleaning until all residual mortar has been removed from the surface. The correct moment for sweeping, is when white smears no longer form on the stone surface during sweeping. Sweeping should be done diagonally to the joint. Do not re-use swept off material.
   6. Protection: The freshly jointed surface needs to be protected against rain for the next 12 – 24 hours. The rain protection layer must not be laid directly onto the paved surface this is to ensure sufficient air circulation. Safe rain protection is afforded by the specially developed ROMEX® protective surface mats that can be simply laid on the surface.

K. Allowable Tolerance
   1. Finished surface of pavement smooth, even, and true to the lines, grades and cross section indicated. Maximum deviation when tested with a 10-foot straight-edge parallel to the centerline of the surfaced area: 1/4 inch in 10 feet.
   2. Maximum offset from flush from paver to paver to a fixed flush edge: 1/16 inch.
   3. Slope finished walk for drainage without any ponded water on the finished surface.

L. Repair, Cleaning and Protection.
   1. Clean paver surface of all debris, dirt, and sand.
   2. Remove and replace pavers which are chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in the same manner as original units, with same joint treatment to eliminate evidence of replacement.
   3. Provide final protection of paver in a manner acceptable to the installer, which ensures paver work being without damage or deterioration at the time of substantial completion.
   4. Warranty. Finished area shall be free of bumps or depressions, evenly graded to levels shown, and shall be guaranteed against defects of materials and workmanship for a period of two years after substantial completion.

MEASUREMENT AND PAYMENT

This work will be measured and paid using the following contract item (pay item):

PAY ITEM	PAY UNIT
Brick, Install Salvaged	Square Foot

Brick, Install Salvaged Brick will be measured and paid by the area of unit paver pavement in place. The work includes the sand setting bed, jointing sand, and all incidental measures required to complete the work, including the utility collars described herein. The concrete base slab and utility collars will be paid for separately.

DETAILED SPECIFICATION
FOR
ITEM #255-01 – HMA, 3E1
ITEM #255-02 – HMA, 4E1
ITEM #255-03 – HMA, 5E1
ITEM #255-04 – HAND PATCHING, MODIFIED

DESCRIPTION

This work shall consist of constructing HMA pavement base, leveling, and wearing courses, and hand patching, in accordance with Division 5 and Section 501 of the 2020 MDOT Standard Specifications, current supplemental MDOT specifications, and the City Standard Specifications, except as modified herein, and as directed by the Engineer.

MATERIALS

General

The HMA mixtures to be used for this work shall be as follows:

WORK ITEM	THICKNESS	MDOT HMA MIXTURE #
HMA Pavement Wearing	2.0"	5E1
HMA Pavement Leveling	2.0"	4E1
HMA Pavement Base Course	3.0"	3E1
Hand Patching (Permanent)	2"/3"	4E1/3E1
Hand Patching (Temporary)	as directed	see note

Binders for the bituminous mixes shall be PG 64-28 or as directed by the Engineer and shall meet the requirements specified in Section 904 of the 2020 MDOT Standard Specifications, and any current supplemental MDOT specifications.

Bond coat shall be an emulsified asphalt Type SS-1h and shall meet the requirements specified in Section 904 of the 2020 MDOT Standard Specifications, and any current supplemental MDOT specifications.

The use of Marshall Mixes and Cold Patch will be acceptable for use in Hand Patching for areas identified as temporary pavement, at the approval of the Engineer.

The Aggregate Wear Index (AWI) number for this project is 260. This AWI number applies to all aggregates used in all top course mixtures. Blending aggregates to achieve this AWI requirement is permitted in accordance with current MDOT Standards, and Supplemental Specifications.

Recycled Asphalt Pavement (RAP) in HMA Mixtures

The use of Recycled Asphalt Pavement (RAP) in HMA mixtures shall be in accordance with Section 501. 02. A. 2 of the 2012 MDOT Standard Specifications, and the City of Ann Arbor Standard Specifications.

CONSTRUCTION METHODS

All concrete work shall be completed prior to placing HMA mixtures.

The Contractor shall have a 10-foot long straight-edge, backhoe, air-compressor and jackhammer available during all paving operations.

Prior to placing the bond coat, the Contractor shall kill all vegetation (within the area to be paved) by applying an approved weed killer ("Round-Up" by Monsanto, or equal), shall thoroughly clean all joints & cracks in the existing pavement (and any gutter to be overlaid) with compressed air and/or vacuum-type street cleaning equipment to remove all dirt and debris to a depth of at least 1-inch, and shall thoroughly clean the entire surface to be paved, with a Vac-All or similar vacuum-type street cleaning equipment.

MDOT SS-1h bond coat shall be applied at a uniform rate of 0.10 gallons/square yard, on all exposed, existing HMA and concrete surfaces which will come in contact with the new HMA material. The Contractor shall take extra care to avoid covering surfaces which are not to be paved. After September 15, SS-1h bond coat shall not be diluted by more than 25%.

The Contractor shall place HMA wedges using the base, leveling, and wearing mixtures specified herein, as directed by the Engineer, prior to placing the wearing course. Such wedging shall be measured and paid for at the respective unit price of the appropriate HMA Pavement item.

Construction of butt joints, where directed by the Engineer, shall be measured and paid for as "Machine Grading Modified."

The Contractor shall construct the pavement courses to provide the final cross-slopes (crowns) specified by the Engineer.

The Contractor shall construct feather joints, and shall feather the leveling and wearing courses at structures, in drive approaches, and at intersection joints, as directed by the Engineer. Feather joints shall vary the thickness of the asphalt from 0.0-inches to the required full paving thickness (approximately 1½-inches) over a 5-foot to 15-foot distance, or as directed by the Engineer. The Contractor shall rake all large aggregates out of the HMA mixture in feather joints, prior to compaction.

The Contractor shall provide a minimum of two rakers during the placement of all wearing and leveling courses. Further, the Contractor shall provide, when directed by the Engineer, a second "Break-Down" roller in order to achieve the specified asphalt densities.

The Contractor shall provide a minimum of 24-hours' notice to the Engineer prior to paving and shall obtain a "Permit To Pave" from the Engineer in advance of scheduling paving.

The Contractor and Engineer shall carefully observe the paving operation for signs of faulty mixtures. Points of weakness in the surface shall be removed or corrected by the Contractor, at his/her expense, prior to paving subsequent lifts of HMA material. Such corrective action may include the removal and replacement of thin or contaminated sections of pavement, including sections that are weak or unstable. Once the Contractor or his representative is notified by the Engineer that the material being placed is out of allowable tolerances, or there is a problem with the paving operation, the Contractor shall stop the paving operation at once, and shall not be permitted to continue placing HMA material until again authorized by the Engineer. Substandard work that, in the Engineer's opinion, requires removal and replacement, shall be completed as follows:

1. Remove and replace leveling and/or wearing course areas mixed with foreign materials and defective areas.
2. Sawcut full depth of existing pavement in perpendicular and parallel directions to adjoining surfaces to ensure a quality and aesthetically pleasing repair.

3. Replacement may need to extend beyond the area of repair. Cut out such areas and fill with fresh, hot mix asphalt.
4. Compact by rolling to specified density and smoothness.
5. Sawcut or route new joint and fill with specified Hot Poured Rubber Joint Sealer product.

During the placement of leveling and wearing courses, the speed of the paving machine(s) shall not exceed 50-feet per minute.

The Contractor shall furnish and operate enough materials and equipment so as to keep the paving machine(s) moving continuously at all times. Failure to do so shall be cause for the suspension of the paving operation until the Contractor can demonstrate to the satisfaction of the Engineer, that sufficient resources have been dedicated to perform the work in accordance with the specifications.

Each layer of HMA mixture shall be compacted to between 92 to 96 percent (or as determined acceptable by the Engineer) of the theoretical maximum density, as listed on the approved Job Mix Formula.

MEASUREMENT AND PAYMENT

Measurement of these HMA paving items shall be by the ton, in place. Unused portions of material loads shall be returned to the plant and re-weighed, and the corrected weight slip shall be provided to the Engineer. All weight slips must include the type of mixture (codes are not acceptable), as well as vehicle number, gross weight, tare weight and net weight.

The bond coat is included in the cost of the HMA Pavement Item.

Corrective action shall be enforced as described at Division 5 of the 2020 MDOT Standard Specifications and will be based on the City's or DDA's testing reports.

All costs for furnishing and operating vacuum-type street cleaning equipment, backhoes, jackhammers, and air compressors shall be included in the bid prices for these items of work or in the item of work "General Conditions."

The completed work as measured for these items of work will be paid for at the Contract Unit Prices for the following Contract (Pay) Items:

PAY ITEM	PAY UNIT
All HMA Pavement Items	Ton

The unit prices for these items of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this detailed Specification.

Payment Adjustment In Lieu Of Repair/Replacement

In the case that the work that is installed does not meet the specified quality of materials or installation, the DDA may opt to require the full removal and replacement of the substandard work, or, at their discretion, use the formulas listed below to reduce payment for the work.

A. Pavement Compaction:
   1. Pavement

a. If the daily average in place density is less than 94%, but greater than 93% of the mixture theoretical maximum density (TMD) the paving will be evaluated by the Engineer and Owner and at Owner's discretion, the unit price of that days paving will be reduced to 90% of full payment.
b. If the daily average in place density is less than 93% but greater than 92% of the mixture TMD the paving will be evaluated by the Engineer and Owner and at Owner's discretion may either be removed or the unit price of that days paving will be reduced to 75% of full payment.
c. If the daily average in place density is less than 92% of the mixture TMD the paving will be removed and replaced at no cost to Owner.

CITY OF ANN ARBOR
DETAILED SPECIFICATION
FOR
Item 257: Regulatory Signs

1 of 1 03/11/2022

a. Description. This work shall consist of fabricating and shipping Regulatory Signs to the City of Arbor.

b. Materials. The contractor will furnish "Regulatory Signs" to the Owner. Signs are to be fabricated in accordance with Section 919.02 Traffic Signs of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction Standard Specifications and the 2011 Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

The plans indicate the signs to be fabricated. The engineer will provide a detailed list of the signs to be fabricated prior to the contractor ordering the signs.

The Contractor will provide the name and a qualifications summary of the proposed fabricator for approval by the Engineer prior to ordering the work.

Signs are to be delivered to the City of Ann Arbor at a location designated by the Engineer in an undamaged condition.

c. Construction. Installation of the Regulatory Signs will be completed by the City of Ann Arbor.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price for the following pay item:

Pay Item	**Pay Unit**
Item 257: Regulatory Signs	Square Foot

DETAILED SPECIFICATION
FOR
ITEM #259-01 - PAVT MRKG, POLYUREA, 4 INCH, YELLOW
ITEM # 259-02 - PAVT MRKG, POLYUREA, 4 INCH, WHITE
ITEM #259-03 - PAVT MRKG, POLYUREA, BIKE ARROW AND YIELD SYM.
ITEM #259-04 - PAVT MRKG, POLYUREA, DIRECTIONAL/TURN ARROW
ITEM #259-05 - PAVT MRKG, POLYUREA, BIKE SYM.
ITEM #259-06 - PAVT MRKG, POLYUREA, RAMP ARROW SYMBOL
ITEM #259-07 - PAVT MRKG, POLYUREA, 12 INCH, STOP BAR OR CROSSWALK
ITEM #259-08 - PAVT MRKG, POLYUREA, 24 INCH, STOP BAR OR CROSSWALK
ITEM #259-09 - PAVT MRKG, ENDURABLEND, BIKE LANE GREEN
ITEM #259-10 - PAVT MRKG, POLYUREA, 18 INCH X 18 INCH BIKEWAY MARKS, WHITE

DESCRIPTION

This work consists of furnishing and installing wet night retroreflective (WR) beads and/or elements, liquid applied pavement marking materials, and Endurablend Polymer Cement Surfacing bike lane pavement markings.

All work shall be consistent with the City of Ann Arbor Standard Specifications and the 2020 MDOT Standard Specifications for Construction, except as specified herein.

MATERIALS

Wet Night Retroreflective Beads and/or Elements. Select WR beads and/or elements from one of the following Manufacturers or a Department approved alternative that meets the requirements in Table 1:

3M Corporation
Potter's Industries
Swarco
Flex-o-Lite

Table 1: WR Markings

Average Initial Retroreflectivity at 30 meter geometry in mcd/lux/m^2		
Test Method	Colo	
	White	Yellow
Dry (ASTM E 1710)	700	500
Wet Recovery (ASTM E 2177)	250	200

Ship the material to the job site in sturdy containers marked in accordance with subsection 920.01.A of the Standard Specifications for Construction.

Submit to the Engineer prior to the start of work:

a. The Manufacturer's recommended application rate of the beads/elements and the liquid applied pavement marking binder to be used on the project. If the Manufacturer's

recommended application rate differs from the specified rate in Table 811-1 of the Standard Specifications for Construction, the Manufacturer's recommended rate supersedes the table values.

b. Certification from the Manufacturer that when applied according to their application recommendations the beads and/or elements meet the requirements shown in Table 1 above.

Binder. Provide a liquid pavement marking product of the binder type specified in the contract documents from section 811 of the Qualified Products List or as specified by special provision, or use an alternative binder as approved by the Engineer.

The Endurablend bike lane pavement marking material must be comprised with green pigment and anti-skid abilities. The polymer cement surfacing shall be manufactured by Pavement Surface Coatings of Hanover New Jersey, and no material substitutions will be allowed.

1. Pigmented Resin. Transpo Color-Safe Bike Lane Green must be used as the pigment or approved equal. The approved color pigmented resin shall comply with FHWA green color guidelines for bike lanes.
2. Anti-Skid Aggregate. Anti-skid aggregates shall be provided by the pavement marking supplier. Aggregate shall have a minimum Hardness of 7.0 per Mohs Scale.

CONSTRUCTION

Place the binder and beads and polymer surface coatings in accordance with the Manufacturers' recommendations and sections 811 and 920 of the Standard Specifications for Construction except as noted above.

Construction of bike lane pavement markings shall be in accordance with manufacturer application and installation procedures, MDOT 2020 Standard Specifications for Construction, and Engineer.

All pavement marking areas shall be laid out by the contractor and then reviewed by the Engineer. Marking layout shall be approved by the Engineer prior to placement of material.

Surface preparation shall include cleaning of the pavement surface using high pressure water, compressed air or sandblasting and shall conform to ASTM D4263. All surface damage shall be corrected by the Contractor at the Contractor's expense, as directed by the Engineer. Manufacturer recommended pavement and air temperatures must be followed.

All markings on concrete surfaces shall receive a base coat application and shall be included in the pay item. Marking layout, material mixing, base coat application, and pigmented coat application shall comply with the manufacturer's installation procedures.

The Contractor shall protect the pavement markings from damage and allow them to fully cure prior to allowing traffic to drive over markings. Any damage shall be corrected by the Contractor at the Contractor's expense.

MEASUREMENT AND PAYMENT

Item 259-04: Pavt Mrkg, Polyurea, Directional/Turn Arrow includes any descriptive pavement text that is indicated on plans. Arrow combinations that include both thru arrow and turn arrow shall be paid for separately for each direction indicated.

The completed work, as described, will be measured and paid for at contract unit prices using the following pay items:

PAY ITEM	PAY UNIT
Item 259-01: Pavt Mrkg, Polyurea, 4 inch, Yellow	Linear Foot
Item 259-02: Pavt Mrkg, Polyurea, 4 inch, White	Linear Foot
Item 259-03: Pavt Mrkg, Polyurea, Bike Arrow and Yield Sym.	Each
Item 259-04: Pavt Mrkg, Polyurea, Directional/Turn Arrow.	Each
Item 259-05: Pavt Mrkg, Polyurea, Bike Sym.	Each
Item 259-06: Pavt Mrkg, Polyurea, Ramp Arrow Sym.	Each
Item 259-07: Pavt Mrkg, Polyurea, 12 Inch, Stop Bar Or Crosswalk	Linear Foot
Item 259-08: Pavt Mrkg, Polyurea, 24 Inch, Stop Bar Or Crosswalk	Linear Foot
Item 259-09: Pavt Mrkg, Endurablend, Bike Lane Green	Square Foot
Item 259-10: Pavt Mrkg, Polyurea, 18 Inch X 18 Inch Bikeway Marks	Linear Foot

The unit price for these items of work shall include all labor, material, and equipment costs to perform all the work.

DETAILED SPECIFICATION
FOR
ITEM #260-01 - RECESSING PAVT MRKG, LONGITUDINAL
ITEM #260-02 – RECESSING PAVT MRKG, TRANSVERSE

DESCRIPTION

This work consists of providing all equipment and labor required to prepare (grooving) the pavement surface for recessed longitudinal, transverse, and turning guideline pavement markings in accordance with the City of Ann Arbor Permanent Pavement Markings Detailed Specification, the plans, and this detailed specification.

MATERIALS

None specified.

CONSTRUCTION

Install a recess (groove) in accordance with the recessed pavement marking material manufacturer's installation instructions. Ensure all recessing configurations are in accordance with the Michigan Manual of Uniform Traffic Control Devices and the Michigan Department of Transportation Pavement Marking Standards.

1. Grooving Concrete and Hot Mix Asphalt Pavement. If there are no markings on the pavement, paint a temporary tracer line (with no beads) exactly where the permanent markings will be placed. Use these lines as a template for the grooving operation.

   Use equipment and methods approved by the manufacturer of the recessed pavement marking material to be recessed for forming grooves in pavement surfaces. Dry cut the grooves in a single pass using stacked diamond cutting heads on self-vacuuming equipment capable of producing a finished groove ready for pavement marking material installation.

   Ensure that the bottom of the groove has a fine corduroy finish. If a coarse tooth pattern results, increase the number of blades and decrease the spaces on the cutting head until the required finish is achieved.

2. Groove Dimensions. Ensure grooves for recessed pavement markings are in accordance with the following:

   Longitudinal Markings

Groove Width:	Material width +1 inch, (±1/8 inch)
Groove Depth:	As recommended by the manufacturer, (±5 mils)
Groove Position:	Center/Lane Lines: 2 inches from joint line, (±1/8 inch) Edge Lines: On lane, 2-4 inches in from the joint line, (±1/8 inch) Edge Lines for 14-foot paved lanes: as directed by the Engineer

Transverse Markings

Groove Width:	Material width +1 inch, (±1/8 inch)
Groove Depth:	As recommended by the manufacturer, (±5 mils)
Groove Position:	In the exact location where the transverse marking (crosswalk or stop bar) will be placed.

Turning Guideline Markings

Groove Width:	Material width +1 inch, (±1/8 inch)
Groove Depth:	As recommended by the manufacturer, (±5 mils)
Groove Position:	In the exact location where the turning guideline markings will be placed.

Placing Recessed Pavement Markings. Place the pavement marking material in the grooves within 24 hours of the grooves being made. Ensure the grooves are clean and dry prior to placing pavement marking material. Locate the groove so the entire marking can be placed within the groove.

MEASUREMENT AND PAYMENT

The completed work, as described, will be measured, and paid for at the contract unit price using the following pay items:

PAY ITEM	PAY UNIT
Item 260-01: Recessing Pavt Mrkg, Longitudinal	Linear Foot
Item 260-02: Recessing Pavt Mrkg, Transverse	Linear Foot

Pavement marking materials, including retroreflective pavement marking required for traffic control, will be paid for separately using the appropriate pay items.

DETAILED SPECIFICATION
FOR
ITEM # 272-01 – HARDENED CENTERLINE
ITEM #272-02 BIKELANE DELINEATOR POST

DESCRIPTION

This work consists of furnishing all labor, equipment, materials, required to place bikeway posts and bikeway curb in the areas shown on the plans. All work must be conducted in accordance with the plans and specifications, the 2012 MDOT Standard Specification for Construction, and the City Standard Specifications.

MATERIALS

Hardened Centerline is to be as manufactured by Tree Top Products; model shall be the "Premium Rubber Speed Hump", a molded recycled rubber product with yellow and black stripes; 14 inches wide and 2.25 inches high, at the lengths indicated on the plans; include tapered end sections for each exposed end of each segment.

Bikeway Delineator Posts are to be as manufactured by Pexco; model shall be "City Post" Surface Mount Model SM as noted on plans, with the optional anchor cup plug. Color shall be yellow, with silver reflective bands.

Shop drawings from the manufacturer are to be submitted to the Engineer for approval prior to fabrication for the Hardened Centerline and the Bikeway Delineator Posts.

CONSTRUCTION METHODS

Layout the locations of the bikeway posts and bikeway curbs for approval by the engineer prior to installation.

Install the bikeway posts per manufacturer's recommendations.

Bikeway posts and bikeway curbs are to be installed in a line parallel to the street markings and curb, with no elements being more than 2 inches from a straight-line end to end.

Evenly space bikeway posts at the dimensions noted on plans. Bikeway posts and bollards on the bikeway curb must be installed plumb and in line with each other and shall be firmly connected to the anchor system.

Hardened centerline products will be installed by the City of Ann Arbor. Contractor is to purchase the products required and deliver the products to the City of Ann Arbor at the location determined by the Engineer.

MEASUREMENT AND PAYMENT

The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

PAY ITEM	PAY UNIT
Item 272-01 Hardened Centerline	Linear Foot
Item 272-02 Bikeway Delineator Post	Each

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
Item 279: Line Stop, Ductile/Cast Iron Pipe, __ inch
Item 279-1: Line Stop, Additional Rental Day

a. Description.- The Contractor shall furnish all materials, labor and equipment to properly install and set water main line stops into the existing Ductile/Cast Iron Main(s) at the locations as shown on the plans and as directed by the Engineer. All work shall be performed in accordance with the requirements as detailed herein.

The existing mains, upstream and downstream of the proposed line stop(s) cannot be shut down or taken out of service. To ensure that the entire operation shall be accomplished without interruption of service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to line stops of the required size(s).

The work shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; the furnishing, installation, and removal of sheeting and/or shoring where needed; the furnishing, placement and compaction of approved bedding and backfill materials; furnishing and placing suitable, clean, gravel to create a stable working surface at the bottom of the excavation; de-watering; pipe cleaning, measuring, and performing all advance work necessary to prepare for the performance of the line stop; nighttime lighting as required; the removal of all materials and equipment associated with the work when no longer needed; and backfill, restoration and compaction of subgrade.
This work shall also include all traffic maintenance and control items in accordance with the Michigan Manual of Uniform Traffic Control Devices.

b. Materials.- Bedding and backfill for areas contained within a segment of water main designated as Trench Detail I (under roadbed), Modified, shall be Granular Material, Class II, meeting the requirements of Section 902 of the 2020 MDOT Standard Specifications for Construction. For work within a segment of water main designated as Trench Detail V (outside of the 1:1 influence line of roadbed or curb and gutter), Modified, Granular Material, Class II and Engineer approved native material, placed in accordance with the trench details, shall be used.

The Contractor shall submit to the Engineer two (2) sets of drawings, furnished by manufacturers, fully and distinctly illustrated and describing the Line Stop fittings proposed to be furnished. Work shall not commence until such time as the drawings have been reviewed and accepted by the Engineer.

Line Stop Fittings shall be full encirclement, pressure retention type split tee. It shall consist of two steel weldments; an upper line stop flange saddle plate and a lower saddle plate. These two saddle plates shall be contiguous.

Line Stop Flange: The outlet of each fitting shall be machined from a 150 lb. forged steel flange (ASTM A181 or A105) or from pressure vessel quality steel plate (ASTM A285, Grade C); flat faced and drilled per ANSI B16.5). Suitable independently operated locking devices shall be provided in the periphery of the flange to secure the completion plug.

Line stop Nozzle: The nozzle, which lies between the saddle and the flange shall be fabricated from steel pipe (ASTM A234). After welding and stress relief, the nozzle shall be accurately bored as follows to accommodate the Line stop plugging head:

a) Machine an internal circular shoulder to seal against the circumferential gasket carried on the plugging head.

Completion Plug: The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from the Line stop flange, and the second to contain a compressible "O" ring to seal pressure tight against the bore of the flange.

Blind Flange: Each Line stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the Line stop flange. Minimum blind flange thickness shall be that of AWWA Spec. 207, Class D.

Saddle Alignment Marking: Each saddle-half shall be matched and marked with serial numbers, to insure proper alignment in the field.

Fasteners: All bolts, studs, and nuts used on Line stop, drain/equalization fittings, blind flange, and other elements that shall remain upon completion of the work shall be stainless steel and meet the requirements of ASTM F 593.

General: Manufacturer will exercise extreme care to ensure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the ductile iron main during installation, pressure tapping, or Line stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.

Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with water in the 32 to 140 deg. F temperature range.

Upper Line stop Flange Saddle: Shall consist of a saddle plate, a Line stop flange, and a Line Stop nozzle. The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior of the ductile iron main. This gasket shall constitute the only seal between the main and the fitting. The flange saddle shall also meet the following requirements:

a) Saddle plate shall be of a minimum of 0.375" in thickness. It shall be shaped to be concentric to the outside of the ductile iron main. The smallest I.D. of the saddle and its interior rings shall exceed the O.D. of the main by a minimum of 0.250" to allow for ovality of the main;
b) Line stop nozzle of 0.375" min. wall thickness shall be securely welded to the saddle plate;
c) The Line Stop flange shall be securely welded to the nozzle. After welding, the assembly shall be braced, stress relieved, and bored to receive the completion plug and the circumferential gasket of the Line Stop machine plugging head; and,
d) Bolt, nut of stud, nut, and washer assemblies shall be furnished to draw the upper and lower saddles together for sealing. Bolting brackets shall be gusseted.

Lower Saddle Plate: Saddle plate shall be of a minimum 0.375" thickness and shall be shaped to be concentric to the outside brackets shall match upper half.

c. Equipment.- The equipment shall consist of a cylindrical plugging head that contains a flat, expandable elastomer sealing element. The plugging head shall be advanced into and retracted from the main by means of a linear actuator. When retracted, the plugging head and carrier are housed in an adapter, bolted pressure tight between the tapping valve and the actuator.

Sealing Element: The element shall be monolithically molded from a suitable polyurethane compound. The element shall be flat in a plane perpendicular to the flow in the main. Minimum thickness of the element shall be 4". The bottom of the element shall be semi-circular to conform to the bore of the main.

Drilling equipment: Shall be in good working condition, equipped with power drive to e0nsure smooth cutting, and to minimize shock and vibration. Cutting equipment shall be carbide tipped and capable of being replaced without removal from the jobsite.

Plugging Head: The diameter of the cylindrical plugging head shall be slightly smaller than the bore of the Line Stop nozzle. The plugging head shall have a suitable circumferential gasket to seal against the shoulder in the Line stop nozzle. This gasket shall also seal against the sealing element to prevent bypass flow around the Line stop.

Deposits in Bore of Main: The semi-cylindrical bottom of the plugging head shall be designed to break and dislodge tuberculation and other deposits in the bore of the main which might interfere with a satisfactory Line stop.

d. Method of Construction.- Installation of proposed line stops mains will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

If necessary, The City will reduce the pressure to 100 psig or less for the duration of the installations. The entire operation of installing the line stop shall be accomplished without reduction of water pressure in the main(s) below 100 psig. It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation.

Preliminary Field Inspection of Water Main:

Dimensional, specification, and other data regarding the existing mains have been taken from existing records. This information may be inaccurate, out of date, and/or inadequate. The data have not been verified by field inspections. Further, the water main consists of ductile iron pipe which may contain dimensional and structural flaws. In addition, the Contractor shall anticipate that exterior main conditions, bells, service connections, or presence of adjoining utilities may require relocation of proposed line stop. Prior to proceeding with the installation of any line stop, it is necessary to know the exact main outside diameter of the water main, if it has any ovality, and the internal diameter of the pipe before line stop fittings and plugging head sealing elements can be manufactured and/or ordered.

Prior to ordering material, Contractor shall excavate at each proposed location and carefully measure the outside diameter of the water main with calipers along at least four (4) locations to determine ovality and the critical outside diameter of the water main. The Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be taken to determine extent of internal deposits, tuberculation, etc.

If the Engineer determines that Contractor's data are not adequate, the Engineer may direct Contractor to make one or more pressure taps on main to obtain test pipe coupons for the Engineer's evaluation. The minimum size of the test coupon shall be 5" diameter, drilled through a nominal 6" valve. Pressure tapping saddles and other materials used for inspection taps shall conform to the requirements of this Special Provision. The Contractor shall anticipate that heavy interior corrosion and/or tuberculation exists within the water main.

If, in Engineer's opinion, the proposed location is unsatisfactory based on measurements of the existing pipe at the locations of the proposed line stops, the Engineer will direct excavation at another site. Excavating, de-watering, inspections, backfill, and restoration will be paid for separately in accordance with the applicable contract unit prices or Section 109.05.C and 109.05.D of the 2020

MDOT Standard Specifications for Construction whichever the Engineer deems most appropriate.

Because of possible internal corrosion and deposits in existing water mains, a "bottle-tight" shut down may not occur. A satisfactory shutdown which allows the work to be accomplished (i.e. valve replacement, water main tie-in, etc.) using drainage pumps to de-water excavations, with workmen wearing boots and raingear, if necessary, must be obtained. The Contractor will not be allowed to proceed with further work until an acceptable shutdown is achieved. The Contractor shall be aware that this may require the halting of work and re-scheduling of all work operations.

Contractor shall power wire brush and grind the exterior of the water main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each line stop fitting against each main. Any structural defects in the water main, service connections, appurtenances, adjacent utilities, etc., that could interfere with the line stop installation shall be immediately reported to Engineer.

All line stop fittings and appurtenances shall be cleaned and disinfected in accordance with the current City of Ann Arbor Public Services Area Standard Specifications prior to bolting any of the line stop fittings in place or commencing any pipe cutting.

Contractor shall fit upper and lower saddle plate assemblies to main, thoroughly checking for proper fit to main. Under no circumstances shall Contractor attempt to force, reshape, or bend saddle plates by excessive tightening of saddle studs while the line stop fitting is assembled around the main. Any required retrofitting shall be accomplished with the fitting removed from the main. Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.

Upper and Lower saddle halves shall be drawn together by bolt assemblies and the Saddle plates shall be bolted together in the horizontal position.

All line stop work shall be performed in accordance with the equipment manufacturers approved work procedures and installation guidelines.

Final closure of the water main shall be accomplished by insertion of a manufacturer-approved completion plug. The Contractor shall test the completion plug sealing through the use of a bleed off assembly in the machine housing.

The Contractor shall remove the temporary valve and the installation of a blind flange shall be completed.

The Contractor shall place polyethylene encasement meeting the requirements of the City of Ann Arbor Standard Specifications for Construction around the upper and lower saddle halves, the blind flange, and to a point at least 1 foot on either side of the saddle halves. All polyethylene encasement shall be securely taped to the water main such that water entry is minimized to the greatest extent possible.

Lighting Requirements for Nighttime Water Main Work:

Night work shall be lighted to an average intensity of 108 lux minimum. Sufficient light sources shall be provided to achieve this illumination requirement. The lighting scheme shall be submitted to the Engineer for review and approval. Nighttime water main work will not be allowed to begin until such time as the lighting scheme has been approved by the Engineer.

The lighting shall allow the inspector to clearly see and inspect all work operations, including pipe, fitting, and valve installations, disinfection of the pipe, pipe cleaning, and all other night work.

Lighting systems may be fixed, portable, or equipment mounted. A power source shall be supplied with sufficient capacity to operate the lighting system. The lighting system(s) shall be arranged such that they do not interfere with the vision of motorists or unnecessarily illuminate surrounding properties or residences.

e. Measurement and Payment.- The completed work will be paid for at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Item 279: Line Stop, Ductile/Cast Iron Pipe, __ inch	Each
Item 279-1: Line Stop, Additional Rental Day	Each

All work shall be paid in full at the contract unit prices which shall include all the labor, materials, and equipment required to perform the work as detailed herein. This shall also include all required costs associated with night time work, supplemental lighting, and all other required elements of the work, including all traffic maintenance and control.

"Additional Rental Day" will be paid for each day after the first installation and day of use of a temporary water main line stop, regardless of size, until, in the opinion of the Engineer, the line stop is no longer needed.

Pavement removal, aggregate base course, bituminous pavement, and traffic control items as necessary to construct the line stop (as determined by the Engineer), shall be paid for separately as specified elsewhere; all other items shall be included in the pay item for the line stop.

DETAILED SPECIFICATION
FOR
ITEM #280 – RAIN GARDEN PLANTING SOIL

DESCRIPTION

The work consists of providing and placing Planting Soil (Topsoil) in landscape planters, lawn areas, and tree pits, and rain garden soils as shown on the plans, as detailed herein or as directed by the Engineer. All work must be conducted in accordance with the plans and specifications, the 2020 MDOT Standard Specification for Construction, and the City Standard Specifications.

The rain garden cell consists of a layer containing the composite planting mix. Underneath the rain garden soil planting mix lies an underdrain storage trench comprised of an aggregate storage area and an underdrain system to achieve positive drainage. The underdrain flows to an overflow structure at the low point of the of the cell bed.

MATERIAL

Provide materials as described below.

A. **Rain Garden Planting Soil:** The Rain Garden Planting Soil shall be used in all rain garden areas, and shall meet the requirement noted below:

Item	Composition by Volume
Compost	20%
Topsoil	30%
Sand	50%

The rain garden planting mix must be a uniform mix, free of plant residue, stones, stumps, roots or other similar objects larger than 2 inches. No other materials or substances are permitted to be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting operations.

The topsoil provided shall meet the requirements of City of Ann Arbor Division III, Section 6B. Planting and Backfill Soil Material, and be amended as noted in Section 6B for use in all landscape applications other than the rain gardens.

Compost shall meet the requirements of Section 917 of the 2020 MDOT Standard Specification for Construction.

Sand shall be washed and screen natural sand meeting the requirements of MDOT Natural Sand 2NS, as provided in Section 902 of the 2020 MDOT Standard Specification for

Construction.

CONSTRUCTION METHOD

All earth disturbing activities within the vicinity of the planters must be substantially complete, and curb and paving work completed prior to the excavation of the planter. Scarify and loosen subgrade in planters to a depth of 12 inches below the proposed Rain Garden Planting Soil, removing all debris and stones lager than 3 inches in any dimension from subgrade.

Conduct excavation work with the equipment within the footprint of the planter as detailed on the plans. No equipment is permitted in the planter unless approved in advance by the Engineer. In those instances where equipment is allowed within the cell bed it must consist of low ground pressure, lightweight equipment. In these instances, ensure the underlying bed soil is restored to a friable condition to a minimum depth of 12 inches.

Excavate to the depth detailed on the plans and miscellaneous details to accommodate the planting soil mix and mulch. Final grades shown on the plans are to the top of the soil, or as directed by the Engineer.

Place the rain garden soil planting mix in horizontal layers not to exceed 12 inches in depth for the entire area of the rain garden facility. Saturate the rain garden soil planting mix over the entire area after each lift until water flows from the underdrain to lightly consolidate the mix. Apply water by spraying or sprinkling in a manner to avoid separation of the mix components. Ensure the Engineer is present during the saturation of each lift. If the rain garden soil planting mix becomes contaminated during construction, remove the contaminated material and replace with suitable material at no cost to the Department. Perform the final grading of the rain garden soil planting mix after a 24 hour settling period. Upon final grading of the surface of the rain garden soil planting mix rototill to a depth of 6 inches.

The depth of the tree root balls may require the excavation into the aggregate storage area or subgrade to accommodate the root ball. 8 inches of planting soils shall be placed between the root ball and the aggregate.

MEASUREMENT AND PAYMENT

The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

PAY ITEM	PAY UNIT
Item 280: Raingarden Planting Soil	Cubic Yard

Provide surface mulch on landscape beds and tree planting as indicated on plans. Mulch is considered incidental to the landscape and soils pay items and will not be paid for separately.

DETAILED SPECIFICATION
FOR
ITEM # 282- TREE GRATE, 4 ft. X 8 ft.

DESCRIPTION

This work consists of furnishing and installing cast iron tree grates and their frames. All work must be conducted in accordance with the plans and specifications, the 2020 MDOT Standard Specification for Construction, and the City Standard Specifications.

MATERIALS

Provide iron castings conforming to section 908 of the MDOT Standard Specification for Construction that come with a 10-year warranty against breakage. Tree grates and frames are to be the sizes and configurations noted on the plans, with openings slots in a pattern that conforms to ADA guidelines.

Tree grate castings and frames to be furnished and manufactured by Urban Accessories of Tacoma, WA (phone is 877-487-0488). Contractor is to provide the specified tree grate casting and frame and tree guard, or an equal product approved by the Engineer; as follows:

A. Tree Grate, 4 ft. x 8 ft.: Shall be 4 ft. x 8 ft. in size (nominal), "Jamison" model, with Urban Accessories manufactured frame, and supports. All materials to have a galvanized finish per the manufacturer's specifications.

All castings will be made of Ductile Iron meeting ASTM A536 Class 65-45-12, and galvanized, per manufacturer's process. Ensure all anchoring bolts, nuts, washers, and all other hardware for installation meet the manufacturer's recommendation.

The tree grate shall be rated to support light vehicular traffic loads.

Furnish certification regarding the compliance of materials incorporated in the work, for approval by Engineer prior to installation.

Ensure all anchoring bolts, nuts, washers, and all other hardware for installation meet the manufacturer's recommendation.

Furnish certification and product shop drawings regarding the compliance of materials incorporated in the work, for approval by Engineer prior to installation.

CONSTRUCTION METHODS

A. Fabrication
   1. Ensure all tree grate castings are manufactured true to pattern and component parts must fit together in a uniform manner.

   2. Ensure castings are free of all defects and cleaned by shot blasting.

3. Provide tree grate frames that are suitable for anchoring into the different adjacent paving types. Coordinate fabrication and delivery of frames with the concrete installer so that the frames can be installed during paving operations.

B. Installation
   1. Square up the frame sections and bolt them together. Install the tree grate frame flush and on a plane with the proposed surrounding slope, prior to casting the concrete around it. Ensure that top of frame and tree grate is no greater than 1/8-inch higher or lower than adjacent pavement surfaces and meets ADA requirements for public sidewalks.

   2. Set the grates flush with the top of the frame and ensure that the grate does not rock in the frame. Securely bolt grate halves together on the underside. Clean any foreign matter from the tree pits and grates prior to setting.

   3. If the engineer believes that the product or the installation has resulted in either a poorly fitted grate and frame, an unsafe walking surface, or an unacceptable amount of rocking, they may reject the installed product, and require a new installation and/or a new tree grate.

   4. Install the tree guards to be square to the tree grate and plum and secured to the grate per the manufacturer's recommendation.

C. Tolerances
   1. Maximum Space Between Adjacent Sections: ¼ inch
   2. Maximum Variation from Top Surface Plan of Adjacent Sections: 1/8 inch

MEASUREMENT AND PAYMENT

The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

PAY ITEM	PAY UNIT
Item 282- Tree Grate, 4 ft. X 8 ft.	Each

The unit price for **"Tree Grate, 4 ft. X 8 ft."** shall include all labor, material, and equipment costs to perform all the work specified, including thickened concrete edge, frames, grates, hardware, and grate supports.

DETAILED SPECIFICATION

FOR

ITEM # 283 - RIPRAP, FIELDSTONE

DESCRIPTION

This work consists of providing all labor, equipment, and materials necessary to furnish and place fieldstone riprap in the rain gardens and planters as shown on the plans. All work must be conducted in accordance with the plans and specifications, the 2020 MDOT Standard Specification for Construction, and the City Standard Specifications.

MATERIALS

Use washed, uncrushed, rounded fieldstone for riprap. The diameter of each stone must be between 4 to 8 inches. When placed in the final location the in-place thickness must be a minimum of 8 inches.

Acceptance will be based on visual inspection of riprap in-place by the Engineer.

Geotextile separation fabric shall be a non-woven fabric, minimum 6 Oz. weight.

Grout shall be MDOT standard grout mix R-3, as specified in Section 702 of the 2012 MDOT Standard Specification for Construction.

CONSTRUCTION METHODS

Place riprap over geotextile separation fabric in accordance with subsection 813.03 of the 2020 MDOT MDOT Standard Specification for Construction.

Standard Specifications for Construction, on prepared grades to the elevations, thickness and lateral limits as shown on the plans. Shape and compact all grades to the required cross section. The riprap installation must not damage the geotextile fabric below.

If directed by Engineer, secure rock with grouting. Rock to be grouted shall be kept wet for a least 2 hours immediately prior to grouting. Place riprap such that each stone will be firmly embedded into the grout and against adjoining stones. Construct the riprap in a manner which produces a uniform mat free of voids. Grout and stone should be installed within 1.5 hours of the completion of the initial mixing of the grout

MEASUREMENT AND PAYMENT

The completed work, as described and including geotextile fabric, stone rip rap and grouting, will be measured and paid for at the contract unit price using the following pay item:

PAY ITEM	PAY UNIT
Item 283: Riprap, Fieldstone	Cubic Yard

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
Item 284: Sacrificial Anode, __ lb
Item 285: CL-50, D.I. Water Main, w/ Poly Wrap, ___ inch, Tr Det I, Mod
Item 285A: CL-52, D.I. Water Main, w/ Poly Wrap, __ inch, Tr Det I, Mod
Item 286 and 287: Bends And Reducers, ___ inch
Item 288: Cross, 12 inch x 12 inch
Item 288: Tee, ___ inch x ___ inch x ___ inch
Item 289: Fire Hydrant Assy, w/Extensions, Complete
Item 290: Gate Valve-in-Box, ___ inch
Item 291: Gate Valve-in-Well, ___ inch
Item 293: Excavate and Backfill for Water Service Tap And Lead

a. Description.- The Contractor shall furnish all labor, equipment, pipe, valves, fittings, restrained-joint pipe, restrained-joint gaskets, special gaskets as detailed on the plans and in the specification, polywrap, blow-off assemblies, fire hydrants, fire hydrant extensions, supplemental lighting towers, and all other materials necessary to complete the work as shown on the Plans, as detailed in this Detailed Specification, and as directed by the Engineer.

All water main installation and testing procedures shall be performed in accordance with the plans, the requirements of this Detailed Specification, and as directed by the Engineer. The Contractor shall excavate all trenches and pits to the required dimensions; sheet, brace, and properly support the adjoining ground or structures where necessary to comply with MIOSHA, Section 104.07.B of the MDOT 2020 Standard Specifications for Construction, and other relevant safety standards.

The work for all items shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; connections to new and existing water mains; the furnishing and installation of solid sleeves and push-on-joint plugs where needed; the furnishing, installation, and removal of sheeting and/or shoring where needed; all items necessary for the protection of the trench and all persons employed in the work during the work day and "after-hours" periods; polywrap; the furnishing, placement and compaction of approved bedding and backfill materials; thrust blocks; additional labor and equipment costs associated with any required nighttime water main work; cleaning, disinfecting, flushing, bacteriological and hydrostatic testing; and any other required items to complete the work as shown on the plans, as detailed in this Detailed Specification, and as directed by the Engineer.

The work of installing a gate valve-in-well shall include installation and backfill of the specified valve, furnishing and installing pre-cast concrete gate wells including the concrete base, straight pre-cast concrete sections, transition sections, and the adjustment of the structure cover. No separate payment will be made for adjusting the structure covers on new gate wells. The gate well cover shall be paid as "Dr Structure Cover." Upon

completion of the work, the Contractor shall clean the Gate Well to the approval of the Engineer.

The cost of adjusting new gate valve-in-boxes shall be included in the unit price for Gate Valve-in-Box and shall not be paid for separately.

The fire hydrant assembly work shall include the hydrant, the 6 inch gate valve-in-box, 3 feet of 6 inch pipe, the thrust block, and any required extensions to install the fire hydrant to the finish grade as shown on the plans.

b. Materials.-

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:

   A. Product data on all ductile iron pipe, valves, fittings, asbestos concrete pipe to ductile iron pipe fittings, and hydrants.

   B. Manufacturer's certifications on all pipe, fittings, and precast concrete units indicating that all materials meet the minimum requirements of these specifications.

   C. Information on equipment and methods to be used for flushing, chlorination, pressure and bacteriological testing.

2. General Specifications.

   A. Cast Ductile Iron Pipe and Fittings:

   Cast ductile iron pipe shall be Iron Grade 60-42-10 and meet the requirements of ANSI/AWWA C151/A21.51 in all respects; with standard thickness cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4; and, coated outside with an asphaltic coating in accordance with ANSI/AWWA C151/A21.51. 100% of the ferrous metals used in the manufacture of cast ductile iron pipe shall be recycled from scrap and other sources.

   All pipe 6" and larger (except for pipe in bored steel casing) shall be Thickness Class 50 (Table 50.15, ANSI/AWWA C150/A21.50). 4" pipe shall be Thickness Class 52. Pipe in bored steel casing under railroad shall be Thickness Class 56.

   Cast ductile iron river crossing pipe shall be Clow Corp. "F-141 River Crossing Pipe", U.S. Pipe "USIFLEX Boltless Flexible Joint Pipe" or equal approved by the Engineer, and shall be thickness Class 56 minimum. The

pipe shall have a boltless flexible joint of the ball and socket type, and be designed for, and rated at, a minimum interior working water pressure of 250 psi.

Restrained joint pipe, where called for on the Plans, shall be boltless, factory-manufactured restrained joints gaskets for ductile iron pipe and fittings sizes 4-inch to 24-inch in diameter; utilizing Field Lok™ by US Pipe or Fast Grip by American Ductile Iron Pipe gaskets or approved equal. All gaskets shall be Tyton or Fast Tite joint in design with corrosion resistant stainless steel locking teeth vulcanized into the rubber. All restraining gaskets sizes 4-inches to 12-inches in diameter shall be functional for 350 psi operating pressure with a 2:1 safety factor and allowed for complete joint deflection of 5 degrees.

Cast ductile iron fittings shall be push-on joint (with the exception of solid sleeves and fire hydrants which shall be mechanical joint), meeting the requirements of ANSI/AWWA C110/A21.10 for short body cast iron fittings. Fittings shall have a cement mortar lining and asphaltic seal coat in accordance with ANSI/AWWA C104/A21.4 and ANSI/AWWA C110/A21.10. The outside of all fittings shall have an asphaltic coating in accordance with ANSI/AWWA C110/A21.10.

Solid sleeves shall be long-pattern sleeves.

B. Gate Valves and Gate Valve Boxes:

All gate valves shall be resilient seated meeting the requirements of AWWA C509. All valves shall be of the push-on joint type, unless used on tapping sleeve assemblies, or noted otherwise on the plans. The valves supplied shall be:

a. Metroseal 250 Resilient Seated Gate Valve as manufactured by U.S. Pipe & Foundry Company
b. U. S. Pipe and Foundry Tyton Joint, Resilient Wedge Seated Gate Valve, meeting the requirements of AWWA C 509, AWWA C550, and ASTM D 2794
c. American Flow Control, Series 2500, Single Resilient Wedge
d. East Jordan Iron Works FlowMaster Resilient Wedge Valve
e. Mueller Series, 4" through 12", A-2360-38, Resilient Wedge – SL x SL
f. Tyler Series DRS 250-22 Double Resilient Wedge

All valves shall come equipped with a two-inch square operating nut, opening right.

Valve Boxes shall be Tyler 6860 Buffalo type, Size D, screw-type, 3 piece, 5-1/4 inch shaft and a No. 6 Base for a valve 8 inches or less and a No. 8 base for 10 and 12 inch valves.

C. Gate Valve Wells:

Pre-cast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat-slab tops shall conform to the requirements of ASTM C-478. Joints on precast gate wells shall meet the requirements of ASTM C-443, rubber O-ring gasket.

Flat-slab top, pre-cast, gate wells shall be designed to accommodate HL-93 Modified Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed. For the purposes of design, a HL-93 Modified Live Load shall consist of 1.2 times the design truck or 1.2 times a single 60 kip load, whichever produces the greater stresses.

D. Fire Hydrants:

Fire hydrants shall be East Jordan Iron Works Model 5-BR Water Master BR 250 with traffic flange. All fire hydrants shall have the following features: a 6 inch push-on joint pipe connection, ANSI/AWWA C111/A21.11; two 2-1/2 inch National Standard hose connections; one 5 inch integral Stortz connection (facing hydrant Stortz on right); one 3-3/8"x7.5" pumper nozzle; 1-3/8 inch pentagon operating and cap nuts (1-3/8 in. point-to-flat at top; 1-7/16 in. point-to-flat at base); open left; breakable flange construction; no barrel drain; and a painted red finish. Depth of bury (bottom of pipe to ground surface) is generally 6 feet but may vary depending on specific site conditions. The Stortz pumper connection must be 21 in. ± 3 in. above finished grade, and the breakable traffic flange must be between finished grade and 8 in. above finished grade.

Fire hydrant extensions shall be fully compatible with the manufacturer of the fire hydrant assembly provided and be approved by the Engineer. East Jordan Iron Works hydrants shall be provided with a model 5-BR extension kit.

All fire hydrants must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system.

E. Tapping Sleeves and Valves:

Tapping sleeves and valves shall be manufactured of cast iron or stainless steel and designed for water service with a minimum working pressure of

150 psi. The sleeve shall be a full-bodied split sleeve design manufactured by one of the following manufacturers:

a) Clow No. F-5205;
b) Mueller Co. No. H-615;
c) Waterous Series 800;
d) East Jordan Iron Works MJ Tapping Sleeve with East Jordan FlowMaster RW Valve;
e) Tyler/Union D.I. MJ Tapping Sleeve;
f) Ford Meter Box Company Style FTSS;
g) Power Seal Model No. 3490 AS;
h) Smith Blair Model No. 622;
i) JCM 432 All Stainless Steel Tapping Sleeve; and
j) Price Brothers Company Tapping Sleeve for Prestressed Concrete Steel Cylinder Pipe (only to be used on concrete water mains.)

Tapping Sleeves for Pre-stressed Concrete Steel Cylinder Pipe shall be in accordance with AWWA M-9. The sleeves shall have a separate gland which permits installation of the sleeve prior to cutting of the prestress wires. The gland shall have a fusion epoxy coated (per AWWA C-213) waterway, and a broad gasket set in a retaining groove of a pressure plate gusseted to eliminate flexing. The gland shall be equipped with load bearing set screws to protect the cylinder. Grout under saddle is needed whether saddle is epoxy coated or not. Sleeves shall be furnished with grouting seals and grout horns to facilitate filling the space between the sleeve and the pipe. Tapping sleeves shall be a Price Brothers Company Tapping Sleeve for Prestressed Concrete Steel Cylinder Pipe or Engineer approved equal.

Tapping valves shall be double-disk type of the same manufacture as the sleeve, NRS with two-inch square operating nut-opening right, with a mechanical joint outlet.

All tapping sleeves and valves must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system.

F. Asbestos Concrete Pipe to Ductile Iron Pipe Coupling:

The asbestos concrete pipe to ductile iron pipe coupling shall be the "Smith-Blair 415 (23.15"—21.60") Gaskets, Alloy bolts and Epoxy" coupling or equivalent.

G. Joints:

Push-on joints shall be single gasket joint meeting the requirements of ANSI/AWWA C111/A21.11.

Mechanical joints for fire hydrants and solid sleeves shall be in accordance with ANSI/AWWA C111/A21.11 and shall be the Mega Lug Series 1100 joint restraint system manufactured by EBAA Iron Sales, Inc. or the Ford Meter Box Co. Uni-flange Retainer (UFR 1400-D-x style.)

Bolts for mechanical joints shall be high strength, low alloy steel bolts, only, meeting the requirements of ANSI/AWWA C111/A21.11. All bolts, nuts, and washers if required, shall be coated with a factory-applied flouropolymer coating meeting the following requirements:

Use Temperature: -100°F to 500°F
Salt Spray – ASTM B117 up to 4000 hours (nuts must not become frozen)
Pencil Hardness – 5H to 6H – ASTM D3363-92A
Kinetic Coefficient of Friction – 0.06 to 0.08
Thickness – nominal 0.001" (1 mil)
Impact – 160 in-lbs as measured by ASTM D2794-93
Adhesion – 5B – ASTM D3359-95
Di-electric Strength – 500V per mil
Elongation – 35% to 50%
Tensile Strength – 4,000 psi
Operating Pressure – up to 100,000 psi
Kesternich Test – Nuts not frozen up to 30+ cycles (DIN 50018)

Corrosion Resistance: as measured by;

ASTM D 1308 Muriatic Acid 31% HCL - 24 hours - No Effect
Sulfuric Acid 93% H_2SO_4 - 24 hours - No Effect
Caustic Soda 100% NaOH - 24 hours - No Effect
Methy Ethyl Keytone MEK - 24 hours - No Effect
ASTM B117 Salt Fog - 1,000 hours - No Effect

The flouropolymer coating shall strongly adhere to surface being coated and shall not flake off or be easily removed by rubbing or brushing.

Cast ductile iron river crossing pipe joints shall be a push-on type ball and socket joint utilizing a first grade rubber gasket. The joint shall be capable of 15-degree full turning deflection without separation, leakage, or restriction of the pipe waterway. Joint restraint shall be provided by a boltless means which is locked against accidental disengagement of the restraining component. Pipe shall be furnished with the necessary gaskets, lubricant, and retainer locking accessories.

Restrained, push-on joint, pipe shall be American Pipe's "Fast-Grip" gasket system; U.S. Pipe's "Field-Lok 350" gasket system; or, Griffin Pipe "Field-Lok 350" gasket system.

The use of retainer glands and set screws shall not be acceptable.

Lubricants used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

H. Pipe Wrapping:

All Cast Ductile Iron Pipe, Fittings, and Valves (except river crossing pipe) shall be fully wrapped with polyethylene per ANSI/AWWA C105/A21.5 and the details as contained on the plans.

I. Anodes

Anodes shall be high potential magnesium anode ingots with packaged backfill. Anode ingot shall meet or exceed ASTM B843, Grade M1C for high-potential magnesium anodes.

Anode shall come furnished with minimum 10 feet of coiled #12 AWG solid copper lead wire with TW, THHN or THWN insulation, firmly attached to the galvanized steel core of the anode. The core cavity shall be filled with electrical sealing compound to assure a fully insulated and protected connection. Magnesium anode and backfill shall be pre-packaged into a single unit in a permeable cloth bag.

Connection of anode lead wire to cast iron or ductile iron pipe or fittings shall be made by the thermite weld method. Thermite weld materials shall consist of wire sleeves, weld mold and weld cartridges according to the weld manufacturer's recommendations for the specific wire and pipe sizes and materials. Weld materials from different manufacturers shall not be interchanged. Weld molds shall be graphite molds. Ceramic "one -shot" molds will not be acceptable.

J. Casing Pipe:

Steel casing pipe used for construction at railroad or State highway crossings shall comply with the following minimum requirements unless more stringent requirements are established by the railroad or State. Casing pipes at other locations shall comply with the following minimum requirements unless otherwise indicated on the Plans or in the Specifications.

Nominal Diameter of Casing Pipe (Inches)	Minimum Wall Thickness (Inches)
Under 14	0.250
14, 16, and 18	0.312
20 and 22	0.375
24, 26, 28, and 30	0.500
32 and 34	0.563
36, 38, 40, 42, and 48	0.625

Steel pipe shall be non-spiral pipe and have a minimum yield strength of 35,000 psi. All joints shall be made leakproof using full penetration, continuous welds. Welds shall be ground smooth outside and inside (except inside 22 in. diameter and less) to prevent conflict with the soil or pipe placement. Steel pipe shall meet the requirements of ASTM A 53, Type E or S, Grade B.

Pipe Marking:

The following information shall be clearly marked on each length of pipe:

a) The pipe designation and class (e.g. A 53, Type S, Grade B.)
b) The name or trademark of the manufacturer.
c) Identification of the manufacturing plant.

Inspection:

All casing pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe that, independent of physical tests specified under the standard specifications designated herein, fails to conform to the requirements of these Specifications.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

K. Water Main Pipe Marking:

The following information shall be clearly marked and/or cast on each length of pipe:

a) The pipe designation and class (e.g., D.I., Class 50).
b) The name or trademark of the manufacturer.
c) Country where cast.

d) The year in which the pipe was produced.

The following shall be distinctly cast on each fitting:

a) The pressure rating of the fitting.
b) Nominal diameters of openings.
c) The name or trademark of the manufacturer.
d) Country where cast.
e) The number of degrees or fraction of the circle on all bends.
f) Ductile iron fittings shall have the letters "DI" or "Ductile" cast on them.

L. Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

All materials that will potentially be in contact with the City of Ann Arbor water supply must be certified by Underwriters Laboratory (UL) or the National Sanitation Foundation (NSF) for use in a potable water system. These materials shall include pipe coatings, pipe metals, cement linings, and joint lubricants and gaskets.

M. Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection. The Contractor shall also notify the Engineer when the material has arrived at the site.

All ductile iron water main pipe shall be stacked on pallets off of the existing grade, with each end plugged or bagged so as to keep the pipe interior clean until final installation.

Cast ductile iron pipe and fittings shall be subject to rejection on account of any of the following:

a) Variation in any dimension exceeding the permissible variations given in the material specifications.
b) Any crack or defect in the cement mortar lining which, in the opinion of the Engineer, is non-repairable, including, but not limited to, loose or "hollow" lining.
c) Any signs of physical damage or poor manufacturing which might render the material unsuitable for its intended use.
d) Variation of more than 1/16 inch per lineal foot in alignment of pipe intended to be straight.
e) Damaged ends, where in the judgment of the Engineer such damage would prevent making a satisfactory joint.
f) Improper handling during delivery, unloading, or installation.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

N. Water Main Bedding and Backfill Materials:

Bedding and backfill material for Trench Detail I (under roadbed), Modified, shall be Granular Material, Class II, meeting the requirements of Section 902. Bedding and backfill for Trench Detail V (outside of the 1:1 influence line of roadbed or curb and gutter), Modified, shall be Granular Material, Class II and Engineer approved native material, placed in accordance with the trench details.

c. Water Main Installation, Bacteriologic and Hydrostatic Testing, and Acceptance Requirements.- Installation of proposed water mains will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to all relevant MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

A. Dry Tap:

When a connection to an existing water main is to be made in the dry, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so that the connection may be made in the dry. All pipe materials and appurtenances which will come into contact with potable City water after the restoration of water service following the connections shall be disinfected with a strong chlorine solution prior to installation.

The Contractor may not operate City water main valves. For valve operation, contact City of Ann Arbor Public Services Area personnel; the City of Ann Arbor personnel will direct the operation of all valves by Contractor personnel. It is

recommended that the Contractor request that the existing valves, which will need to be operated in order to perform the water main work, are checked in advance of the work to ensure that they operate properly. If the Contractor elects not to request the operation of the valves in advance of any required water main operation, then a request for extension of contract time will not be allowed.

It is possible that the valves which need to be operated to facilitate a shutdown will not close entirely, thereby allowing water to leak past the valve into the area of the shut down. The Contractor shall provide the necessary labor, material, and equipment to enable work to be completed with a poor shut down. Under no circumstances shall the Contractor be compensated for "downtime" associated with water main valve or appurtenance failure or its inability to properly operate or close fully. An extension of contract time may be allowed, if the Contractor has requested that the water main valves have been exercised in advance of the intended water main shutdown.

Due to the size and length of pipe being shut down, and the quality of shut-down attained, large amounts of water may need to be removed from the excavation. Where possible, the water shall be run directly into nearby storm sewer inlets via pumps and hose.

The Contractor shall have all pipe, fittings and appurtenances required to complete the water main connection prior to the excavation for the connection, or the work will not be allowed to commence.

The Contractor shall complete the water main work in a manner which minimizes the disruption of water service to the greatest extent possible.

The City must notify all businesses 48 hours in advance of a water main shut-down; residences must be notified 24 hours in advance. To give the City an opportunity to provide such notification, the Contractor shall schedule the water main shut-downs at least 72 hours in advance, and preferably a full four or five days in advance, of the water main shut-down.

No water main shutdown shall take place after 12:00 p.m. (noon), unless written permission has been granted by the Engineer and that the Contractor has sufficient lighting equipment to provide a safe and efficient work area for working after dark. No water main will be shut down until the main has been exposed and cleaned, and is ready to be cut.

There shall be no gap larger than 1/4 inch left in the existing water main as a result of the tie-in. If needed, a closure piece ("thrust ring") of such size so as to meet this requirement shall be installed.

B. Wet Tap:

Prior to the installation of a tapping sleeve, the section of pipe to be tapped shall be cleaned of all foreign material and wire brushed to a smooth surface. The two halves of the sleeve shall be placed around the pipe with the gaskets installed per the manufacturer's instructions. The bolts shall be tightened evenly from the center toward the ends. The bolts shall be tightened to the manufacturer's specified torque.

When performing a wet tap in a prestressed concrete steel cylinder water main, grout is to be placed under the tapping saddle whether or not the saddle is epoxy coated.

All pipe materials and appurtenances which may come into contact with potable City water shall be disinfected with a strong chlorine solution prior to installation. This includes the pipe section to be tapped, the two halves of the sleeve, gaskets and the gate valve.

Prior to installation of the end gaskets, the sleeve shall be blocked with cement bricks such that the outlet is in proper position. The end gaskets shall be installed with an overlap as specified by the manufacturer.

The glands shall be assembled on the pipe. The bolts around the gland shall be tightened evenly, causing the gaskets to uniformly compress.

The valve shall be installed on the sleeve following the manufacturer's instructions.

Prior to tapping, the assembly shall be tested using the test plug tap in the sleeve with the valve closed, or by placing a tapped plug on the outlet of the valve with the valve open. The assembly shall be pressurized to l50 psi and hold the pressure fifteen minutes. After the pressure test is complete, the pipe shall be tapped.

C. Oversized Water Mains:

Portions of the proposed water mains or fittings may connect with existing water mains or fittings. The possibility exists that some of the existing water mains may have been constructed using oversized, cast iron, pipe. Where tie-ins or interconnections are specified and the existing main is found to be oversized, the Contractor shall furnish and install Clow 3501B Sleeves, Tyler Dual Sleeve 5-146L, or Rockwell 441 Sleeves. These sleeves are to be present on the jobsite prior to the excavation for the water main connection, or the work will not be allowed to commence.

D. Permissible Deflection at Joints:

Wherever it is necessary to deflect ductile iron pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions, to plumb valve stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint, and shall be approved by the Engineer. The deflection shall not exceed the following amounts:

Size of Pipe (Inches)	Joint Angle (Degrees)	Deflection in 18 ft. (Inches)	Approx. Radius of Curve Produced by Succession of 18 ft. Lengths (Feet)
4	5	19	205
6	5	19	205
8	5	19	205
10	5	19	205
12	5	19	205
16	3	11	340
20	3	11	340
24	3	11	340
30	3	11	340

The above joint deflection angles apply to fittings as well as pipe joints.

E. Trench Opening:

The Contractor shall fully comply with all laws and regulations governing construction methods and the furnishing and use of all safeguards, safety devices, protective equipment, and pollution controls. Where required to support the surfaces of adjacent roadways, structures, or excavations, or to protect the construction work, adjacent work, or workmen, the Contractor shall design and install sheeting, bracing, and shoring. The Engineer will not review the Contractor's design(s) or be responsible for the adequacy of the elements supporting the trench. The placing of such supports shall not release the Contractor of the responsibility for the sufficiency and integrity of the trench, trench opening, and the safety of all persons involved in the work.

Sheeting, bracing, and shoring shall not be left in place after completion of the work except as required by the Engineer. In the removing of sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to adjacent property. Where the Engineer requires the sheeting, bracing, or shoring to be left in place it shall be cut off below the established surface grade as required by the Engineer.

All excavation shall be performed in such a manner as to provide adequate room for the construction and installation of the work to the lines, grades and dimensions shown on the Plans. The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified.

For each size of pipe, the minimum trench width shall provide clearance of four inches on each side of the bell of the pipe or fitting or six inches on each side of the pipe barrel, whichever is greater. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports, sheeting and bracing, and handling of special fittings. The Work shall be performed such that the existing utilities, asphalt curb and gutter, and existing pavement shall be protected at all times.

In excavating for water mains, the excavation shall at all times be finished to the required grade in advance of the pipe line, but unless otherwise permitted in writing by the Engineer, not more than 50 feet of trench shall be open at one time in advance of the pipe. At no time shall more than 200 feet of trench be opened and incompletely backfilled. At the end of each day, no more than 10 feet of trench may be left open, and access to all drives shall be restored. This opening shall be surrounded by fencing and barricades, or plated. The remainder of the trenching operation shall be available for safe vehicular and pedestrian traffic at all times.

It is essential that the discharge of the trench de-watering pumps be conducted to natural drainage channels, drains, or storm sewers. Engineer-approved soil erosion and sedimentation controls shall be installed and maintained at the point of discharge.

The length of street which may be occupied by the construction work at any one time shall be subject to the approval of the Engineer and will be based on the requirements of use of the street by the public.

F. Boring Pits

The means and methods of boring pit excavation and support, in whatever conditions encountered or created, shall be determined by the Contractor, subject to approval by the Engineer. All costs shall be included in the Contract Price per lineal foot of bored water main. Perform all excavations required for construction of pits, shafts, and other structures. Excavations shall include any and all materials encountered in the Work, such as topsoil, clay, sand, gravel, cinders, rocks, boulders, fill, old timber, buried trees and roots, abandoned utilities, abandoned foundations and structures, buried debris, or any combination of these, in whatever condition found.

Provide and maintain all sheeting, shoring, and bracing required in shafts and pits, and open cut excavations to insure protection and safety of personnel and to protect adjacent structures, property and work in place. The Contractor shall be responsible for the complete design of all sheeting, shoring, and bracing work. The design shall be appropriate for the soil conditions, 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. Prior to installing the sheeting, shoring or bracing, the Contractor shall

submit plans for this work to the Engineer for informational purposes only. Sheeting, shoring, and bracing shall conform to the current federal or state regulations for safety.

Excavate as required to perform all boring work to the grades, lines and levels indicated on the Plans and as specified herein. 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. Locate the approach tunnel or working shaft or pit so that it will not unduly interfere with traffic or with the use of adjacent property.

Where required, control the infiltration of groundwater into the excavation. Use dewatering systems to lower the groundwater to below the bottom of the shaft or use other approved methods at no additional cost to the Owner.

Any relocations or removal and replacement of utilities, including gas mains, water mains, services, sewers, irrigation systems, signs, and other miscellaneous items required to construct shafts shall be incidental to the project unless otherwise specified.

Excavation under railroads shall conform to the requirements of the American Railroad Engineering Association (AREA) and the railroad corporation having jurisdiction.

G. Laying Pipe:

Each pipe shall be inspected for defects prior to being lowered into the trench. Inside of pipe and outside of spigot shall be cleaned of any earth or foreign matter.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of an excavator using chains, slings, or other suitable tools or equipment as recommended by the manufacturer, in such a manner as to prevent damage to them and their protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

New water main construction shall not be connected into the existing system until it has been tested and accepted by the Engineer. The Contractor shall excavate for all bell holes and shall place the bell of the pipe in the excavated bell hole. Pipe shall be laid on the prepared trench bottom with the bell ends facing the direction of laying, unless otherwise directed by the Engineer.

The Contractor shall take every precaution to prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At times when

pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply during the noon hours as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Pipe shall be jointed as specified elsewhere herein. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space.

All pipe shall be laid at the correct line and grade as indicated by the grade stakes and offset line. Each pipe, as laid, shall be checked by the Contractor to ensure that this result is obtained. The staking shall be provided by the Engineer. No pipe shall be laid until a cut sheet for that pipe has been approved by the Engineer. The grade as shown on the Plans is that of the top-of-pipe for water main; and, the work must conform to this profile. For water main construction, a variation from the profile grade of two inches with ductile iron pipe, and three inches with reinforced concrete pipe, will be deemed sufficient reason to cause the work to be rejected and re-laid. Water main pipe alignment shall be maintained so as not to vary more than three inches from the correct line. Any pipe found out of line shall be re-laid properly by the Contractor.

Due to conditions in the field, changes to the proposed vertical and horizontal alignment of the proposed water main may become necessary. The Contractor shall, where directed by the Engineer, excavate up to 60 feet in advance of the pipe laying operation to expose existing underground facilities thereby enabling the Engineer to make alignment decisions. The Contractor is required to realign (re-lay) the water main up to 2 feet vertically and/or horizontally as directed by the Engineer at no extra cost to the project. The excavation in advance of the pipe laying is intended to help eliminate the need for re-laying pipe.

H. Crossing Existing Structures and Facilities:

During the construction it may be necessary to cross under or over certain sewers, drains, culverts, water lines, gas lines, electric lines, fiber optic communication, telecommunication, and other types of underground structures or facilities, known or unknown. The Contractor shall make every effort to prevent damage to such underground structures and facilities. The Contractor shall not intentionally damage or break existing structures or facilities and repair them in order to expedite the water main installation process. Wherever such structures or facilities may inadvertently be disturbed or broken, they shall be restored to a condition that is equal to, or better than, that was encountered prior to the damage. All damaged structures and/or facilities shall be made fully acceptable to the owner and the City, at the Contractor's expense. All crossings shall be made with a

minimum of twelve inches of vertical clearance between or alongside existing structures or facilities.

I. Cutting Pipe:

Cutting cast iron or ductile iron pipe for inserting valves, fittings, or closure pieces shall be performed in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the longitudinal axis. Where the type of pipe joint in use is such that it employs push-on assembly to affect the joint seal, the outside of the cut end shall be tapered back 1/8 inch with a coarse file or a portable grinder at an angle of about 30 degrees. The tapering must remove all sharp and/or rough edges which might injure the gasket.

The flame cutting of pipe will not be allowed. Reinforced concrete water main pipe shall not be cut.

J. Setting Water Main Fittings and Accessories:

Valves, fittings, plugs, hydrants, etc. shall be set and joined to pipe in the manner specified in the Section entitled "Making Joints."

Hydrants shall be located as shown on the Plans or as directed by the Engineer in such a manner as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians.

Hydrants shall be set to stand plumb with their nozzles parallel to the street and the pumper nozzle facing the street. Hydrants shall be set with pumper nozzles between 18 and 24 inches above finished grade, or as directed in writing by the Engineer.

K. Making Joints:

Mechanical means shall be used for pulling home all rubber-gasket pipes regardless of trench condition where manual means will not result in pushing and holding the pipe home. When a trench box or liner is used, a cable shall be used to pull the joints home and hold them in position.

Where work is performed in wet trenches or trenches with running sand, the Contractor shall provide and use mechanical means for pulling the pipe home in making up the joint and for holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside or outside of the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

Where not required by these Specifications, manual means will be acceptable only if the joints can be pushed home and held.

L. Anchorage for Water Main Fittings and Accessories:

All plugs, caps, tees, hydrants, and bends shall be provided with MDOT Grade S2 concrete meeting the requirements of Section 701 of the 2012 MDOT Standard Specifications for Construction reaction backing (thrust block) as shown on the Plans or specified herein. Valves shall be restrained from movement at adjacent sleeves by the use of a closure piece, or thrust ring (full size pipe section cut to fill the gap inside the sleeve to within 1/4") as specified herein.

Reaction backing shall be placed between unexcavated solid ground and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance shall be that shown on the details or directed by the Engineer. The reaction backing shall, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repairs. This shall include adequate protection of any bolts from direct contact with the concrete.

Metal harnesses of tie rods or clamps may not be used instead of concrete reaction backing. Mega-Lug joint restraint systems and restrained, push-on joint, pipe shall be used where connections to existing lines require immediate pressurization, as specified herein.

In the event that the Engineer determines a change in the anchorage or design is required due to unsuitable earth conditions, changes may be ordered by the Engineer.

The use of friction clamps or set-screw type retainer glands for thrust restraint will not be allowed.

M. Casing Pipe Installation

Casing pipe I.D. shall be a minimum of 6-inches larger than the largest O.D. of the water main pipe. Larger diameter casing pipes shall be required where so noted on the plans. Place pipe to the lines and grades indicated on the Plans. Use care to not damage pipe, joints or joint material.

Perform boring or auguring excavation by excavating an opening larger than the outside diameter of the pipe to be installed. The diameter of the excavation shall not exceed the outside diameter of the casing pipe by more than 1-inch. Employ grouting or other methods approved by the Engineer to fill voids within 48 hours of completing the bore.

N. Abandonment or Removal of Water Main:

The Contractor shall abandon or remove water main(s) where shown on the Plans. All work shall be performed in accordance with the Detailed Specification entitled "Water Main and Appurtenances, Remove or Abandon."

O. Water Main Testing:

The water main shall be disinfected and tested by the Contractor in the presence of the Engineer in accordance with the requirements below. The Contractor shall furnish all piping, pumps, hoses, gauges, and other materials and equipment required to carry out the tests using water from the City's water mains. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course. Any hoses which are needed to direct water from blow-offs and/or hydrants during water main testing and flushing shall be supplied by the Contractor. The City shall furnish and install one inch corporation stops at all necessary locations, at the expense of the Contractor. The tapping of water mains, the installation of all corporation stops, and the operation of valves and hydrants is reserved for City personnel. The Contractor is required to assist in valve and hydrant operation, however. The Contractor shall give the City forty-eight hours prior written notice of intent and desire to test water mains.

P. Bacteriological Testing Sequences:

In the case of all water mains connected to existing facilities, flushing, chlorination and bacteriological testing must precede pressure testing. Where mains can be totally isolated from existing facilities with air gaps or double valves, pressure testing may precede chlorination and bacteriological testing. The normal sequence and time requirements for testing are:

Isolated (Gapped) Water Main	Connected Water Main
1. Fill Main	1. Flush and Swab*
2. Pressure Test	2. Chlorinate
3. Connect One End of Main	3. Wait; 24 hours
4. Flush and Swab*	4. Flush**
5. Chlorinate	5. Wait; 24 hours
6. Wait; 24 hours	6. Bacteriological Samples
7. Flush**	7. Wait; 24 hours
8. Wait; 24 hours	8. Bacteriological Samples
9. Bacteriological Samples	9. Wait; 48 hours
10.Wait; 24 hours	10. Pressure Test (If both sets of Bacteriological samples pass)
11.Bacteriological Samples	11. Flush
12. Wait; 48 hours	12. Wait; 24 hours
13. Make Final Connection(s) – Place in Service (If both sets of bacteriological samples pass)	13. Bacteriological Samples
	14. Wait; 24 hours

	15. Bacteriological Samples
	16. Wait; 48 hours
	17. Place in Service (If both sets of bacteriological samples pass)

*Collect flush water in operable storm water retention/detention facility.
**Discharge flush water into approved sanitary sewer.

The Contractor shall not connect any end of a newly constructed water main to an existing, in-service, water main, until the newly constructed water main passes the hydrostatic test, unless approved in writing by the Engineer.

Q. Hydrostatic (Pressure Test):

Insofar as is practical, mains shall be pressure tested between valves. The maximum length of water main to be tested in any one test shall be 1500 feet. The section of main to be tested shall be slowly filled with potable water and the entrained air within the pipe removed or absorbed and pumped up to a pressure of 150 psi (or other pressure if specified) and the test period shall start immediately thereafter. The lines shall then be maintained under a test pressure of 145-155 psi for a continuous period of three hours by pumping chlorinated (25 ppm) water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the line under test during the interval. Visible leaks shall be repaired regardless of test results. The leakage under the conditions of the test shall not exceed the values shown in the table below. If one side of a double disc gate valve is under test pressure, that seat shall count as four joints.

Maximum Allowable Leakage per 100 Joints at 150 psi Avg. Test Pressure

Pipe Diameter (Inches)	4	6	8	10	12	16	20	24	30	36
Leakage (gallons/hr)	0.66	0.99	1.32	1.66	1.99	2.65	3.30	3.97	4.97	5.96

In the event that the leakage exceeds the maximum allowable leakage as specified above, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or fittings found to be leaking shall be removed and replaced with new pieces by the Contractor. After this work has been performed, all tests shall be repeated.

R. Flushing and Swabbing:

The Contractor shall flush the water main after making a connection to the existing City water main where a valve separates the new water main from the

existing main. As a result, flushing will be accomplished using flow through the full size of the new water main. If a storm water retention/detention facility is to be constructed as part of the project, this facility is to be completed, stabilized, operable, and utilized for the collection of the flushing water. All pipe, materials, and appurtenances which will come into contact with potable City water after the restoration of water service following the connection shall be disinfected with a strong chlorine solution prior to installation.

Water main shall be cleaned using a high density poly-pig, Girard Aqua Swab (2 lbs/ft3 density) swab, or Engineer approved equal and flushed. The diameter of the blow-off pipes shall be at least 50% of the diameter of the pipe being flushed. Hydrants, with internal components removed, may serve as blow-offs for mains 12 inches and less. The Contractor shall provide details, for the review and approval of the Engineer, for the various required blow-offs. Blow-off pipes, discharge hoses, where needed, and associated costs shall be included in the cost of the permanent water main being installed and will not be paid for separately. If there are no branch connections to be swabbed, the poly-pig shall be inserted in the new water main at the time of connection described above. The poly-pig shall be located on the "downstream" or new side of the separation valve. The poly-pig shall then be forced through the new water main during the first flush and discharged through a construction blow-off of sufficient size to allow passage of the poly-pig. For water mains with branch connections, a launching tee or wye shall be installed as shown in the details, for launching multiple poly-pigs. The main line and each branch main shall be flushed and swabbed individually. Following the successful final bacteriological testing of the water main, the launching tee/wye shall be permanently capped at its branch.

During the flushing and swabbing of a water main, the discharge point for the main shall be left open, with all other discharge points closed, to direct the poly-pig completely through the main being swabbed to its point of termination. Following the initial swabbing of water main, the separation valve shall be closed, and then the discharge point closed. If a branch water main is to be swabbed, the poly-pig is then to be placed in the launcher; the discharge point for the branch water main is to be opened; the poly-pig is to be inserted into the water main; the separation valve partially opened and the branch water main flushed and swabbed.

Following the swabbing of the water main(s), the water main(s) are to be flushed as required. If approved or directed by the Engineer, the water main(s) may be flushed overnight, provided that proper controls (i.e. hoses directed into storm structures, etc.) are installed to direct and control the flushing water.

S. Chlorination:

After the water mains to be tested have been acceptably flushed, they shall be disinfected in accordance with AWWA C651 "Disinfecting Water Mains" and these Specifications. All new mains and fittings, and any existing mains contaminated by

the Contractor, shall be chlorinated to a minimum residual of fifty (50) parts per million (ppm) with commercial liquid chlorine solution (sodium hypochlorite - pool type). Other forms of chlorination and disinfection methods of water mains may be presented by the Contractor and shall receive prior approval in writing by the Engineer before being used. The minimum recommended dosage of sodium hypochlorite is as follows (based on 10% available chlorine):

Recommended Minimum Chlorine Dosage to Disinfect 100 L.F. of Pipe

Pipe Diameter (inches)	10% Chlorine Solution (gallon)
6	0.153
8	0.272
10	0.426
12	0.613
16	1.090
20	1.703
24	2.452

The chlorinated water shall remain in the mains for a minimum of 24 hours, at the end of which period the chlorinated water at all parts of the main must show free available chlorine residual of at least twenty-five (25) ppm. If less than 25 ppm residual is shown at the end of the first 24 hour period, additional chlorine shall be added until a residual of not less than 25 ppm at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and disposed of into an existing, approved City sanitary sewer main, or other location approved in writing by the Engineer. All chlorinated water shall be discharged directly to the sanitary sewer and will not be allowed to be discharged to the ground or any surrounding water course. The mains shall then be left full of water ready for bacteriological testing.

T. Bacteriological Testing:

The City will obtain bacteriological samples of the water in the mains for analysis from testing blow-offs, corporations, or other sampling points as determined acceptable by the City. Samples will be taken after the mains have been satisfactorily chlorinated in accordance with these Specifications, the chlorinated water flushed out and removed, and the mains filled with potable water. The water samples will only be bacteriologically tested at the City's Water Treatment Plant Laboratory; the use of other laboratories or testing locations shall not be allowed or deemed to provide satisfactory test results by the City of Ann Arbor under any circumstance. No samples will be deemed acceptable until they meet all city requirements. If the newly constructed water main is connected at one end to an in-service section of the City water main, and the chlorination precedes pressure

testing, the City will also take samples after satisfactory pressure testing. In each case, two sets of samples shall be taken; a period of 24 hours must elapse between flushing of the main and drawing of the first samples, with the second samples being drawn 24 hours after the first samples were drawn. For each sample, a minimum of 48 hours is required to obtain test results. All samples must pass the bacteriological test.

The Contractor shall plan for these testing sequences and durations in his construction schedule. Contract time will continue during all water main testing phases, regardless of duration.

d. Construction, General Requirements.- coordination with the City of Ann Arbor Field Operations Unit for the installation of 1-inch corporations in the gate wells to be used for water main testing and/or filling of new main.

The Contractor must have all materials, fittings, pumps and other miscellaneous equipment, and personnel on-site before the City of Ann Arbor Public Services personnel will prepare and shutdown and existing main.

The bedding and backfill for Trench Detail I (under roadbed), Modified, shall be MDOT Granular Material, Class II compacted to 95% of its maximum dry density in maximum lifts of 12 inches. The bedding and backfill for Trench Detail V (within 1:1 influence of the roadbed or curb and gutter), Modified, to a point 12 inches above the top of pipe, shall be MDOT Class II sand compacted to 95% of its maximum dry density. The material above this point shall be Engineer-approved native material compacted to 90% of its maximum dry density.

The Contractor shall dig-up and expose all utility crossings prior to laying any water main pipe. This will allow the Engineer to adjust the grade of the water main, if possible, to avoid the existing utilities. The costs of the 'dig-ups", and all related costs, shall be included in the respective items of work in this Detailed Specification. Some "dig-ups" may need to occur out of Phase.

Should the water main, or other pay items in this Detailed Specification, conflict with abandoned sewers or water mains, the conflicting section of the abandoned sewer or water main shall be removed and the remaining sections shall be (re)abandoned in accordance the Detailed Specification for "Water Main and Appurtenances, Abandon" and the Detailed Specification for "Sewer, Any Size or Depth, Abandon," except that flow filling the sewer will not be required. All the work shall be included in the cost of the water main, or other pay items in this Detailed Specification.

e. Excavate and Backfill For Water Service Tap And Lead - This work shall consist of exposing new water mains and excavating and backfilling a trench from the water main as directed by the Engineer for the purpose of transferring existing water services to new water mains or replacing existing water services as necessary.

The trench is to be excavated to the applicable MIOSHA standards for the purposes of transferring water services, installing water service taps, leads, and curb stops and boxes. The City will furnish all labor and materials for taps, leads, and curb stops and boxes. The Contractor will not be entitled to extra compensation due to delays caused by City of Ann Arbor personnel in performing work on the project. The Contractor shall be responsible for all coordination with the City of Ann Arbor – Field Operations personnel for the scheduling and execution of the work.

Granular Material, Class II bedding (3 inch) and backfill material shall be placed in lifts not to exceed 12 inches and compacted to a minimum of 95% of its maximum dry density as measured by the AASHTO T-180 test.

f. Lighting Requirements for Nighttime Water Main Work.- Night work shall be lighted to an average intensity of 10 foot-candles minimum. Sufficient light sources shall be provided to achieve this illumination requirement. The lighting scheme shall be submitted to the Engineer for review and approval a minimum of 72 hours prior to the anticipated commencement of the nighttime work. Nighttime work will not be allowed to begin until such time as the lighting scheme has been approved by the Engineer.

The lighting shall allow the inspector to clearly see and inspect all work operations. Light sources shall be adjusted as directed by the Engineer, as many times as needed, in order to meet the requirement.

Lighting systems may be fixed, portable, or equipment mounted. A power source shall be supplied with sufficient capacity to operate the lighting system. The power source shall not violate any local noise ordinance requirements. The lighting system(s) shall be arranged such that they do not interfere with the vision of motorists, glare or shine in the eyes of oncoming drivers, or unnecessarily illuminate surrounding properties or residences. After initial set-up, drive through and observe the lighted area from each direction on the roadway. Adjust lighting units as many times as needed in order to comply with these requirements.

g. Sequence of Construction.- All water main construction shall be completed in accordance with the Detailed Specification entitled "Maintaining Traffic and Construction Sequencing" and as detailed herein. The Contractor shall schedule and coordinate all water main shutdowns with the Engineer. The Contractor shall submit for the Engineer's review and approval the sequence of all water main "shut downs" and tie-ins such that disruption in service to existing properties is minimized to the greatest extent possible. Should the Engineer not accept the Contractor's proposed construction sequence, it shall not be a basis of claim for extension of contract time or additional compensation.

All water main and appurtenances shall be pressure tested, cleaned, disinfected and bacteriological tested in accordance with the specifications outlined within this Detailed Specification.

After acceptance of each section of new main the Contractor shall begin coordination with the City of Ann Arbor Public Services Area for the reconnection of water services.

h. Measurement and Payment.- The completed work will be paid for at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Item 284: Sacrificial Anode, ___ lbs	Each
Item 285: CL-50, D.I. Water Main, w/ Poly Wrap, ___ inch, Tr Det I, Mod	Foot
Item 286 and 287: Bends And Reducers, ___ inch	Each
Item 288: Cross, 12 inch x __ inch	Each
Item 288: Tee, ___ inch x ___ inch x ___ inch	Each
Item 289: Fire Hydrant Assy, w/Extensions, Complete	Each
Item 290: Gate Valve-in-Box, ___ inch	Each
Item 291: Gate Valve-in-Well, ___ inch	Each
Item 292: Tapping Sleeve & Valve-in-Box	Each
Item 293: Excavate and Backfill for Water Service Tap And Lead	Lft

All work shall be paid in full at the contract unit prices which shall include all labor, materials and equipment required including all required costs associated with night time work, supplemental lighting, and all other required elements of the work.

Water main pipe per lineal foot includes restrained joints where called for on the plans.

Water main in bored steel casing includes all excavation, boring pits, sheeting, shoring, bracing, backfilling, casing pipe and water main in casing.

Fittings other than those specifically listed as separate contract items, blow-off assemblies, hoses, and restrained joint pipe and gaskets, special gaskets, and the like, shall not be paid for separately, but shall be considered included in the payment for "CL-50, D.I. Water Main, w/Poly Wrap, ___ inch, Tr Det ___." Tees, Bends, and Reducers and other fittings specifically listed as separate contract items (pay items), shall be paid for at the contract unit price for each unit installed.

Gate Valve-in-Box includes the Valve Box. Valve Box Extensions will only be paid for if they are required by the plans and they are not required due to the Contractor's operations.

"Excavate and Backfill for Water Service Tap and Lead" shall be paid for per each trench excavated in total at the location where the new and existing water services are to be reconnected. The Contractor shall be aware that the plan quantities are estimates only. The actual amount of excavation and backfill may be significantly more or less based on actual field conditions. Price adjustments based upon Section 103.02.B shall not apply to this item of work.

"Sacrificial Anode, ___ lbs" shall include excavation, thermite welding anode lead to existing watermain, and backfilling excavation as specified.

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
Item 294: Water Main Pipe Abandonment
Item 295: Water Main, Abandon w/Flowable Fill
Item 296-01: Gate Valve-in-Box, Abandon
Item 297-01: Gate Valve-in-Well, Abandon
Item 298: Fire Hydrant, Rem

WT:VCM:CGT 1 of 2 05/05/22

a. Description.- This work shall include abandoning or removing existing water mains, valves, valve wells, valve boxes, and fire hydrant assemblies of various sizes as required by the Plans. All work shall be performed in accordance with the project plans, as detailed in this Special Provision, and as directed by the Engineer.

b. Materials.- All materials shall meet the requirements specified in Division 9 and 10 of the MDOT 2020 Standard Specifications for Construction as follows:

Granular Material, Class II.....Section 902
Masonry Units .....Section 913
Mortar Type R-2 .....Section 1005

Push-on joint plugs and thrust blocks shall conform to the requirements as detailed in the Detailed Specification on Water Main and Appurtenances.

c. Methods of Construction.- The Contractor shall abandon water mains where shown on the Plans and as directed by the Engineer. This includes, but is not limited to, cutting the main at each end, plugging the live main at the end(s) with push-on joint plug(s) and thrust block(s), plugging the abandoned main at its end(s) with brick and mortar, concrete, or mechanical joint plug, breaking down any manholes (remove manhole ring and cover and the top 4' of manhole structure, breaking out the manhole base, and backfilling as specified herein) in the abandoned line, removing and salvaging any valves and fittings, plugging the pipe in manholes with brick and mortar, concrete, or mechanical joint plugs.

In locations as shown on the Plans or where abandoned water main, valves or valve wells are within 30 inches of the proposed subgrade, the pipe, valves or valve wells shall be removed completely. The resulting hole or trench shall be backfilled with Granular Material, Class II, in maximum lifts of 12 inches, and be compacted to 95% of its maximum dry density, if located within the public rights-of-way, railroad rights-of-way, or within the influence of paved surfaces or structures. Applicable road pavement cross-section, per plans, shall be installed per plans and as directed by the Engineer. Otherwise, backfill shall be Engineer approved native material, compacted to 90% of its maximum dry density, in lifts of 12 inches or less, unless otherwise noted on the plans.

Abandoned (salvaged) or removed valves and fire hydrant assemblies shall be neatly stacked on-site in a single location so that City of Ann Arbor forces can retrieve them at a later date. The Contractor shall assist City forces by loading them into City trucks. All

costs associated with storing, stockpiling, and loading valves and hydrants into City vehicles will not be paid for separately.

d. Measurement and Payment.- The completed work as measured shall be paid at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	Pay Unit
Item 294: Water Main Pipe Abandonment	Linear Foot
Item 295: Water Main, Abandon w/Flowable Fill	Linear Foot
Item 296-01: Gate Valve-in-Box, Abandon	Each
Item 297-01: Gate Valve-in-Well, Abandon	Each
Item 298: Fire Hydrant, Rem	Each

"Water Main Pipe Abandonment" and " Water Main, Abandon w/Flowlable Fill" shall be measured and paid for by length in lineal feet and shall include all labor, materials, and equipment necessary to abandon or remove the pipe including, but not limited to; excavation; cutting of pipe; furnishing and installing push-on joint plugs and thrust blocks; constructing brick and mortar bulkheads; the furnishing, placement, and compaction of approved granular backfill material, as required; and, the removal and proper disposal off-site of excess materials.

"Gate Valve-in-Box, Abandon", "Gate Valve-in-Well, Abandon", and "Fire Hydrant, Rem" shall be paid for at the contract unit price for each unit abandoned or removed.

Payment shall include all labor, materials, and equipment necessary to completely abandon or remove the valve, including removing and salvaging the valve, valve boxes, and manhole rings and covers. Also included is the removal of the top 4 feet of valve wells; breaking out the valve well base; furnishing, placement, and compaction of approved granular backfill material, as required; stockpiling valves for future City use or removal; and, the removal and disposal of excess materials. Payment for Fire Hydrant, Rem includes payment for abandoning the companion valve.

CITY OF ANN ARBOR

DETAILED SPECIFICAITON
FOR
TRAFFIC SIGNAL EQUIPMENT

WT:JNB 1 of 1 05/06/2022

a. Description. This work consists of furnishing and installing traffic signal equipment in accordance with the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, as shown on the plans, and as specified herein.

b. Materials. Provide materials in accordance with sections 918 and 921 of the MDOT 2020 Standard Specifications for Construction.

c. Methods of Construction. The construction methods used for traffic signal equipment shall conform to sections 818 and 820 of the MDOT 2020 Standard Specifications for Construction.

d. Measurement and Payment. Measure and pay for the completed work, as described, at the respective contract unit prices using the following pay item:

Pay Item	**Pay Unit**
TS, Face, Bag	Each
TS, Face, Bag, Rem	Each
Traf Loop	Each
TS, Pedestrian, _____ Mtd, Rem	Each
Case Sign, Rem	Each
Pedestal, Rem	Each
Pedestal Fdn, Rem	Each
Conduit, Rem	Foot
TS, Pedestrian, __ Way, ____ Mtd (LED), Countdown	Each
Pedestal, Alum	Each
Pedestal, Fdn	Each

Payment for signal equipment includes all labor, material, and equipment required for furnishing and installing the signal equipment as shown on the plans and as specified herein.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PRECAST CONCRETE PEDESTAL SIGNAL FOUNDATION AND PRECAST UNDERGROUND SERVICE PEDESTAL (METAL) FOUNDATION

STR:POJ 1 of 1 APPR:RWS:MJF:06-02-20
FHWA:APPR:06-04-20

a. Description. This work consists of fabricating, furnishing, and installing precast concrete foundations to be used for pedestal pedestrian signals and underground service pedestals (metal), as shown in the contract, and in accordance with the standard specifications except as modified herein.

b. Materials.

1. Concrete. Use concrete grade 3500 or 3500HP in accordance with section 1004 of the Standard Specifications for Construction.

2. Anchor bolts. Use *ASTM F1554 Grade 36.*

3. Reinforcing Steel. Must meet section 905 of the Standard Specifications for Construction.

4. Open-Graded Aggregate, 34R.

c. Fabrication. Fabricate at a commercial precast facility certified by *Precast/Prestress Concrete Institute (PCI)*, *National Precast Concrete Association (NPCA)*, or *American Concrete Pipe Association (ACPA)*. Provide quality control and notify the Engineer prior to fabrication to provide the opportunity for quality assurance inspection. The Engineer may elect to forego this inspection but not the certification requirements. Provide steel reinforcement as necessary to protect foundations from any shipping, handling, or installation damage. Precast foundations are subject to rejection by the Engineer for visible damage or improper material documentation during fabrication and at time of delivery and installation.

d. Construction. Ensure precast pedestal signal foundations are placed plumb and level in the excavation on 6 inches of 34R open-graded aggregate, with an annular space of 3-6 inches. Fill the annular space with 34R in one-foot lifts and compact each lift. Restore disturbed areas in kind in accordance with section 816.

e. Measurement and Payment. The completed work, as described, will not be paid for separately but will be included in the associated pay item(s) covered in subsection 820.04 of the Standard Specifications for Construction.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RECABLE, TRAFFIC SIGNAL

SIG:JYP 1 of 1 APPR:EMS:DBP:11-04-21

a. Description. The work consists of removing existing cable and installing new traffic signal cable to existing traffic signal heads as required due to the relocation or removal and installation of the traffic signals, or the installation of a new traffic signal controller, as indicated on the plans.

b. Materials. Furnish materials in accordance with subsection 918.03 of the Standard Specifications for Construction. Refer to the plans for cable type.

c. Construction. Recable the traffic signal(s) in accordance with subsection 818.03 of the Standard Specifications for Construction. Replace the cable from the controller cabinet to the signal with no splices. Install replacement cable of sufficient length as directed by the Engineer.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	**Pay Unit**
Recable, TS	Foot

Recable, TS will be measured per foot of cable in place from the controller to the signal for replacement of the traffic signal cable for an existing vehicular signal, pedestrian signal, or combination of both and includes terminating both ends.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
WIRELESS VEHICLE DETECTION SYSTEM

SIG:EMS 1 of 6 APPR:HLO:NJB:05-05-20
FHWA:APPR:05-06-20

a. Description. This work consists of completing one or more of the following work types at locations shown on the plans:

1. Furnishing and installing a wireless vehicle detection system (VDS) including serial port protocol (SPP) radios, master interface access point contact closure (APCC) card, extension (EX) cards, and Isolator Module.

2. Furnishing and installing a repeater (RP).

3. Furnishing and installing a vehicle sensor node (VSN).

4. Removing and disposing of an existing wireless VDS.

5. Removing, storing and reinstalling an existing wireless VDS.

6. Removing and disposing of an existing RP.

7. Removing, storing, and reinstalling an existing RP.

8. Removing and disposing of an existing VSN.

9. Removing, storing, and reinstalling an existing VSN.

As applicable, this work includes removal or installation of mounting brackets, hardware, cable, connectors, grounding, sensors and orange epoxy and any other material required to ensure a complete removal or installation, as specified for a location.

b. Materials. Provide materials, as directed by the Engineer, necessary to provide a complete and operating job. Provide materials in accordance with sections 918 and 921 of the Standard Specifications for Constructions and this special provision.

1. Vehicle Detection System (VDS).

   A. A complete VDS consists of:

      (1) Master interface APCC card;

      (2) EX card if required;

      (3) Isolator Module;

(4) Mounting rack and hardware;

(5) The quantity of SPP radios as specified on the plans including *NEMA 4X type* enclosure with mounting bracket and hardware and Category 5e (CAT-5e) 600 volt (V) rated cable from the SSP to the Isolator Module;

(6) Any associated cable, connectors and hardware necessary to complete the work.

B. Provide a VDS that:

(1) Detects and counts vehicles using battery powered magnetometers utilizing wireless communications to transmit detection information;

(2) Provides vehicle counts per lane, lane occupancy, vehicle speed (when more than one VSN is installed per lane), and vehicle classification (when one or more VSN is installed per lane);

(3) Allows the time intervals for the above measurements to be user selectable from 30 seconds to 24 hours.

C. Provide an SPP radio that:

(1) Consists of a 2.4 gigahertz (Ghz) Master transceiver powered via CAT-5e cable;

(2) Includes 600V rated CAT-5e cable from the SPP to the Isolator Module;

(3) Includes an enclosure with mounting bracket, and associated hardware;

(4) Transmits detection information to a 170, 2070 or *NEMA type* controller in real-time;

(5) Operates on 48 volt direct current (VDC) at 3 watt power or via non-isolated external 10 to 15VDC at 2 watt power;

(6) Operates in an ambient temperature range of -37 degrees Fahrenheit (F) to +176 degrees F (-38 degrees Celsius [C] to +80 degrees C);

(7) Provides 1500V isolation and 5 kilovolt (kV) surge protection;

(8) Is housed in a plastic enclosure, no larger than 12 inches high, 8 inches wide, and 4 inches deep, meeting *NEMA 4X* and *International Protection Rating (IP67) standards.*

D. Provide a master interface APCC card that functions as the hub of the sensor network, communicating with up to 96 VSN's transmitting detection information to the APCC.

2. Vehicle Sensor Node (VSN).

A. A complete VSN consists of:

(1) A magnetometer,

(2) A microprocessor,

(3) A wireless transceiver,

(4) A battery, and

(5) Orange epoxy for securing the node in the pavement.

B. Provide a VSN that:

(1) Is 1.9 inches high, 2.9 inches square;

(2) Is contained in a fully encapsulated housing to prevent moisture from degrading the components;

(3) Operates in an ambient temperature range of -37 degrees F to +176 degrees F (-38 degrees C to +80 degrees C);

(4) Operates on battery power for a minimum of 10 years under normal traffic conditions;

(5) Detects a vehicle by measuring a change in the earth's magnetic field and transmits the detected information within 125 milliseconds (ms) of receiving the detected vehicle;

(6) Can be programmed with a unique identifying code and transmits this code and detector information via a wireless radio communication method;

(7) Automatically recalibrates in the event of a detector lock;

(8) Responds within 100 seconds after the AP is powered up.

3. Wireless Repeater (RP).

A. A complete RP consists of:

(1) A battery operated transceiver;

(2) A battery with a minimum 8 year life; and

(3) An enclosure with mounting bracket and associated hardware.

B. Provide an RP that:

(1) Is housed in a plastic enclosure, no larger than 12 inches high, 8 inches wide, and 4 inches deep, meeting *NEMA 4X* and *International Protection Rating (IP67)*

standards;

(2) Extends the effective communication range of the VSN to the SPP up to 1000 feet; and

(3) Operates in an ambient temperature range of -37 degrees F to +176 degrees F (-38 degrees C to +80 degrees C).

4. Bus Interface Unit (BIU). Provide a BUI that meets the requirements of *Section 8 of the NEMA TS2-Specification*. Provide one 6 foot Port 1 communications cable to connect from the detector rack BIU to the controller unit.

5. Wireless Communication. Provide a VDS, RP, or VSN that operates in the unlicensed Industrial, Scientific and Medical (ISM) 2.4GHz band. Ensure the SPP and VSN operate in any one of the 16 channels available in the band. Provide two-way communication between the SPP and VSN to ensure integrity over the RP interface. Provide a VSN that uses a Time Division Multiple Access (TDMA) protocol wherein each sensor is assigned a time slot during which it transmits and receives one or more data packets. Ensure all system components are synchronized to the same time reference sourced by the APCC.

6. Software. Provide a VDS that is capable of accepting software and firmware upgrades. Provide software required to configure the VSN, SPP and RP units and to store and retrieve the detection data. Ensure the VSN and RP are reconfigurable by a user over the wireless communication interface.

7. Warranty. Provide materials with a manufacturer's warranty, transferable to the MDOT, that the supplied materials are free from all defects in materials and workmanship. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing the date of shipment, to the Engineer prior to acceptance.

c. Construction. Complete the work in accordance with sections 819 and 820 of the Standard Specifications for Construction, as shown on the plans, and as directed by the Engineer. Remove, store, and dispose of material in accordance with section 204 of the Standard Specifications for Construction.

1. Installation. When installing new equipment is specified, furnish and install the VDS, RP or VSN as shown on the plans. Installation includes master interface APCC card, EX card as required, Isolator Module, mounting brackets, hardware, cable, connectors, grounding, sensors and other appurtenances required for a complete system.

Install the VSN in a 4 inch by 2¼ inch hole, cored in the pavement in the traffic lane as indicated on the plans, or as directed by the Engineer. Encapsulate the VSN with orange epoxy.

Install the SPP and RP within range of the sensors and as indicated on the plans, or as directed by the Engineer.

2. Removal. When removal is specified, remove the existing VDS, VSN or RP units, associated enclosures, mounting brackets, hardware, and other appurtenances required for a complete removal. Dispose of removed materials.

3. Salvage. When salvage is specified, remove the existing VDS, VSN, or RP units,

associated enclosures, mounting brackets, hardware, and other appurtenances required for a complete removal, store salvaged materials in a protected and clean environment, and re-install the materials. Complete reinstallation in accordance with subsection c.1 of this special provision.

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

Pay Item	**Pay Unit**
Wireless Vehicle Detection System	Each
Wireless Vehicle Sensor Node	Each
Wireless Repeater	Each
Wireless Vehicle Detection System, Rem	Each
Wireless Vehicle Sensor Node, Rem	Each
Wireless Repeater, Rem	Each
Wireless Vehicle Detection System, Salv	Each
Wireless Repeater, Salv	Each
Wireless Vehicle Sensor Node, Salv	Each

1. **Wireless Vehicle Detection System** includes installing a wireless vehicle detection system including the SPP radios, the master interface APCC card, BIU, the EX cards, and the Isolator Module. The work includes all mounting brackets, hardware, cable, connectors, grounding, and all appurtenant material required to complete the work.

2. **Wireless Vehicle Sensor Node** includes installing a wireless vehicle sensor node including the sensors, orange epoxy, and all appurtenant material required to complete the work.

3. **Wireless Repeater** includes installing a wireless repeater including the RP, mounting brackets, hardware, and all appurtenant material required to complete the work.

4. **Wireless Vehicle Detection System, Rem** includes removing a wireless vehicle detection system including the SPP radios, the master interface APCC card, the EX cards, and the Isolator Module. The work includes removing all mounting brackets, hardware, cable, connectors, grounding, and all appurtenant material required to complete the work. **Wireless Vehicle Detection System, Rem** also includes storage or disposal of removed material.

5. **Wireless Vehicle Sensor Node, Rem** includes:

A. Remove a wireless vehicle sensor node including the sensor, epoxy, and all appurtenant material required to complete the work;

B. Storage and or disposal of removed material;

C. Filling the old hole with black epoxy;

6. **Wireless Repeater, Rem** includes removing a wireless repeater including the RP, mounting brackets, hardware, and all appurtenant material required to complete the work. **Wireless Repeater, Rem** also includes storage or disposal of removed material.

7. **Wireless Vehicle Detection System, Salv** includes removing a wireless vehicle detection system including the SPP radios, the master interface APCC card, the EX cards, and the Isolator Module. The work includes removing all mounting brackets, hardware, cable, connectors, grounding, and all appurtenant material required to complete the work. **Wireless Vehicle Detection System, Salv** also includes storage and reinstallation on the project;

8. **Wireless Repeater, Salv** includes removing a wireless repeater including the RP, mounting brackets, hardware, and all appurtenant material required to complete the work. **Wireless Repeater, Salv** also includes storage and reinstallation on the project;

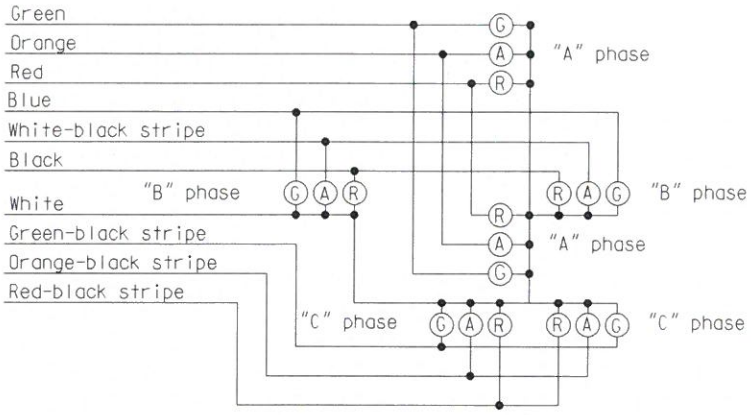
9. **Wireless Vehicle Sensor Node, Salv** includes:

A. Removing a wireless vehicle sensor node including the sensor, epoxy, and all appurtenant material required to complete the work;

B. Storage and reinstallation on the project;

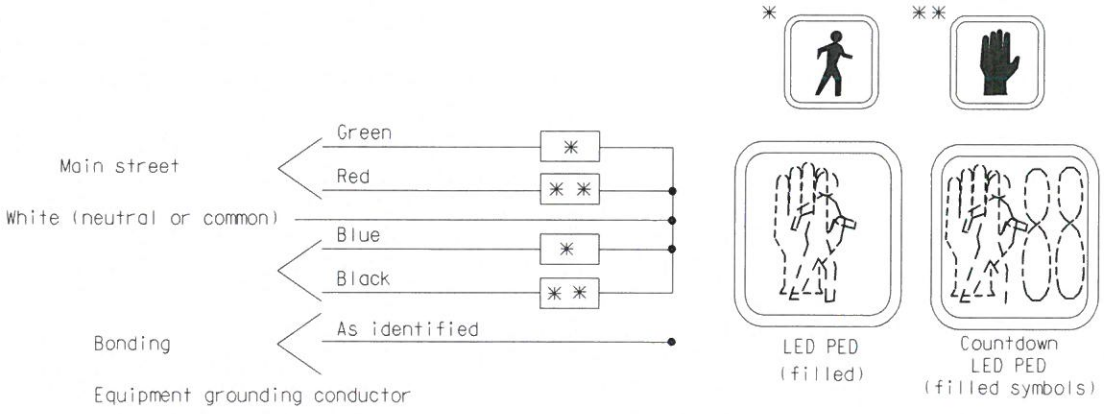
C. Core drilling a new 4 inch by 2¼ inch hole, as indicated on the plans, or as directed by the Engineer, and encapsulating the VSN with orange epoxy; and

D. Filling the old hole with black epoxy.



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

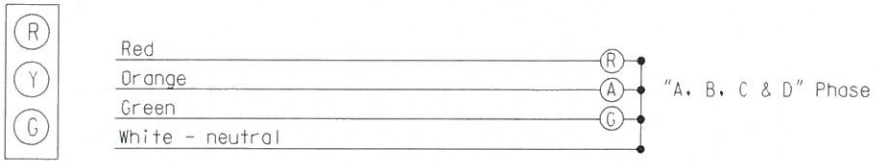
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

COLOR CODE WIRING/
EQUIPMENT GROUNDING

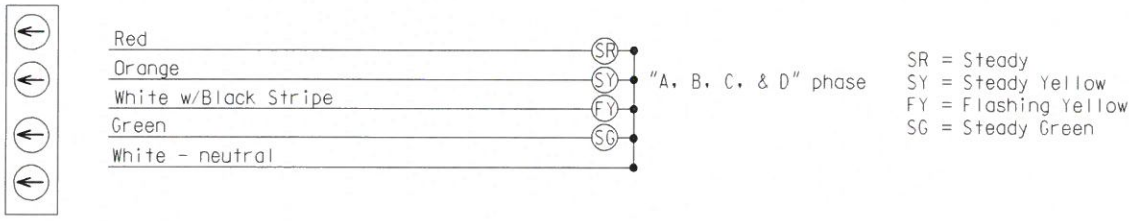
PLAN DATE

SIG-230-A

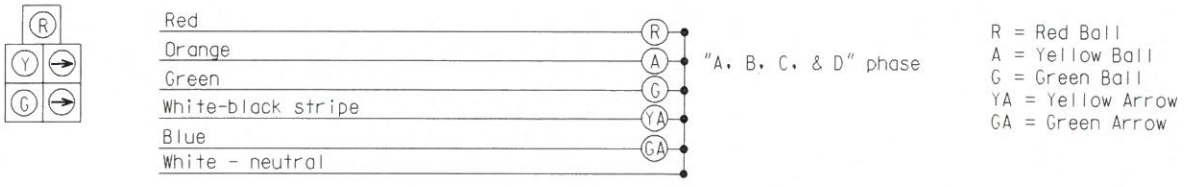
SHEET 1 of 6



STANDARD - 3 COLOR SIGNAL DISPLAY



FLASHING YELLOW ARROW (FYA) - 4 COLOR SIGNAL DISPLAY

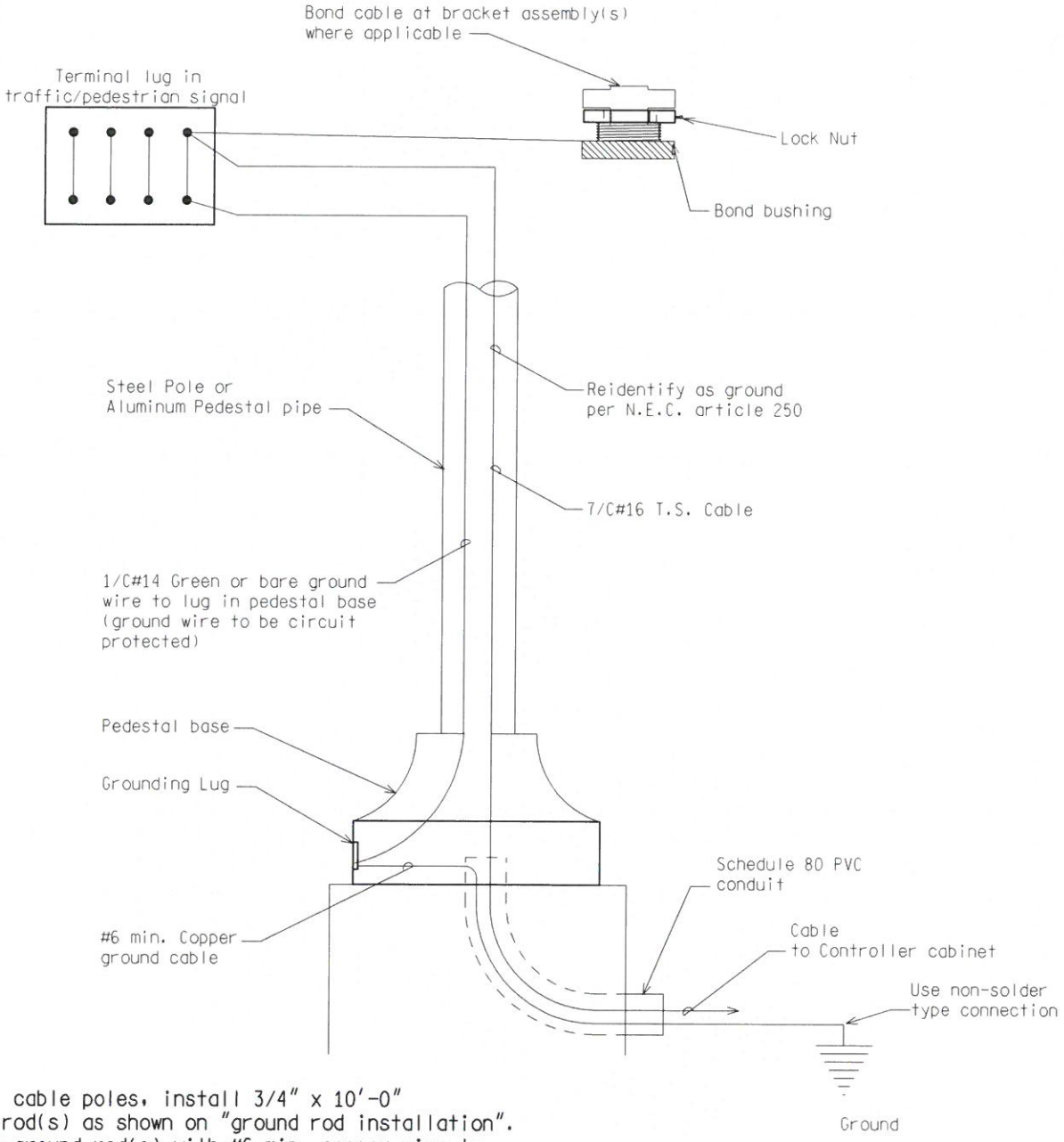


DOG HOUSE W/RIGHT TURNS - 5 COLOR SIGNAL DISPLAY

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		SIG-230-A	SHEET 2 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		

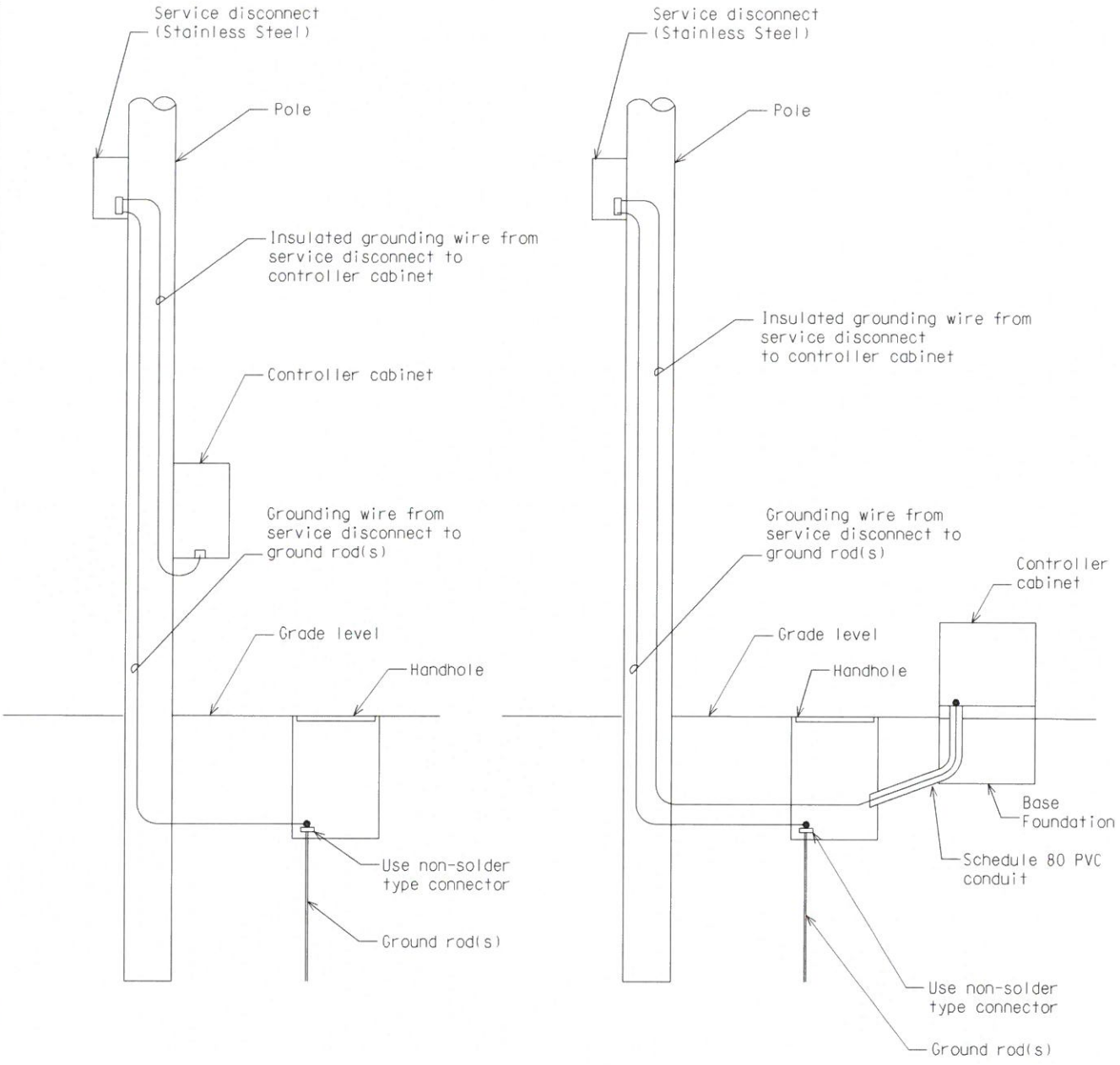


NOTE:
For all cable poles, install 3/4" x 10'-0" ground rod(s) as shown on "ground rod installation". Connect ground rod(s) with #6 min. copper wire to messenger wire with non-solder type connection.

STEEL POLE/PEDESTAL GROUNDING DETAIL

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-230-A	SHEET 3 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		



GROUNDING

Install 3/4 " x 10'-0" copper clad ground rod(s) as required to provide less than 10 OHM resistance to ground.

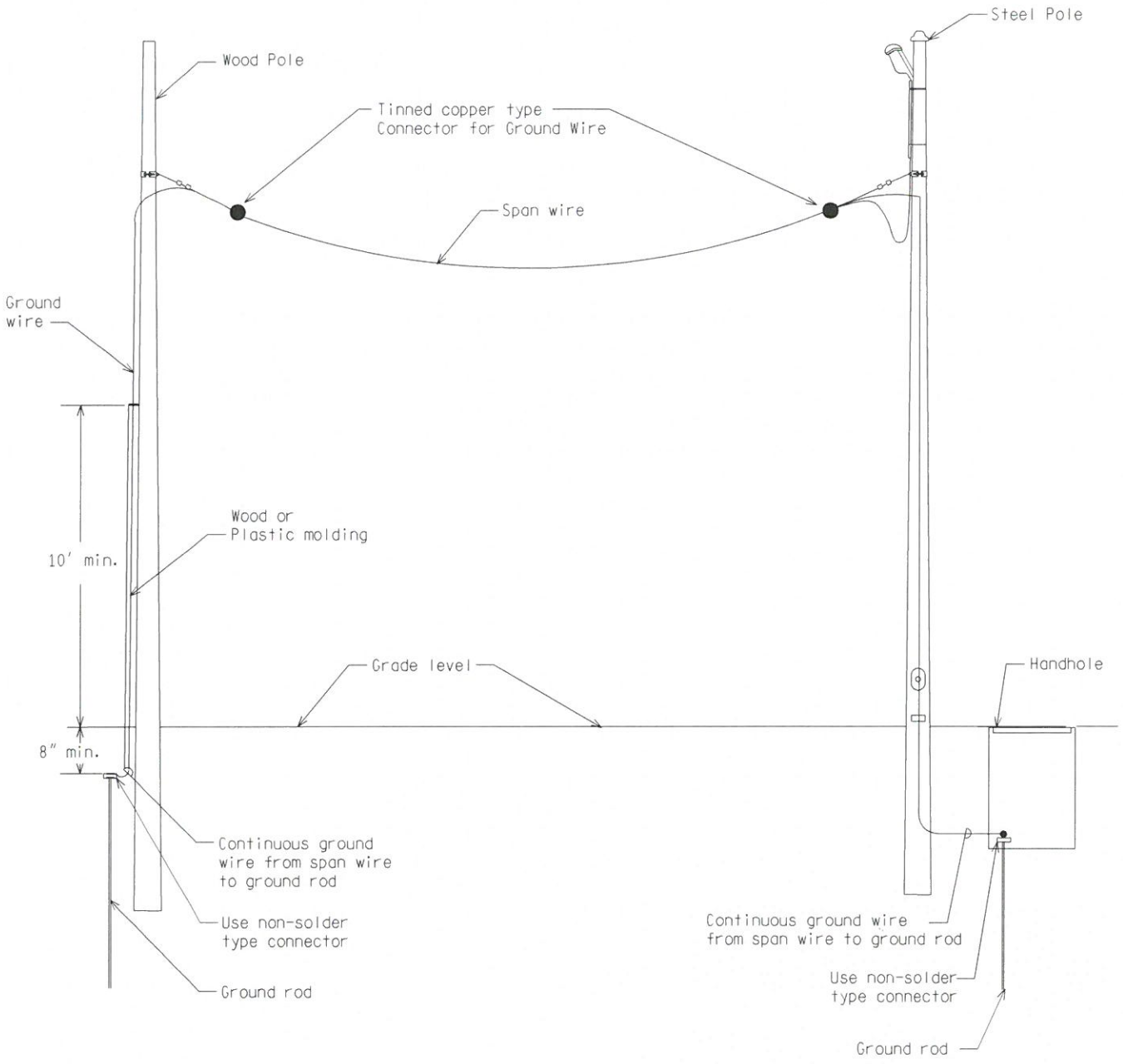
Grounding wire #6 AWG min. bare copper grounding wire shall be installed to meet N.E.C. and utility company specs.

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

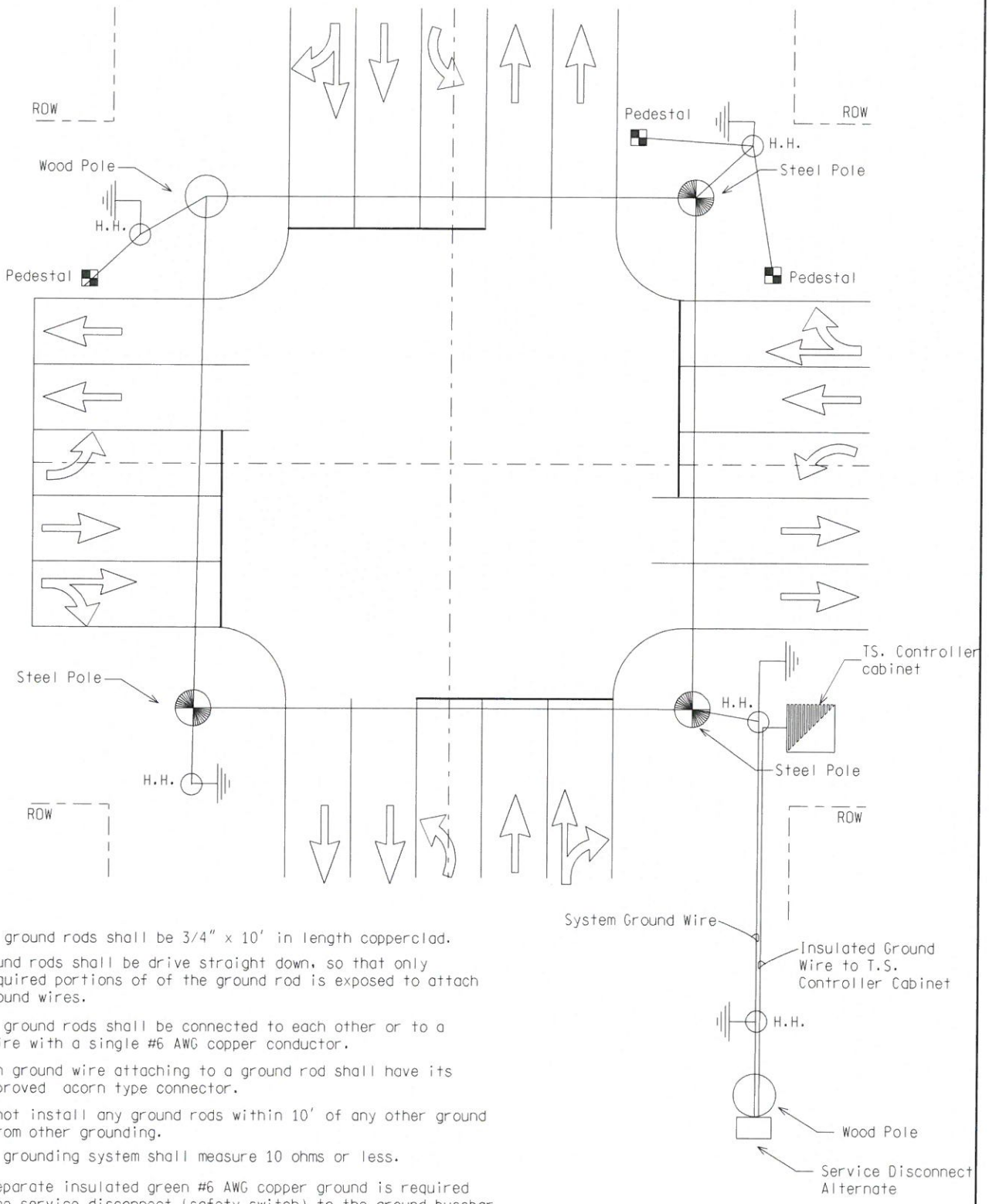
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-230-A	SHEET 4 of 6
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG230A.dgn Rev. 02/16/17		PLAN DATE		



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.

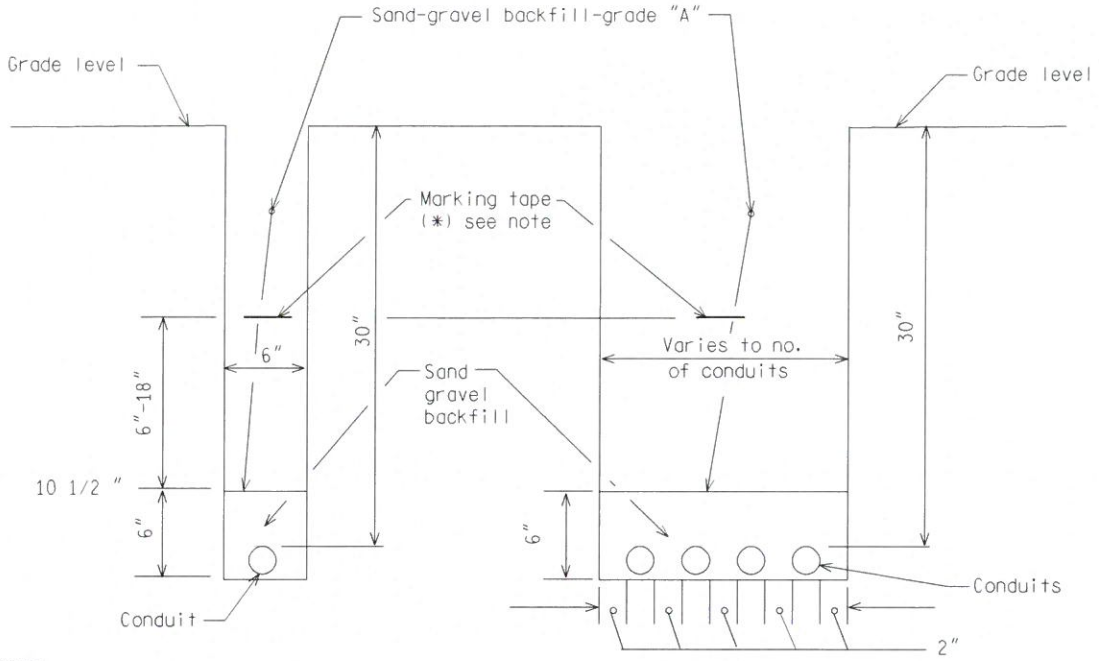
8) Ground rod for each steel pole, wood pole, pedestal and/or traffic signal controller cabinet shall be located in the adjacent handhole as indicated on the plans or as directed by the Engineer.

9) All metal bases must be connected to a ground rod with a #6 ground wire.

SYSTEM GROUNDING DETAL

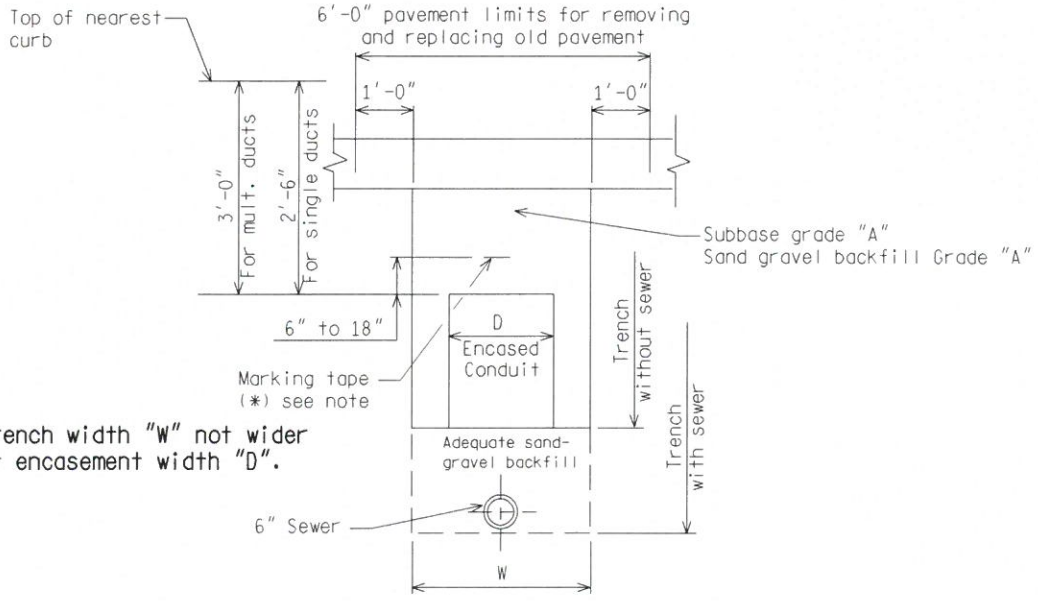
NOT TO SCALE

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		



(*) 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

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG250A.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

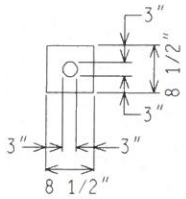
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

CONDUIT (DIRECT BURIAL/ENCASED)

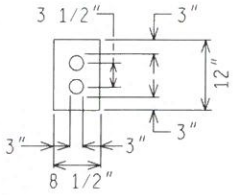
PLAN DATE

SIG-250-A

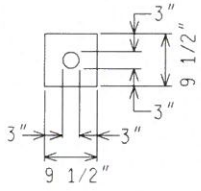
SHEET 1 of 2



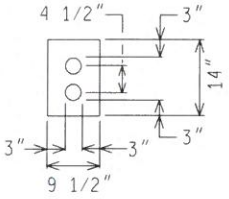
1 2" CONDUIT



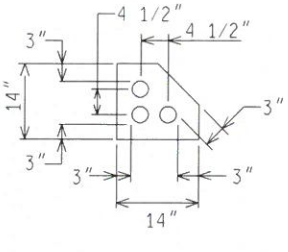
2 2" CONDUIT



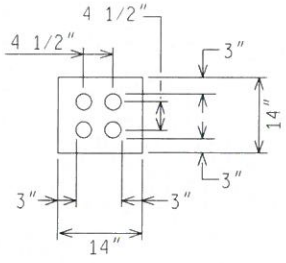
ONE
2 1/2" CONDUIT



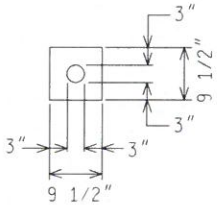
TWO
2 1/2" CONDUIT



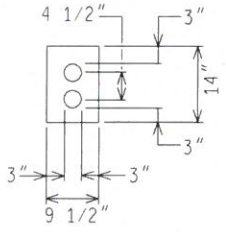
THREE
2 1/2" CONDUIT



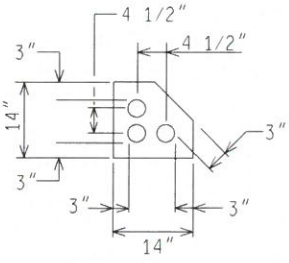
FOUR
2 1/2" CONDUIT



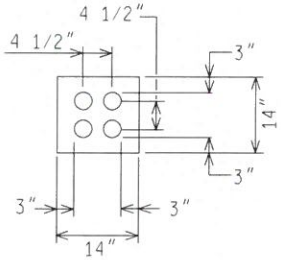
1 3" CONDUIT



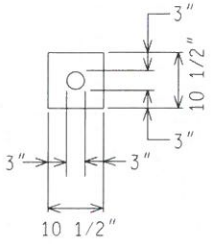
2 3" CONDUIT



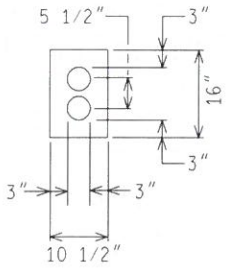
3 3" CONDUIT



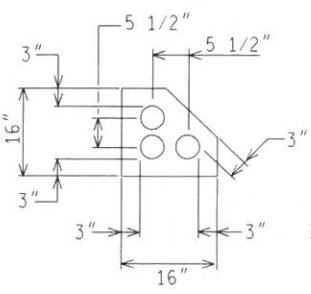
4 3" CONDUIT



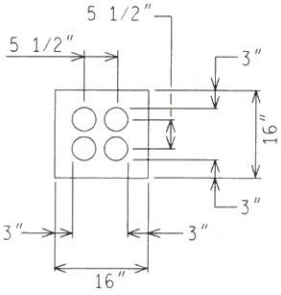
1 4" CONDUIT



2 4" CONDUIT



3 4" CONDUIT



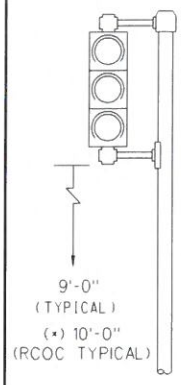
4 4" CONDUIT

ENCASED CONDUIT SECTIONS

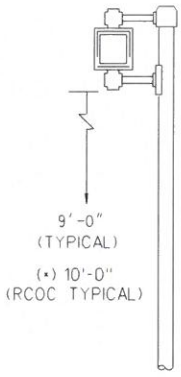
NOT TO SCALE

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		PLAN DATE	SIG-250-A	SHEET 2 of 2

(*) Refer to Note 4 on Sheet 2 of 2.



DETAIL "A-2"



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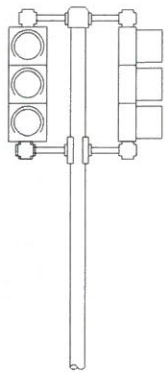
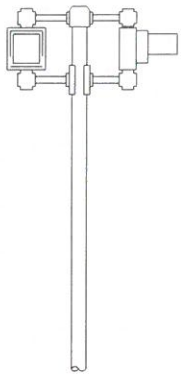


DETAIL "C-2"



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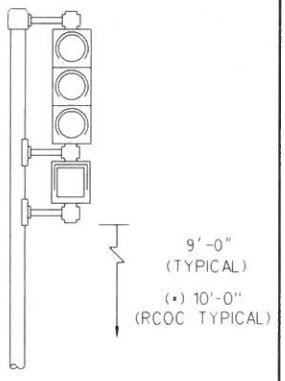

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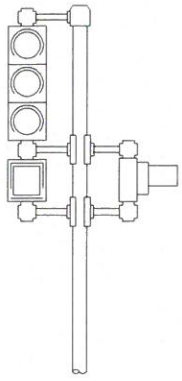

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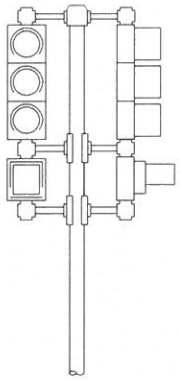
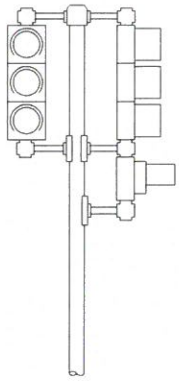


DETAIL "G-2"



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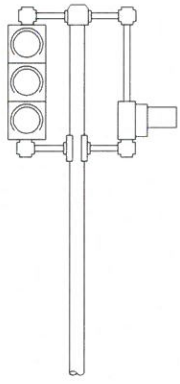

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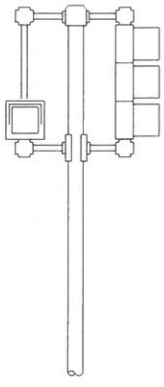

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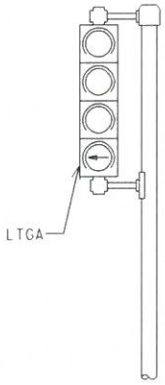

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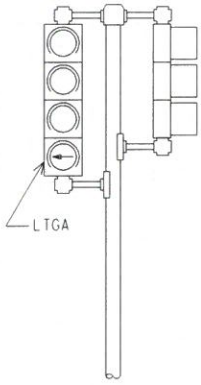

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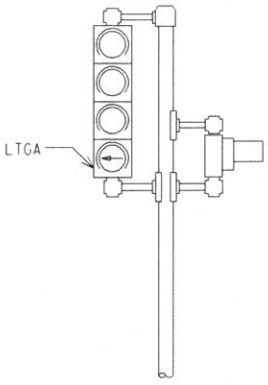

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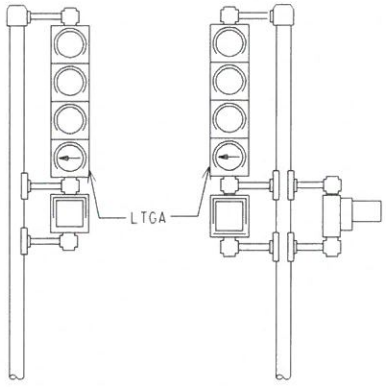


DETAIL "N-2"

DETAIL "O-2"

Left Turn Green Arrow (LTGA)

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG330A.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

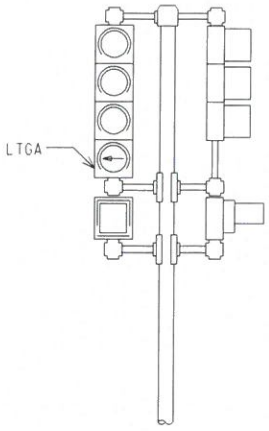
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

PEDESTAL MOUNTED SIGNAL DISPLAYS

PLAN DATE

SIG-330-A

SHEET 1 of 2



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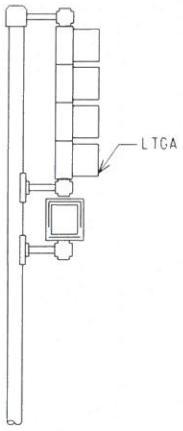

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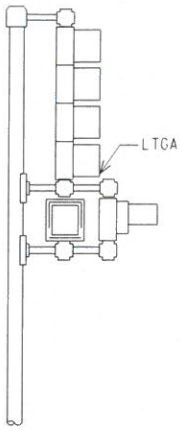
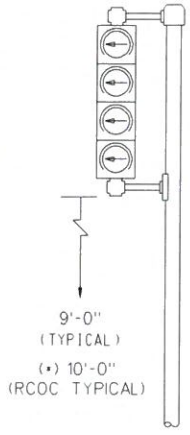
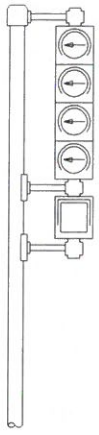


DETAIL "R-2"

Left Turn Green Arrow (LTGA)

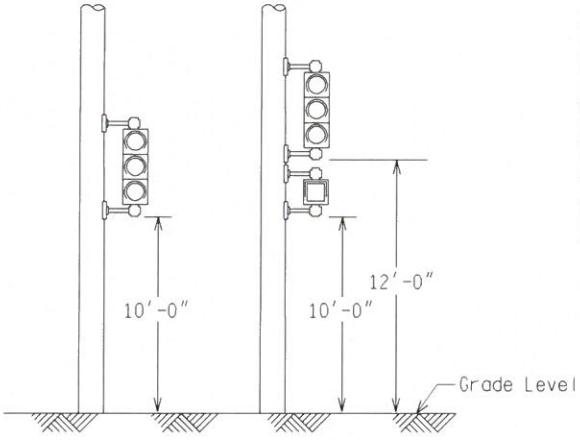


DETAIL "S-2"
(FYA)

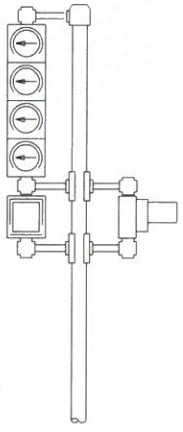


DETAIL "T-2"
(FYA)

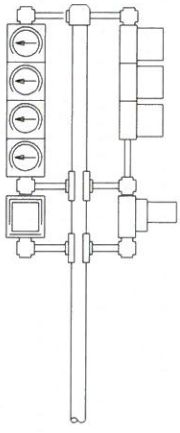
Flashing Yellow Arrow (FYA)



RCOC Mounting Detail (*) see note

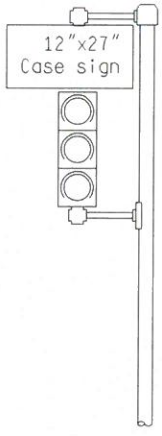


DETAIL "U-2"
(FYA)



DETAIL "V-2"
(FYA)

Flashing Yellow Arrow (FYA)



DETAIL "Typical"
WITH CASE SIGN

NOTE:

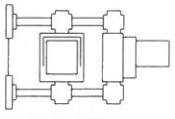
1) Pipe assembly shall be such length and height as to accommodate traffic signals and pedestrian signals for proper maintenance and clear vehicular and pedestrian viewing.

2) Pipe assembly shall be of such length and height as to accommodate an illuminated (12"x27") case sign for proper maintenance and clear vehicular viewing.

3) Bracket lengths are 16 inches for LED pedestrian signals and for LED pedestrian countdown signals.

4) Tolerance within +/- 1/8" for bracketing.

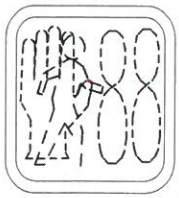
(*) For projects maintained by the Road Commission for Oakland County (RCOC), use the bottom heights and bracket assemblies as shown for the RCOC mounting detail.



LED PED

NOTE:
Walking person and hand symbol are filled.

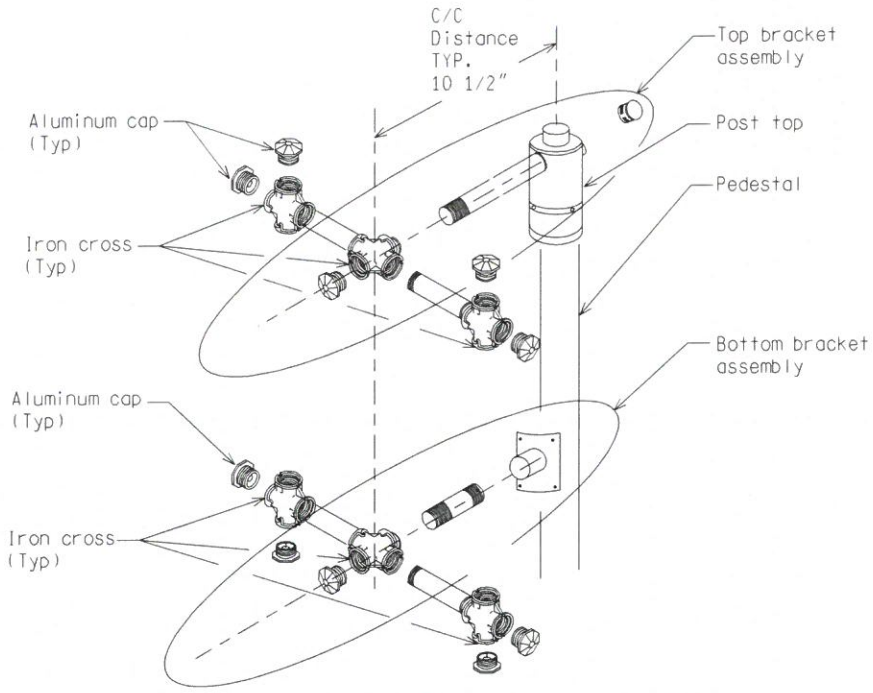
LED PED
(filled)



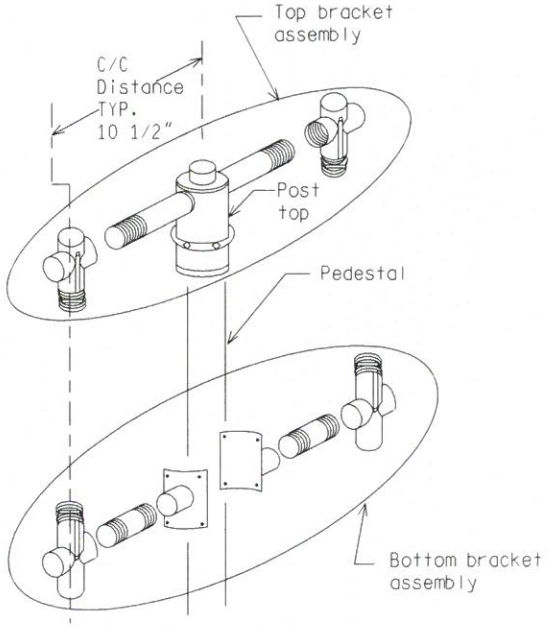
Countdown
LED PED
(filled symbols)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-330-A	SHEET 2 of 2
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG330A.dgn Rev. 02/16/17		PLAN DATE		



SIGNAL MOUNTING HARDWARE FOR BACKSIDE BRACKET



SIGNAL MOUNTING HARDWARE - STANDARD BRACKET

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG331A.dgn Rev.

MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY: DSP

CHECKED BY:

ENGINEER OF DELIVERY

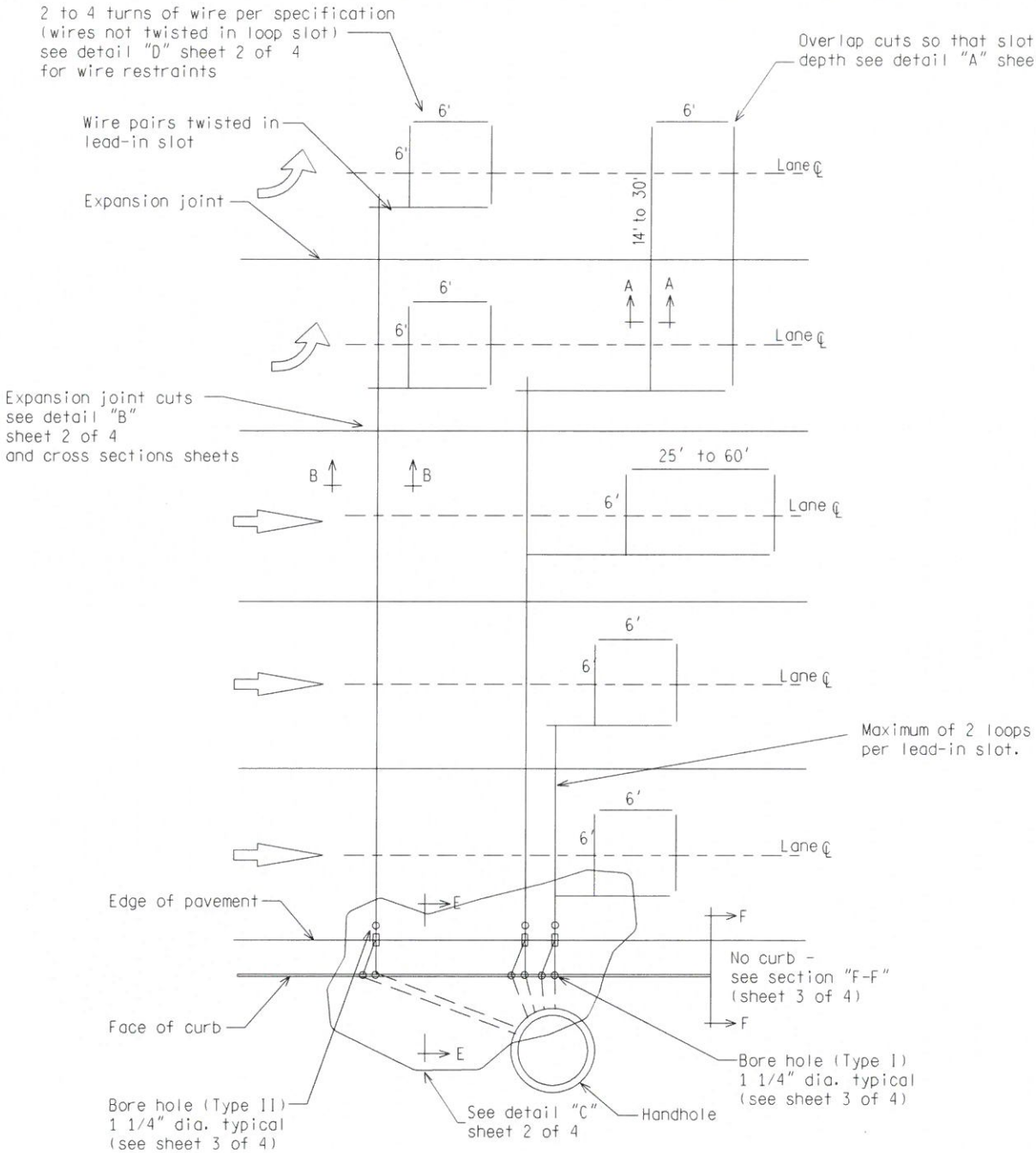
ENGINEER OF DEVELOPMENT

FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

PEDESTAL MOUNTING FOR SIGNALS

02/16/17 PLAN DATE	SIG-331-A	SHEET 1 of 1



NOTES:
Lead-in slot may be on either near or far side of loop approach as directed by the Engineer.
Two loops maximum allowed per saw cut from loop to curb.
3 turns required for loops equal to or greater than 6'x10'
4 turns required for loops less than 6'x10'
Refer to contract documents for high pressure washing of saw cuts and removal of debris

NOT TO SCALE

File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG410A.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

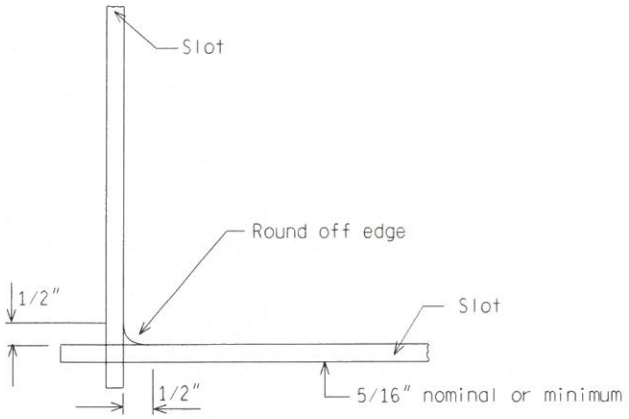
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

TRAFFIC LOOPS

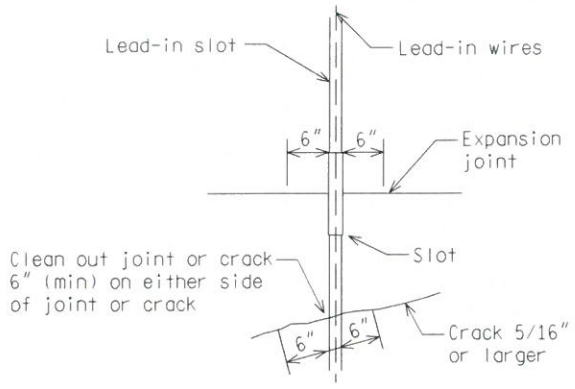
PLAN DATE

SIG-410-A

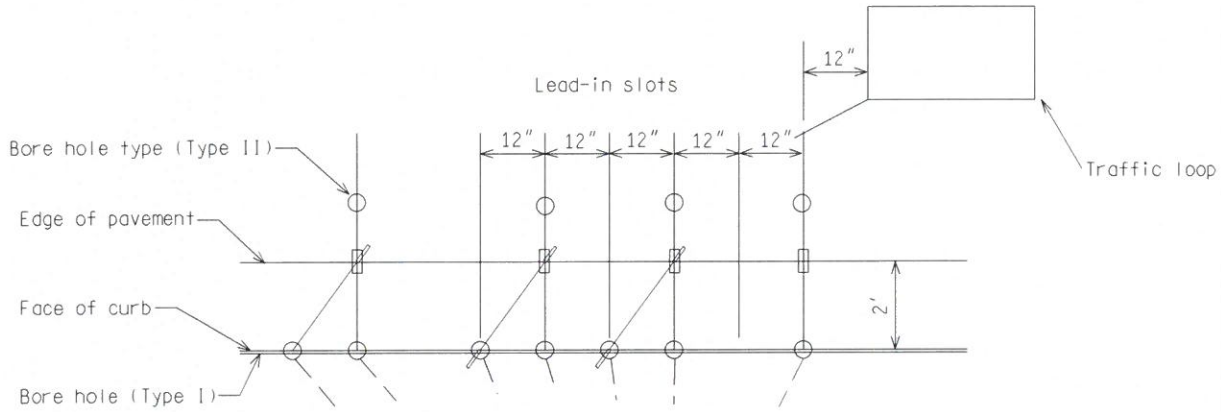
SHEET 1 of 4



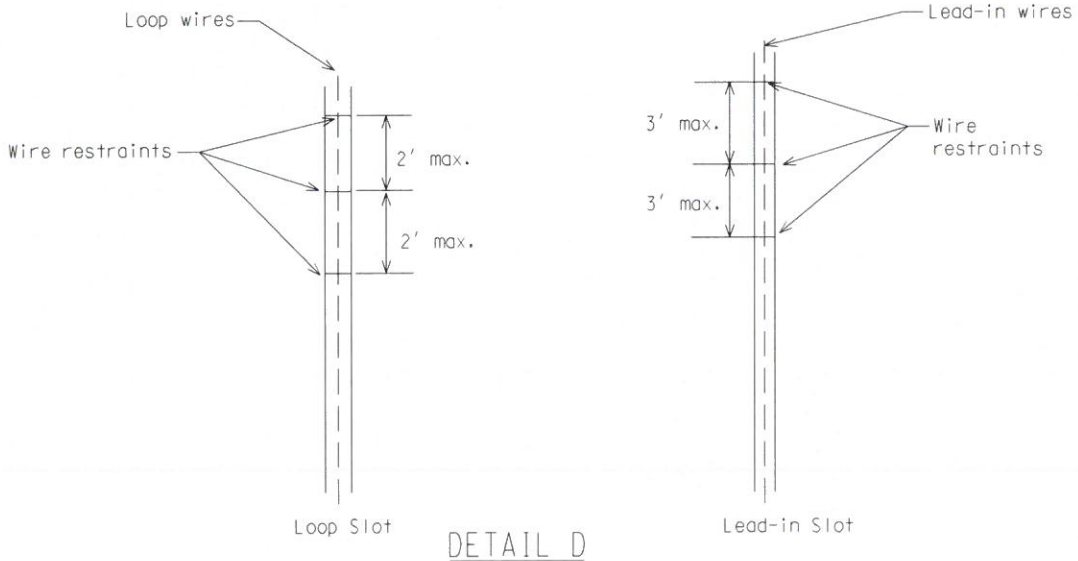
DETAIL A
CORNER CUTS



DETAIL B
EXPANSION JOINT CUTS



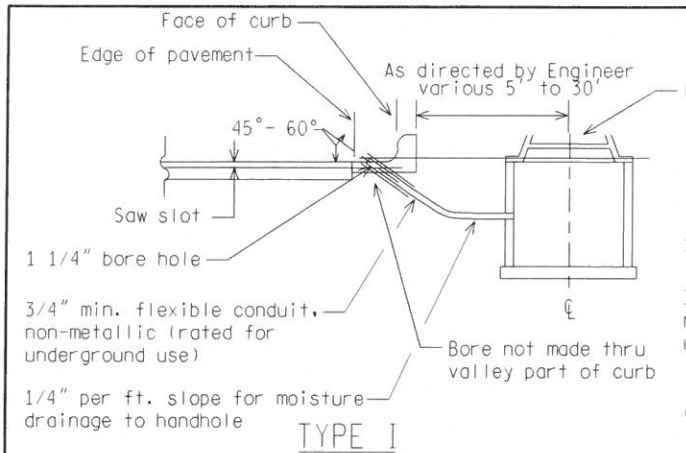
DETAIL C
TERMINATION OF LEAD-IN SLOTS



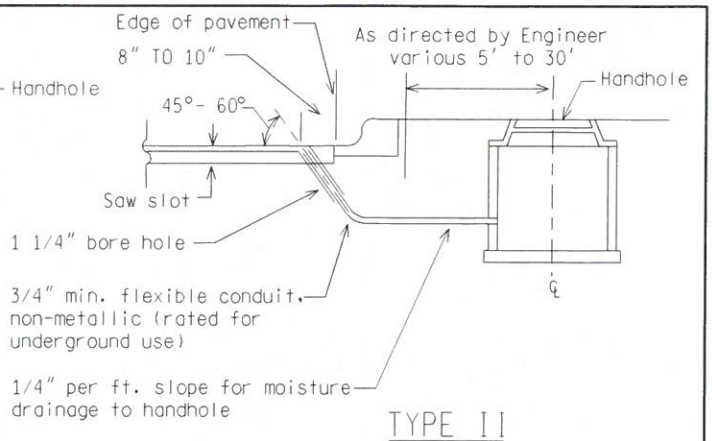
DETAIL D
WIRE RESTRAINTS

NOT TO SCALE

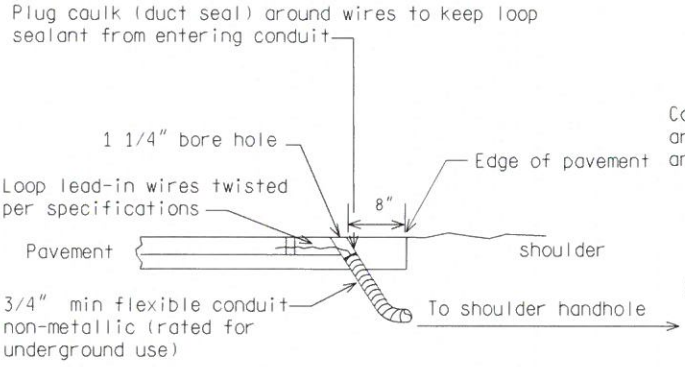
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-410-A	SHEET 2 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG410A.dgn Rev. 02/16/17		PLAN DATE		



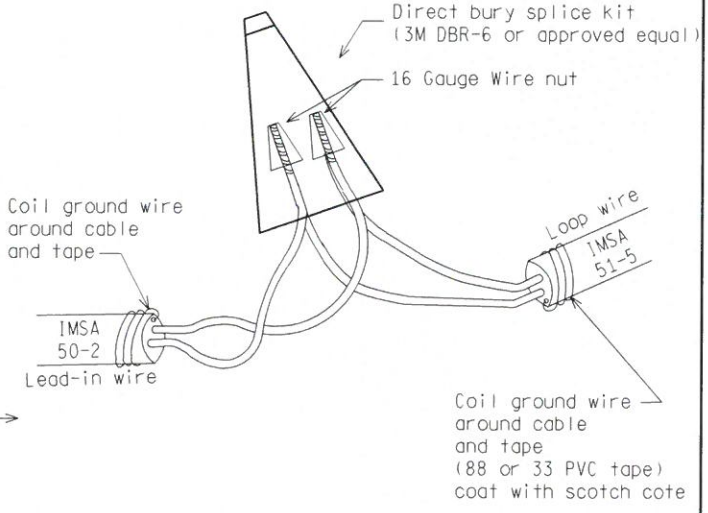
TYPE I
SECTION "E-E"
UNDER CURB INSTALLATION



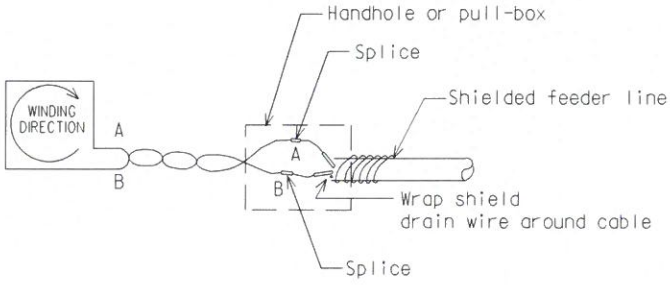
TYPE II
SECTION "E-E"
UNDER CURB INSTALLATION



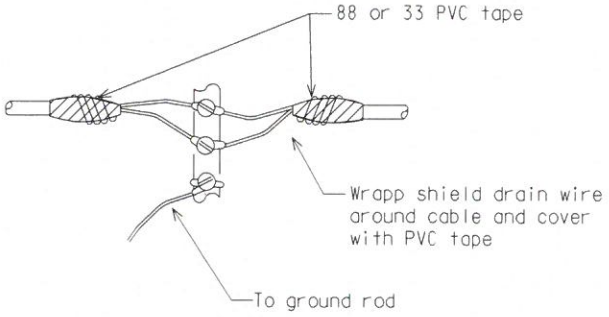
BORE HOLE & LOOP WIRING
SECTION F-F
UNDER PAVEMENT INSTALLATION



HANDHOLE & PULL-BOX SPLICES
(WATERPROOF)



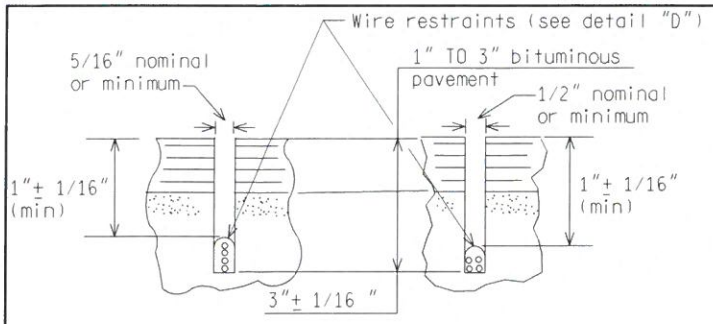
SINGLE LOOP CONNECTION



CONTROLLER CABINET CONNECTION

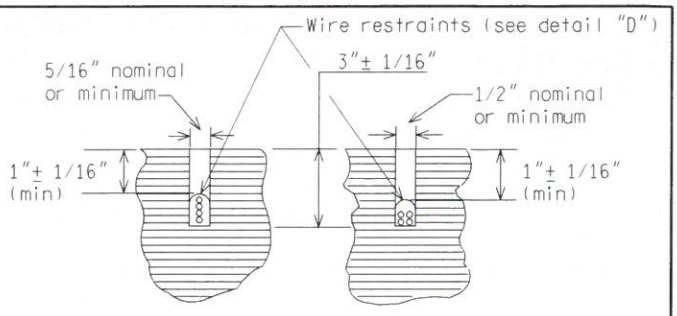
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-410-A	SHEET 3 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG410A.dgn Rev. 02/16/17		PLAN DATE		



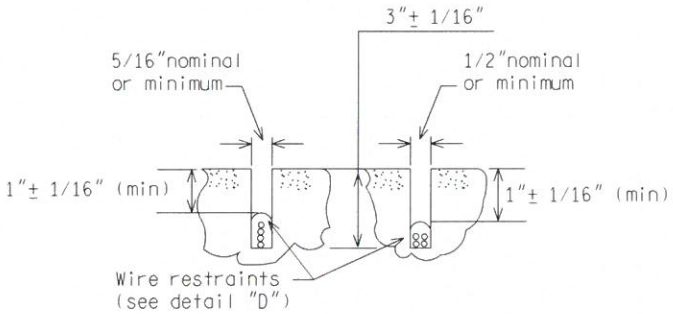
SECTION A-A LOOP SLOT SECTION B-B LEAD-IN SLOT

SLOT CROSS SECTIONS
(BITUMINOUS PAVEMENT OVER CONCRETE)



SECTION A-A LOOP SLOT SECTION B-B LEAD-IN SLOT

SLOT CROSS SECTIONS
(BITUMINOUS PAVEMENT)

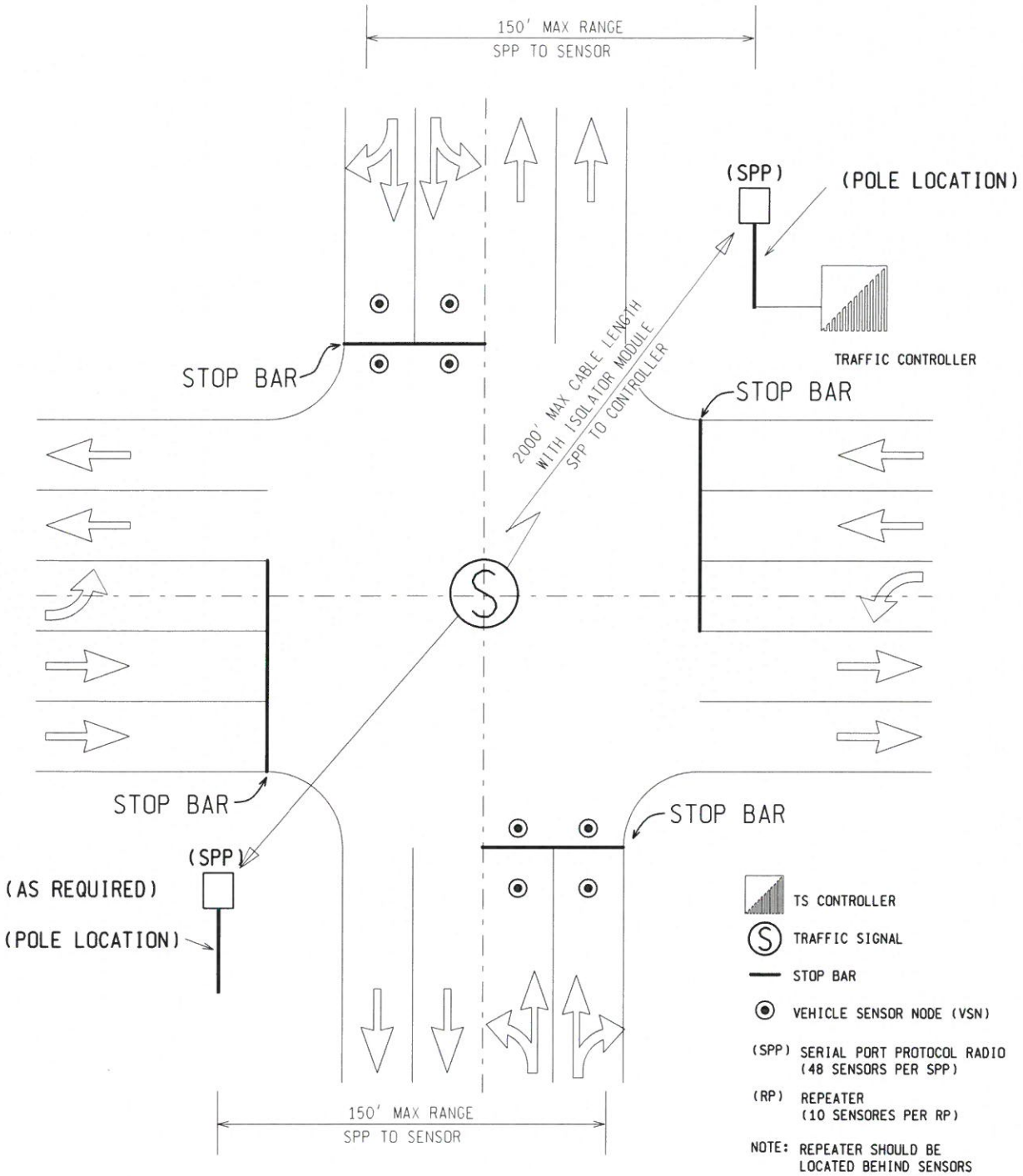


SECTION A-A LOOP SLOT SECTION B-B LEAD-IN SLOT

SLOT CROSS SECTIONS
(CONCRETE PAVEMENT)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-410-A	SHEET 4 of 4
File: RefDoc/TR/Signals/Web/Sp Det/Fin/SIG410A.dgn Rev. 02/16/17		PLAN DATE		



TYPICAL VEHICLE SENSOR NODE CONFIGURATION

INTERSECTION DETECTION CROSS ROAD ACTIVATED (NON-LOCKING)

NOT TO SCALE

File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn Rev. 06/18/2013

MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY: KMZ

CHECKED BY:

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)
FHWA APPROVAL DATE

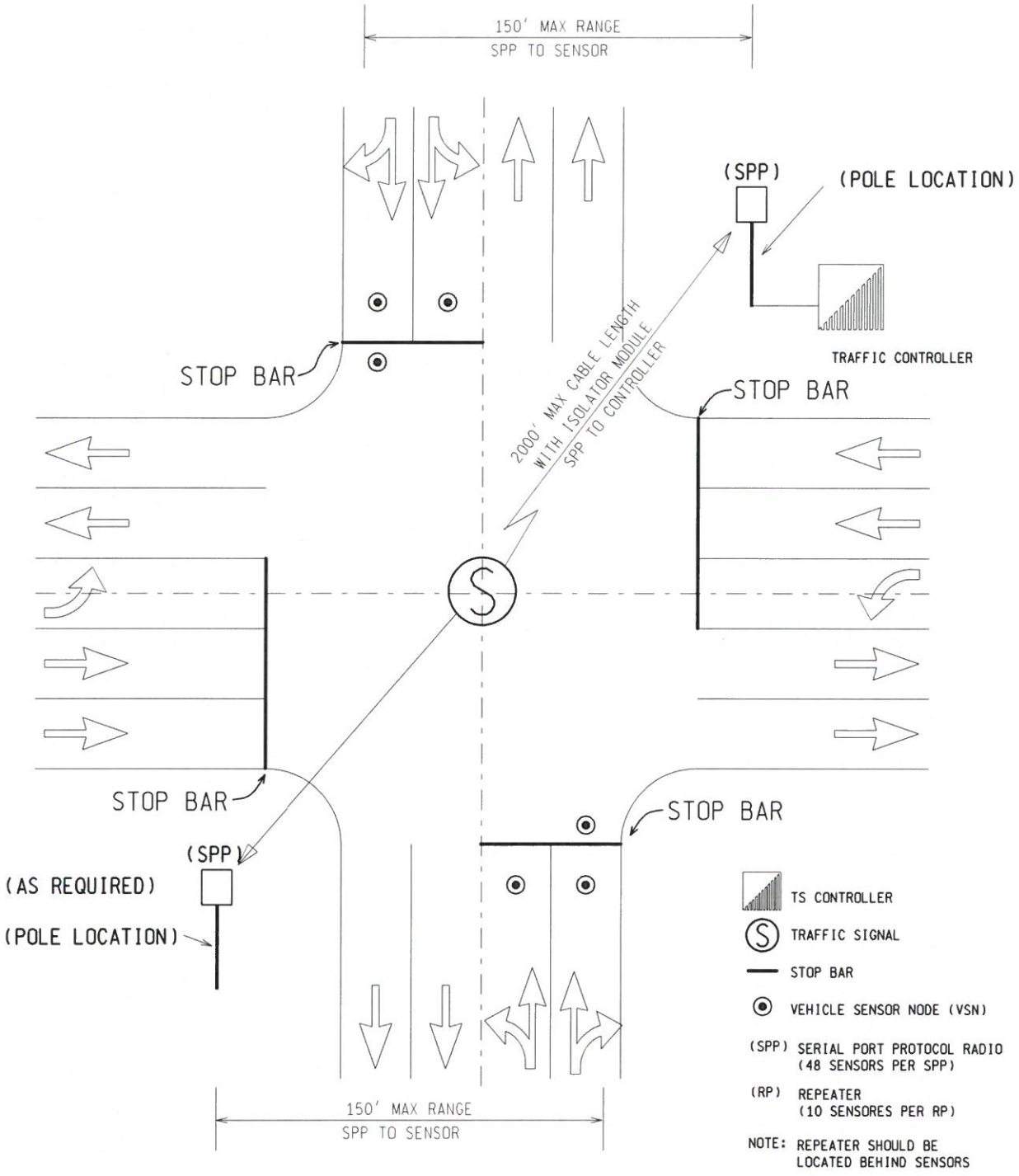
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

WIRELESS VEHICLE DETECTION SYSTEM

PLAN DATE

SIG-420-A

SHEET 1 of 10

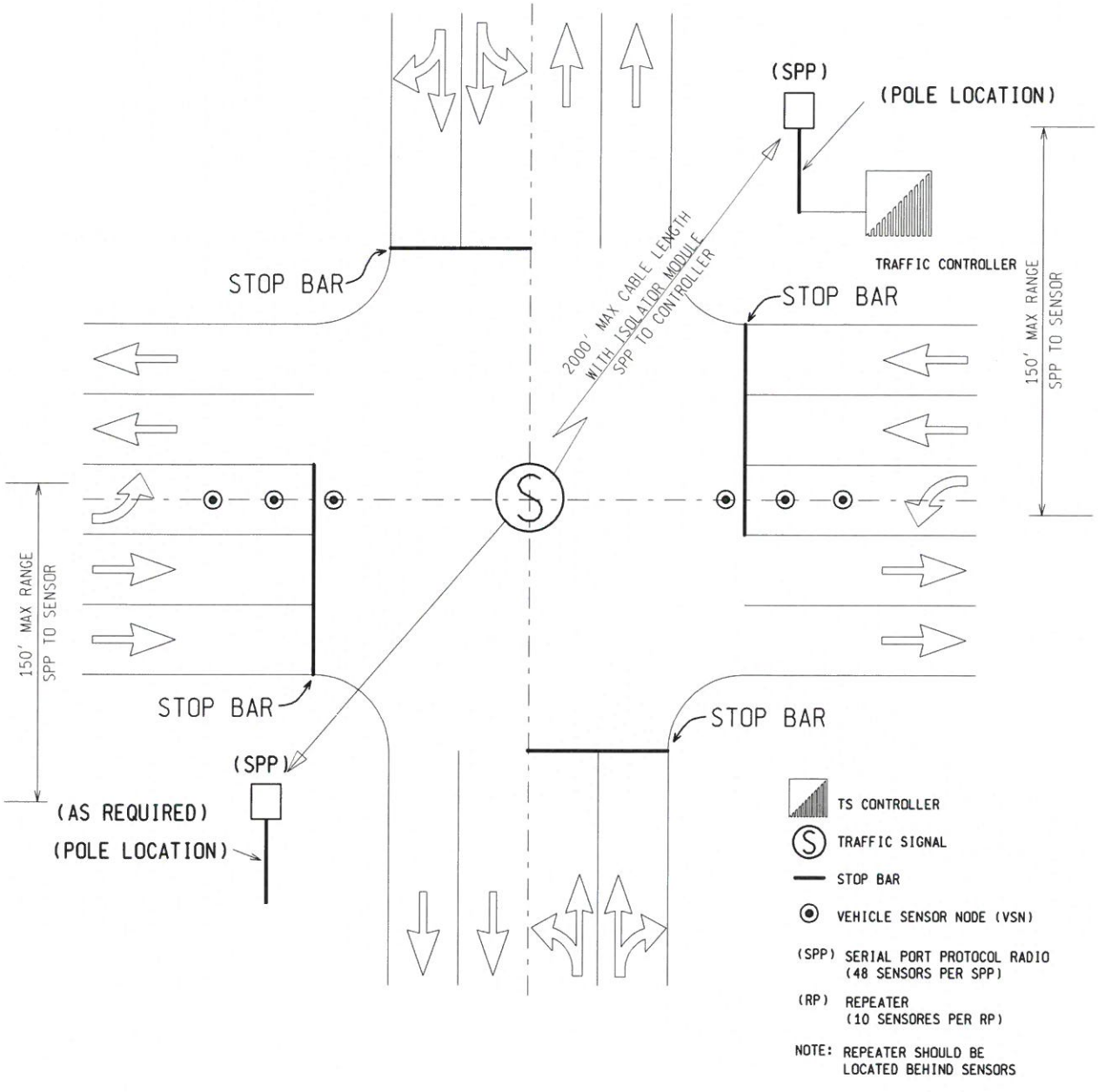


TYPICAL VEHICLE SENSOR NODE CONFIGURATION

INTERSECTION DETECTION CROSS ROAD ACTIVATED (LOCKING)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 2 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		

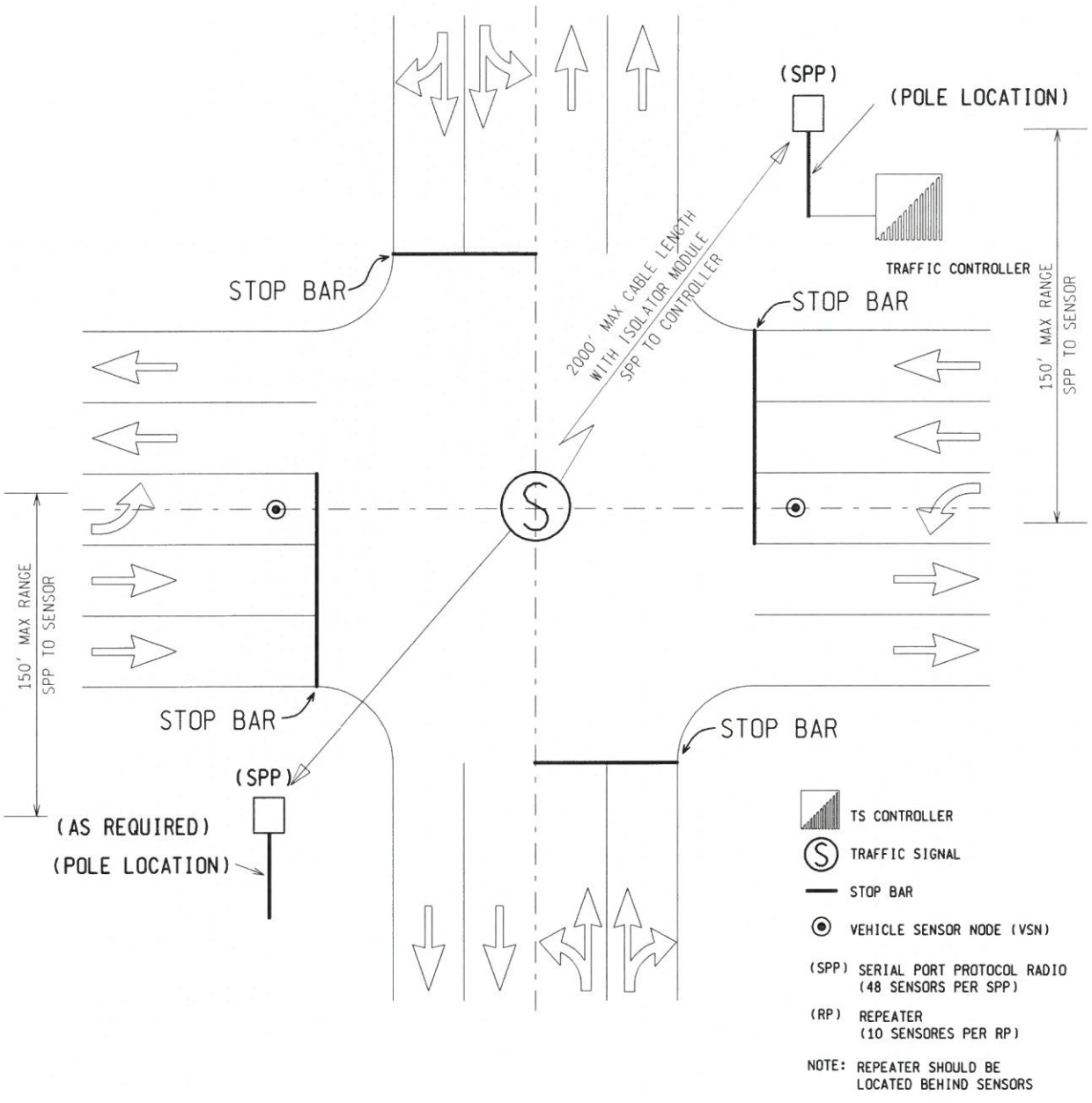


TYPICAL VEHICLE SENSOR NODE CONFIGURATION

INTERSECTION DETECTION LEFT-TURN ACTIVATED
PERMISSIVE PROTECTED (NON-LOCKING)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 3 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		

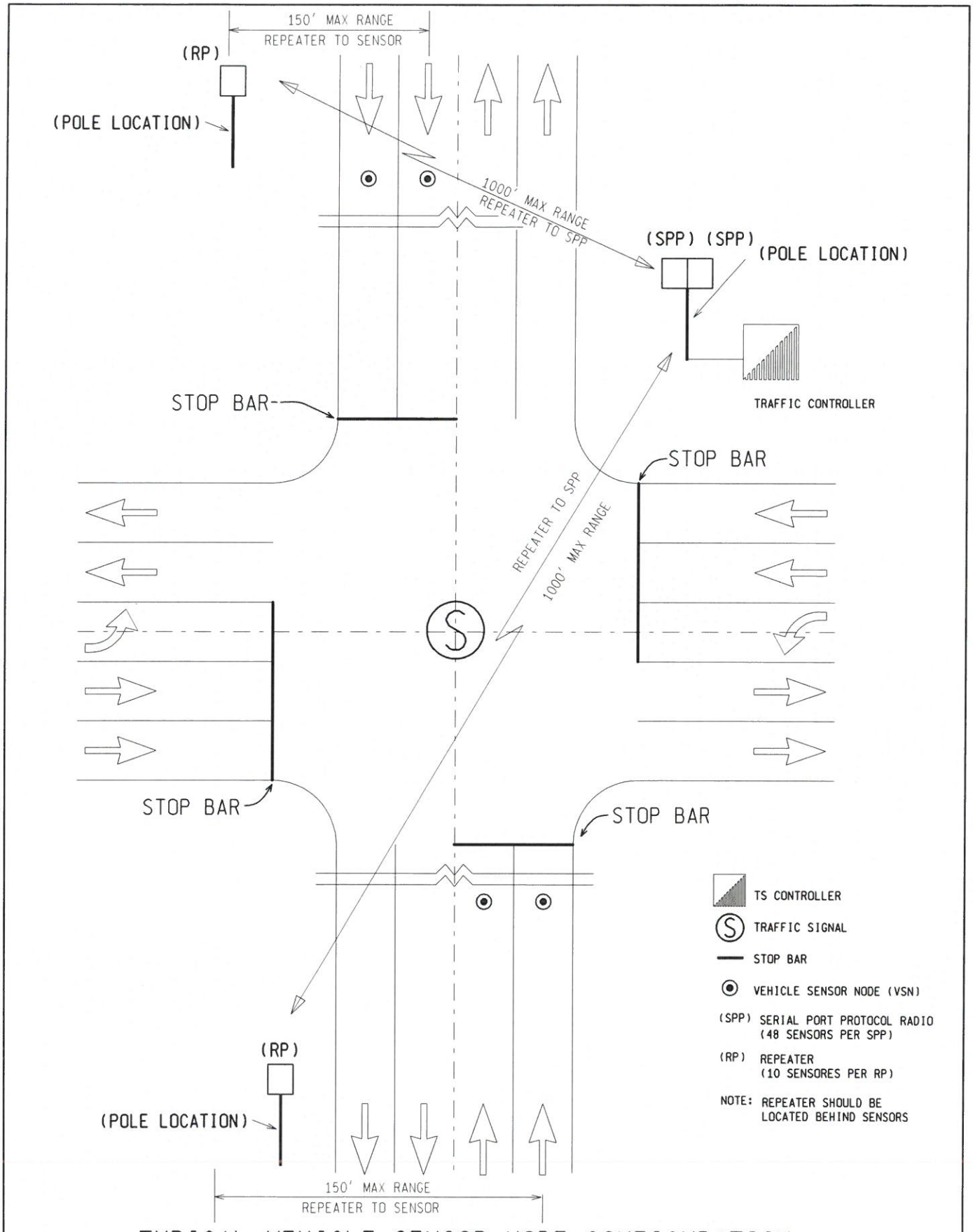


TYPICAL VEHICLE SENSOR NODE CONFIGURATION

INTERSECTION DETECTION LEFT-TURN ACTIVATED
PROTECTED ONLY (LOCKING)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 4 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		

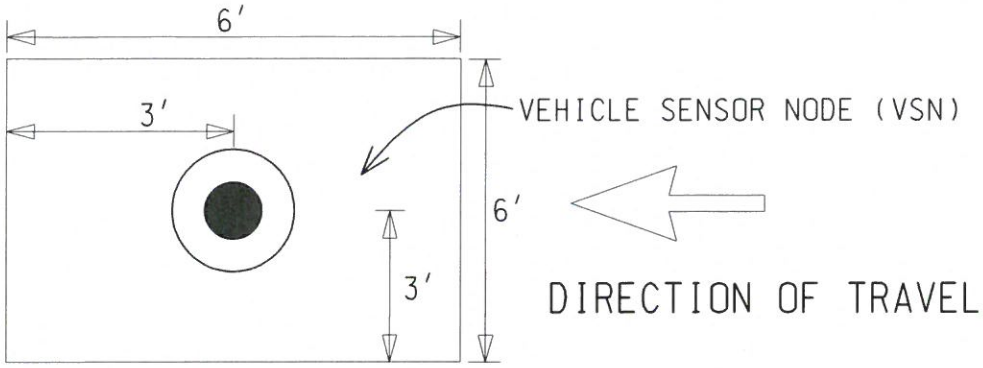


TYPICAL VEHICLE SENSOR NODE CONFIGURATION

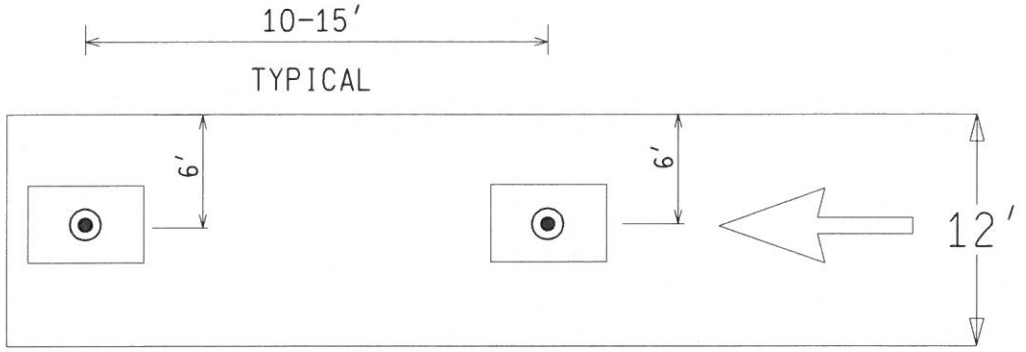
NOT TO SCALE

ADVANCE DETECTION

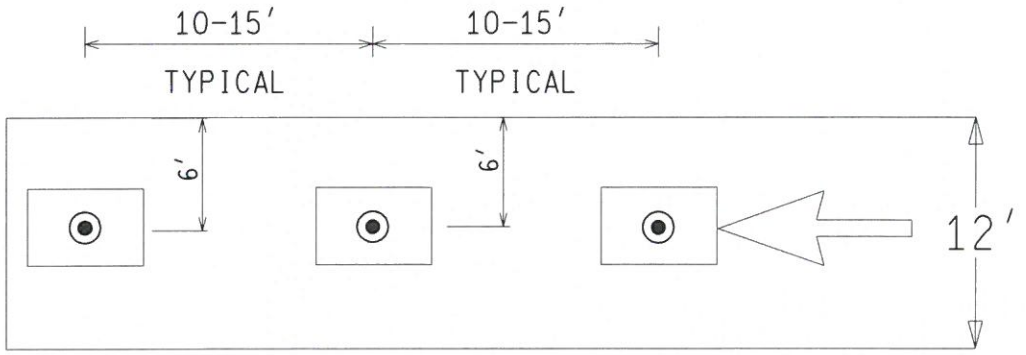
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 5 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		



TYPICAL 6′ X 6′ DETECTION ZONE



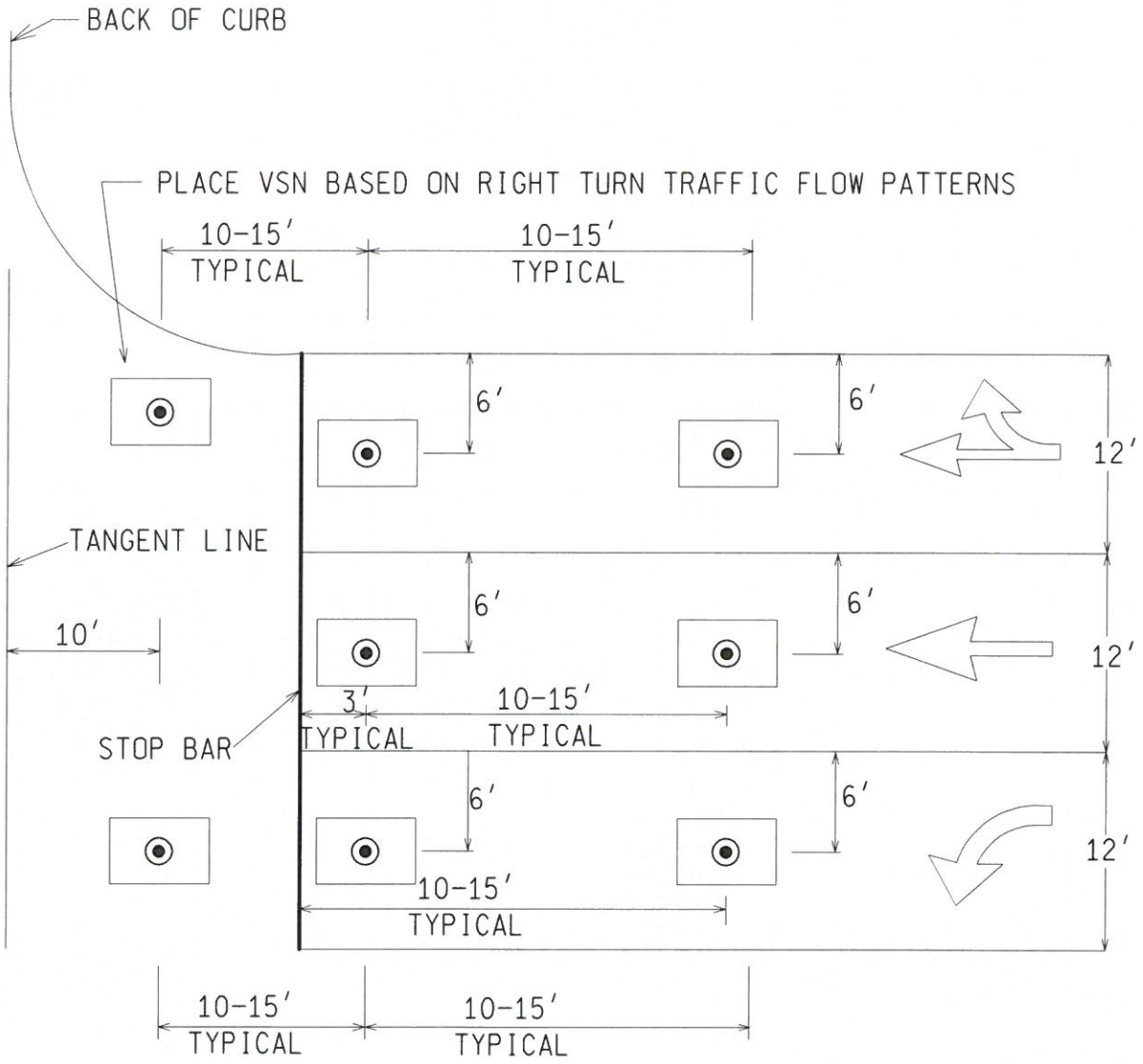
TYPICAL 6′ X 20′ DETECTION ZONE



TYPICAL 6′ X 30′ DETECTION ZONE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 6 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn Rev. 06/18/2013		PLAN DATE		

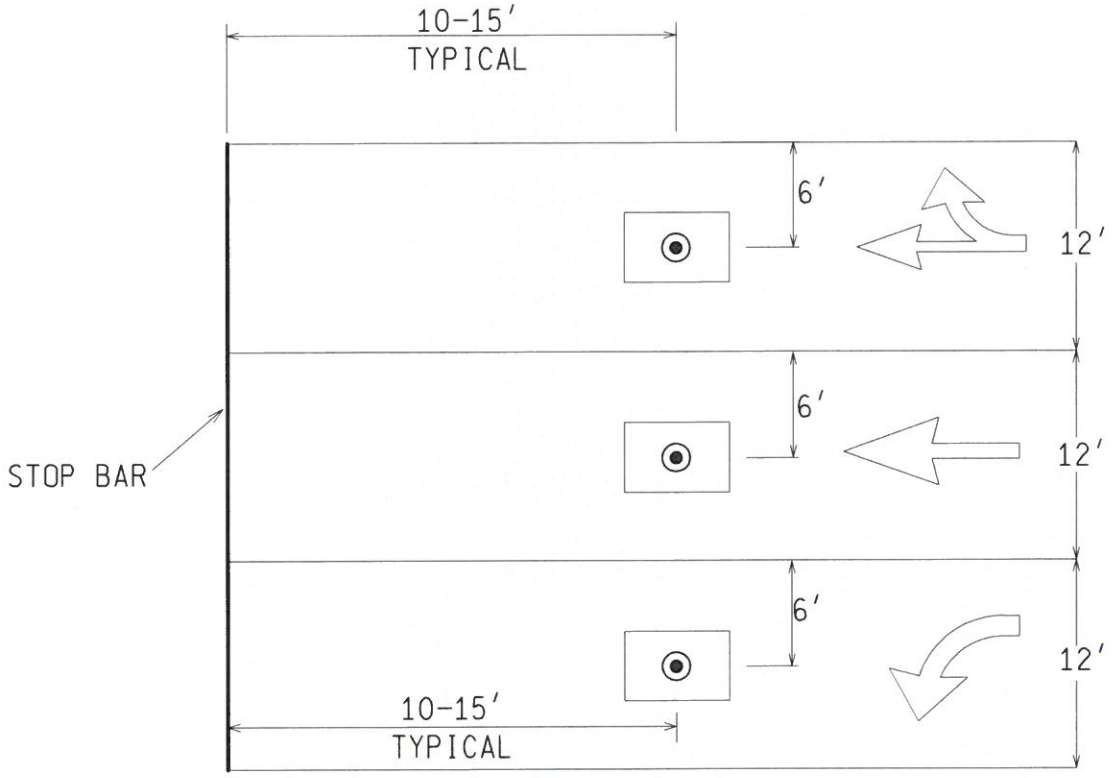


TYPICAL VEHICLE SENSOR NODE (NON-LOCKING) INSTALLATION DIAGRAM

FOR A TWO PHASE (NON-COORDINATED) APPROACH WITH (NON-LOCKING) PERMISSIVE OR PERMISSIVE-PROTECTED LEFT TURN PHASING

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	PLAN DATE	SIG-420-A	SHEET 7 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013			

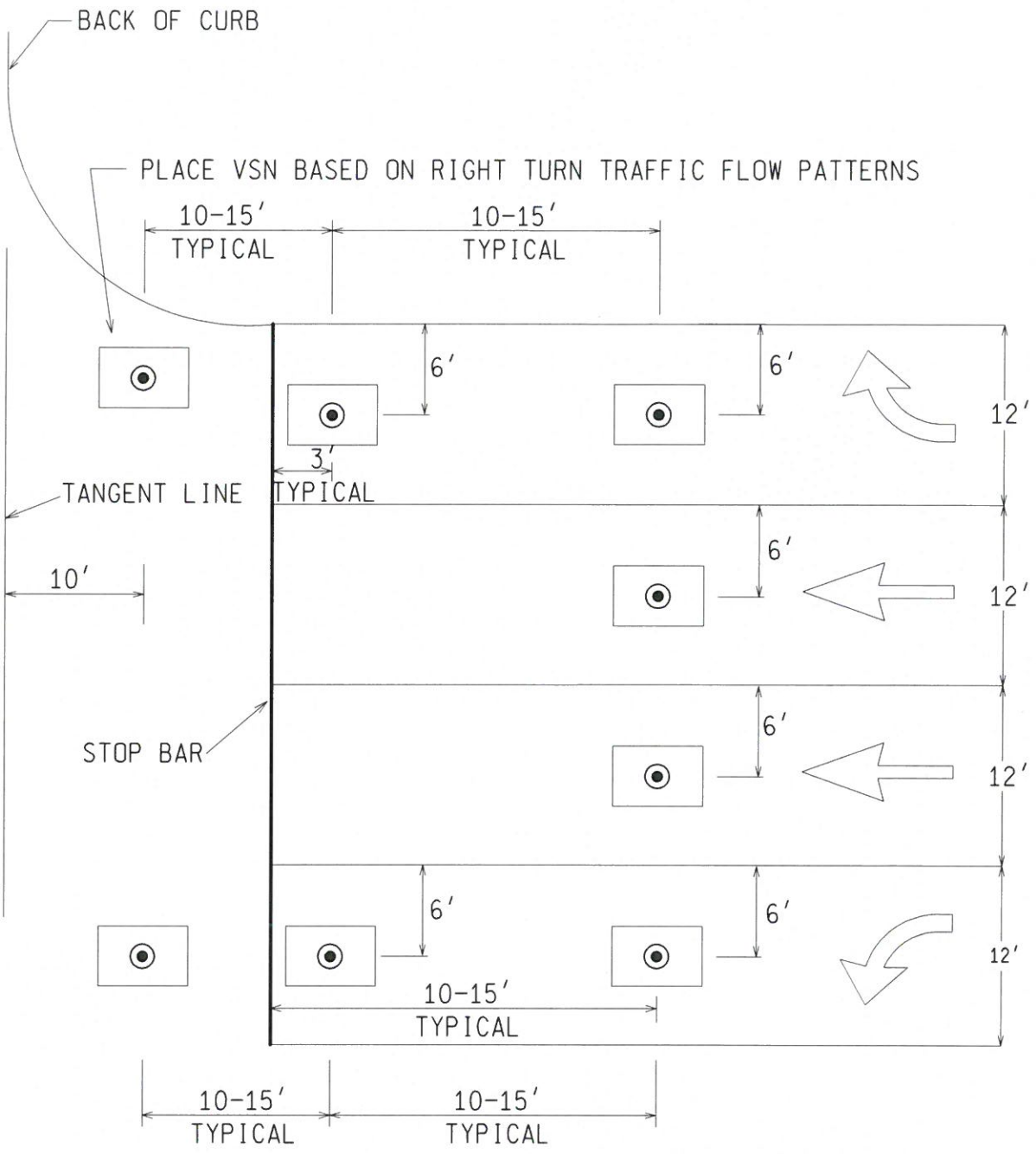


TYPICAL VEHICLE SENSOR NODE (LOCKING) INSTALLATION DIAGRAM

FOR AT TWO PHASE APPROACH WITH (LOCKING)
PROTECTED ONLY LEFT TURN PHASING

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 8 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		

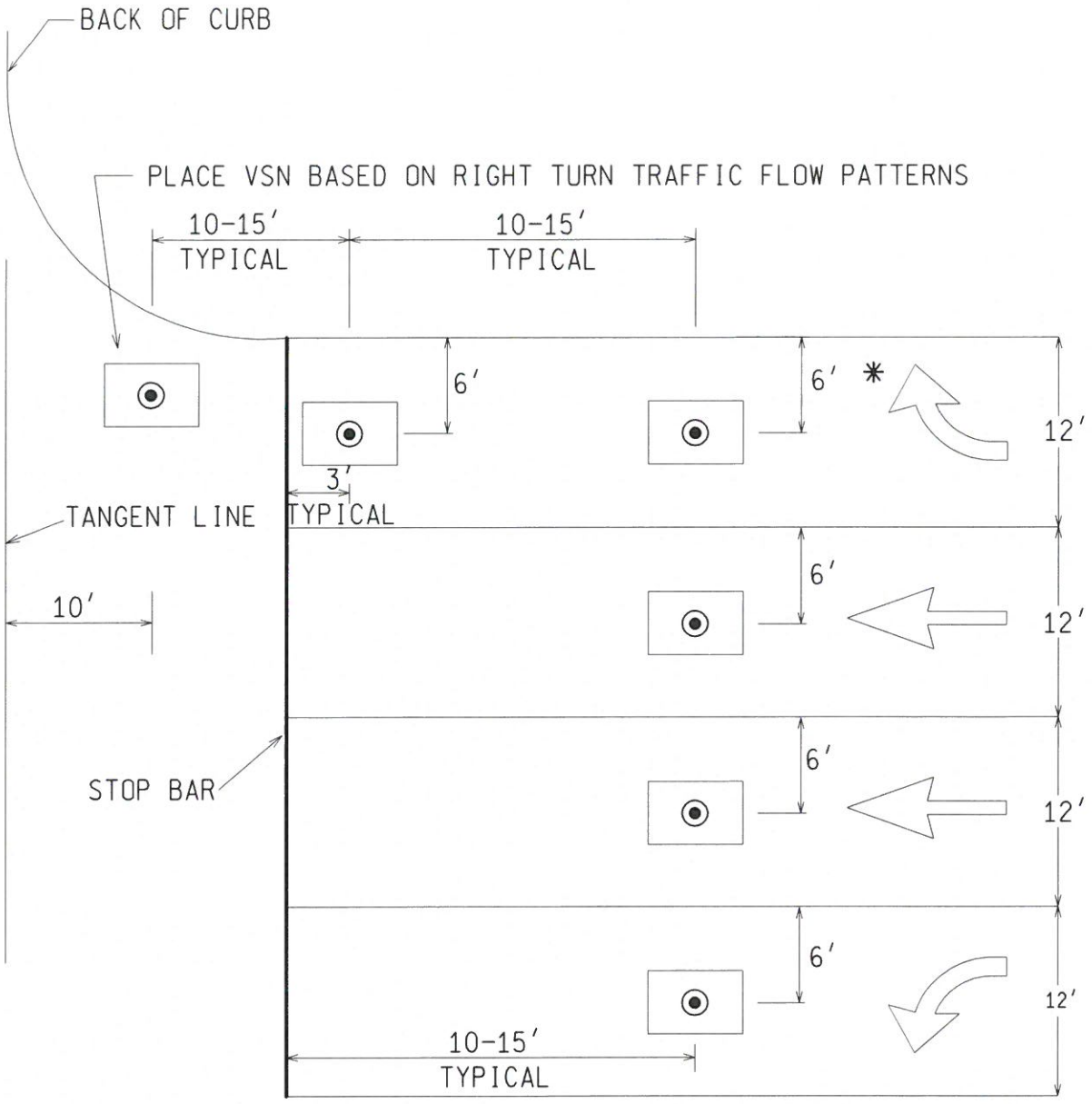


TYPICAL VEHICLE SENSOR NODE (NON-LOCKING) INSTALLATION DIAGRAM

FOR A TWO PHASE (COORDINATED) APPROACH WITH (NON-LOCKING)
PERMISSIVE OR PERMISSIVE-PROTECTED LEFT TURN PHASING

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 9 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		



TYPICAL VEHICLE SENSOR NODE (LOCKING) INSTALLATION DIAGRAM

FOR A TWO PHASE APPROACH WITH PROTECTED ONLY LEFT TURN PHASING

* RIGHT TURNS MAY BE NON-LOCKING OR LOCKING WITH RIGHT TURN DELAYS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE		SIG-420-A	SHEET 10 of 10
File: PW:RD/T&S/Standards/Signals/mdot 420a.dgn	Rev. 06/18/2013	PLAN DATE		

CITY OF ANN ARBOR
SPECIAL PROVISION
FOR
Item 278: Insertion Valve-in-Well, Ductile/Cast Iron Pipe, _ inch

a. Description.- The Contractor shall furnish all materials, labor and equipment to properly install and set water main insertion valves into the existing Ductile/Cast Iron Main(s) at the locations as shown on the plans and as directed by the Engineer. All work shall be performed in accordance with the requirements as detailed herein.

Insertion valves shall be used where the existing mains, upstream and downstream of the proposed connections cannot be shut down or taken out of service. To ensure that the entire operation shall be accomplished without interruption of service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to insertion valves of the required size(s).

The work shall include, but not be limited to; pavement saw-cutting; excavation and disposal of excavated material; the furnishing, installation, and removal of sheeting and/or shoring where needed; the furnishing, placement and compaction of approved bedding and backfill materials; furnishing and placing suitable, clean, gravel to create a stable working surface at the bottom of the excavation; de-watering; pipe cleaning, measuring, and performing all advance work necessary to prepare for the performance of the insertion valve; nighttime lighting as required; the furnishing and installation of insertion valve and valve well; the removal of all materials and equipment associated with the work when no longer needed; and backfill, restoration and compaction of subgrade.

This work shall also include all traffic maintenance and control items in accordance with the Michigan Manual of Uniform Traffic Control Devices.

b. Materials.- Bedding and backfill for areas contained within a segment of water main designated as Trench Detail I (under roadbed), Modified, shall be Granular Material, Class II, meeting the requirements of Section 902 of the 2020 MDOT Standard Specifications for Construction. For work within a segment of water main designated as Trench Detail V (outside of the 1:1 influence line of roadbed or curb and gutter), Modified, Granular Material, Class II and Engineer approved native material, placed in accordance with the trench details, shall be used.

The Contractor shall submit to the Engineer two (2) sets of drawings, furnished by manufacturers, fully and distinctly illustrated and describing the Insertion Valve fittings proposed to be furnished. Work shall not commence until such time as the drawings have been reviewed and accepted by the Engineer.

Insertion valves shall be an all stainless steel body Resilient Wedge Gate and designed for permanent use in potable water, raw water, reclaimed water, irrigation and backflow control systems. The design will allow the valve to be installed into an existing pressurized pipeline

while maintaining constant pressure and service without system shutdown. No restraining devices, restraining fasteners, or transition gaskets shall be required for the installation or operation of the valve.

Valve Body and Bonnet: Valves shall have a stainless steel body, carbon steel epoxy coated bonnet and a reinforced composite polymer valve cartridge to provide superior corrosion resistance, strength and a pressure rating that meets or exceeds the requirements of resilient seated gate valves. The insertion valve shall be stainless steel construction for corrosion resistance, maximum toughness and strength.

Valves must be capable of working on Cast/Grey Iron or Ductile Iron Class A, B, C and D, IPS PVC, C900 and C909 PVC, Steel and AC pipe diameters without changing either top or bottom portion of split valve body or using a transition gasket.

Valves must provide a solid support of the host pipe through the entire laying length of the valve body. No gaps or space between the valve body and host pipe shall be accepted.

Valves shall be rated for 250 psig maximum working pressure. The pressure rating must be permanently marked into the body.

Valves must be hydrostatically pressure tested to 1.25 times of the system operating pressure (minimum) or 1.5 times of the Insertion Valves 250 psig maximum pressure rating. The test shall be sustained for a minimum of 15 minutes. Once the pressure test is affectively achieved the insertion valve body must not be moved in accordance with AWWA Standards. If the insertion valve body is moved the pressure test must be completed again. Any movement, repositioning, loosening and/or re-tightening must be retested before the pipe is tapped.

Resilient Wedge Gate Assembly: All insertion valves shall be resilient seated meeting the requirements of AWWA C509. Valves shall have an EPDM molded resilient wedge seal. The resilient wedge seal will be affixed into a reinforced nylon composite polymer valve cartridge. The entire assembly shall be inert and impervious to corrosion.

Nylon composite polymer valve cartridge shall be engineered to come into contact with the interior of the host pipe and an engineered sealing surface in the valve body to create a seal. The resilient wedge shall be reinforced to resist abrasion thus extending the life and quality of the shutdown where the wedge contacts the host pipe.

Pressure equalization on the down or upstream side of the closed wedge shall not be necessary to open the valve.

Wedge shall be symmetrical and seal equally well with flow in either direction.

Resilient wedge must ride inside a minimum of four body channels to maintain wedge alignment throughout its travel and to achieve maximum fluid control regardless of high or low flow pressure or velocity.

Valves shall have a full size, full port flow way that is unobstructed, and free of depressions to provide optimum flow and sealing and not trap tuberculation or debris.

Fusion-Bonded Epoxy / E Coating: Valves shall have all stainless steel bodies, fasteners and epoxy coated carbon steel valve bonnet. The use of epoxy coatings for protection against corrosion is deemed insufficient for any component other than the valve bonnet.

Gaskets and Stem Seals: Insertion valves shall utilize four O-Ring's to seal between valve body to valve bonnet and valve stem. These O-rings shall be located in such a fashion as to ensure the 250 psig pressure worthiness and prevent ground water and/or foreign materials from entering the valve.

Valve Stem: Valves shall be NRS (non-rising stem) and operate with standard turns 3 turns per diameter inch to open and close. NRS stem must have an integral stem collar manufactured of no lead bronze. Two-piece stem collars are not acceptable. The stem shall be affixed into the valve cartridge to maintain stem alignment, low torque and continuous operation of the valve.

Valves shall be operated by a 2" square wrench nut –open right.

Valve stem shall be made of stainless steel and shall be able to withstand torque of 700 ft. lbs. of torque without compromising operation.

Hardware: Bonnet and valve body fastener hardware shall be stainless steel. Valve cartridge locking pins shall be made of grade 8 zinc coated carbon steel to prevent galling with stainless steel pin plugs coated to prevent galling.

Split Restraint Devices & Fasteners: Valves that require the use of external or integral split restraint devices and or restraint fasteners are prohibited.

Insertion Valve Wells: All insertion valves shall be installed in wells. Pre-cast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones,

eccentric cones, and flat-slab tops shall conform to the requirements of ASTM C-478. Joints on precast gate wells shall meet the requirements of ASTM C-443, rubber O-ring gasket.

Flat-slab top, pre-cast, gate wells shall be designed to accommodate HL-93 Modified Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed. For the purposes of design, a HL-93 Modified Live Load shall consist of 1.2 times the design truck or 1.2 times a single 60 kip load, whichever produces the greater stresses.

General: Manufacturer will exercise extreme care to ensure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the cast iron main during installation, pressure tapping, or Line stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.

d. Method of Construction.- Installation of proposed insertion valves will require work in close proximity to existing utilities. This must be taken into consideration when the contractor determines the required trench safety requirements. All excavation shall conform to MIOSHA Standards; the Contractor is solely responsible for determining all excavation and trench safety requirements.

If necessary, The City will reduce the pressure to 100 psig or less for the duration of the installations. The entire operation of installing the insertion valve shall be accomplished without reduction of water pressure in the main(s) below 100 psig. It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation.

Preliminary Field Inspection of Water Main:

Dimensional, specification, and other data regarding the existing mains have been taken from existing records. This information may be inaccurate, out of date, and/or inadequate. The data have not been verified by field inspections. Further, the water main consists of cast iron pipe which may contain dimensional and structural flaws. In addition, the Contractor shall anticipate that exterior main conditions, bells, service connections, or presence of adjoining utilities may require relocation of proposedvalve. Prior to proceeding with the installation of anyvalve, it is necessary to know the exact main outside diameter of the water main, if it has any ovality, and the internal diameter of the pipe before valve can be manufactured and/or ordered.

Prior to ordering material, Contractor shall excavate at each proposed location and carefully measure the outside diameter of the water main with calipers along at least four (4) locations to determine ovality and the critical outside diameter of the water main. The Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be taken to determine extent of internal deposits, tuberculation, etc.

If the Engineer determines that Contractor's data are not adequate, the Engineer may direct Contractor to make one or more pressure taps on main to obtain test pipe coupons for the Engineer's evaluation. The minimum size of the test coupon shall be 5" diameter, drilled through a nominal 6" valve. Pressure tapping saddles and other materials used for inspection taps shall conform to the requirements of this Special Provision. The Contractor shall anticipate that heavy interior corrosion and/or tuberculation exists within the water main.

If, in Engineer's opinion, the proposed location is unsatisfactory based on measurements of the existing pipe at the locations of the proposed insertion valve, the Engineer will direct excavation at another site. Excavating, de-watering, inspections, backfill, and restoration will be paid for separately in accordance with the applicable contract unit prices or Section 109.05.C and 109.05.D of the 2020 MDOT Standard Specifications for Construction whichever the Engineer deems most appropriate.

Contractor shall power wire brush and grind the exterior of the water main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each insertion valve fitting against each main. Any structural defects in the water main, service connections, appurtenances, adjacent utilities, etc., that could interfere with the insertion valve installation shall be immediately reported to Engineer.

All insertion valve fittings and appurtenances shall be cleaned and disinfected in accordance with the current City of Ann Arbor Public Services Area Standard Specifications prior to bolting any of the line stop fittings in place or commencing any pipe cutting.

Contractor shall fit upper and lower saddle plate assemblies to main, thoroughly checking for proper fit to main. Under no circumstances shall Contractor attempt to force, reshape, or bend saddle plates by excessive tightening of saddle studs while the insertion valve fitting is assembled around the main. Any required retrofitting shall be accomplished with the fitting removed from the main. Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.

Upper and Lower saddle halves shall be drawn together by bolt assemblies and the Saddle plates shall be bolted together in the horizontal position.

All insertion valve work shall be performed in accordance with the equipment manufacturers approved work procedures and installation guidelines.

The Contractor shall place polyethylene encasement meeting the requirements of the City of Ann Arbor Standard Specifications for Construction around the upper and lower saddle halves, the blind flange, and to a point at least 1 foot on either side of the saddle halves. All polyethylene encasement shall be securely taped to the water main such that water entry is minimized to the greatest extent possible.

Lighting Requirements for Nighttime Water Main Work:

Night work shall be lighted to an average intensity of 108 lux minimum. Sufficient light sources shall be provided to achieve this illumination requirement. The lighting scheme shall be submitted to the Engineer for review and approval. Nighttime water main work will not be allowed to begin until such time as the lighting scheme has been approved by the Engineer.

The lighting shall allow the inspector to clearly see and inspect all work operations, including pipe, fitting, and valve installations, disinfection of the pipe, pipe cleaning, and all other night work.

Lighting systems may be fixed, portable, or equipment mounted. A power source shall be supplied with sufficient capacity to operate the lighting system. The lighting system(s) shall be arranged such that they do not interfere with the vision of motorists or unnecessarily illuminate surrounding properties or residences.

e. Measurement and Payment.- The completed work will be paid for at the contract unit prices for the following contract items (pay items):

Contract Item (Pay Item)	**Pay Unit**
Item 278: Insertion Valve-in-Well, Ductile/Cast Iron Pipe, __ inch	Each

All work shall be paid in full at the contract unit prices which shall include all the labor, materials, and equipment required to perform the work as detailed herein. This shall also include all required costs associated with night time work, supplemental lighting, and all other required elements of the work, including all traffic maintenance and control.

Pavement removal, aggregate base course, bituminous pavement, and traffic control items as necessary to construct the line stop (as determined by the Engineer), shall be paid for separately as specified elsewhere; all other items shall be included in the pay item for the insertion valve.

CITY OF ANN ARBOR

DETAILED SPECIFICATION
FOR
Item 350:Sewer, SDR 35 PVC, _ inch, Tr Det I
Item 351: Sewer, SDR 35 PVC, Service Lead, _ inch, Tr Det I

AA:DAD
WT:CGT

05/16/22

a. Description. This work includes installing sanitary sewer, manholes and related items. The Contractor shall furnish all materials, equipment, tools, and labor necessary to perform the work required by this special provision and shall unload, haul, distribute, store, and install all pipe, fittings, castings, manholes, and accessories.

The Contractor shall excavate all trenches and pits to the required dimensions; excavate the bell holes; sheet, brace, and properly support the adjoining ground or structures where necessary to comply with MIOSHA and other relevant safety standards; properly handle and remove all drainage or ground water so that the work can be completed in accordance with the specifications; install and test the pipe, fittings, castings, manholes, and accessories; backfill and compact all fill materials within trenches and pits; and remove and properly dispose of surplus or unsuitable excavated material off-site.

b. Materials. Materials shall conform to the following sections of Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction.

Concrete, Grade 3500	Section 1004
Mortar, Type R-1	Section 1005
Granular Material, Class II	Section 902
Coarse Aggregate, 6A	Section 902
Steel Reinforcement	Section 905
Castings	Section 908
Miscellaneous Metal Products	Section 908
Geosynthetics	Section 910
Masonry Units	Section 913

Coarse Aggregate, 6A shall be crushed limestone. Concrete, Grade X shall consist of Portland cement, coarse and fine aggregates, and water, proportioned with 282 lbs. cement (3 sacks) per cubic yard to produce a minimum 28 day compressive strength of 1000 psi.

1. Submittals. Prior to beginning construction, the Contractor shall submit the following:

   A. Product data on all pipe, fittings, and manhole structures.

   B. Manufacturer's certifications on all pipe, fittings, and manhole structures indicating that all materials meet the minimum requirements of these specifications.

   C. Information on equipment and methods to be used for mandrel, air, infiltration, and exfiltration testing, and television inspection.

2. General Specifications.

A. Vitrified Clay Pipe and Fittings:

Vitrified clay sewer pipe shall be the bell and spigot type, glazed or non-glazed, and shall be of full internal diameter from 4 through 18 inches inclusive. Clay pipe shall conform to the material and testing requirements of ASTM C 700, extra strength.
Joints:

Joints for vitrified clay sewer pipe shall be compression type joints conforming to the material and testing requirements of ASTM C 425. Lubricant used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

(1) Pipe Marking:

The following information shall be clearly marked on each length of pipe:

(a) The pipe designation and class (e.g., C 700, ES).

(b) The name or trademark of the manufacturer.

(c) Identification of the manufacturing plant.

(d) Testing lot number or testing lab stamp.

(2) Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

(3) Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection.

Vitrified clay pipe shall be subject to rejection on account of any of the following:

(a) Variation in any dimension exceeding the permissible variations given in the material specifications. Pipe in all cases shall be full diameter.

(b) Fractures or cracks passing through the barrel or socket.

(c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.

(d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.

(e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

(f) Insecure attachment of branches or spurs.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

B. Polyvinyl Chloride Pipe and Fittings:

Polyvinyl chloride (PVC) pipe shall have an integral wall bell and spigot. PVC pipe shall conform to the material and testing requirements of ASTM D 3034-83. Minimum wall thickness shall be SDR 35.

(1) Joints:

Joints for PVC pipe shall be elastomeric gasketed push-on joints conforming to the requirements of ASTM D 3212-81. Lubricant used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

(2) Pipe Marking:

The following information shall be clearly marked on each length of pipe at intervals of five feet or less:

(a) Manufacturer's name or trademark and code.

(b) Nominal pipe size.

(c) The PVC cell classification (e.g. "12454-B").

(d) The legend "Type PSM SDR-35 PVC Sewer Pipe".

(e) The designation "Specification D 3034".

The following information shall be clearly marked on each fitting:

(a) Manufacturer's name or trademark and code.

(b) Manufacturer's name or trademark.

(c) Nominal size.

(d) The material designation "PVC".

(e) "PSM"

(f) The designation "Specification D 3034".

(3) Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

(4) Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection.

Pipe shall be subject to rejection on account of any of the following:

(a) Variation in any dimension exceeding the permissible variations given in the material specifications. Pipe in all cases shall be full diameter.

(b) Fractures or cracks passing through the barrel or socket.

(c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.

(d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.

(e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

C. Sewer Service Leads, Risers and Fittings:

Allowable pipe materials are; SDR 26 polyvinyl chloride (PVC) plastic conforming to the material and testing requirements of ASTM D 3034; and vitrified clay pipe conforming to the material and testing requirements of ASTM C 700.

Whenever adapters are required to properly connect the pipe with pipe of other material or manufacturer, the nominal I.D. of adapters shall be manufactured for that specific purpose and shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer. The adaptor at this tapped connection shall be made using either a gasketed sewer saddle, a flexible neoprene rubber boot, or approved equal. Gasketed sewer saddles shall meet the following requirements:

(a) The castings shall be ductile iron per ASTM 536, Grade 65-45-12, protected with a yellow shopcoat.

(b) The adjustable strap shall be 3.5" wide, stainless steel per ASTM A 240, type 304.

(c) The bolts shall be 0.5" UNC rolled thread, lubricant coated, stainless steel per ASTM A 1943, type 304.

(d) The nuts shall be per ASTM A 194, type 304.

(e) The washers shall be stainless steel per ASTM A 240, type 304 and plastic lubricating washers.

(f) The gaskets shall be SBR per ASTM D 2000 MBA 710, compounded for water and sewer service.

(1) Joints:

Joints for SDR 35 PVC pipe shall be bell and spigot rubber o-ring gasket joints conforming to the requirements of ASTM D-3212. Lubricant supplied by the pipe manufacturer shall be used, and the joints shall be coupled in accordance with the manufacturer's requirements.

Joints for vitrified clay pipe shall be compression type joints conforming to the material and testing requirements of ASTM C 425. Lubricant used in making up joints shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with the manufacturer's requirements.

Joints for cast iron pipe shall be mechanical compression joints conforming to the material and testing requirements of ASTM C 564.

(2) Pipe Marking:

The following information shall be clearly marked on each length of pipe:

(a) The pipe designation and class (e.g., SDR 35, ASTM D 3034).

(b) The name or trademark of the manufacturer.

(c) Identification of the manufacturing plant.

(d) Testing lot number.

(3) Manufacturer's Certification:

All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading.

(4) Inspection:

All pipe furnished shall be subject to inspection on arrival at the job site by the Engineer. The purpose of the inspection shall be to cull and reject pipe or fittings that, independent of physical tests specified under the standard specifications

designated herein, fail to conform to the requirements of these Specifications.

The Contractor shall notify the Engineer sufficiently in advance so that an Inspector may be on the job during the unloading of materials. A minimum notice of 24 hours is required for such unloading and inspection.

Pipe for sewer service leads and risers shall be subject to rejection on account of any of the following:

(a) Variation in any dimension exceeding the permissible variations given in the material specifications. Pipe in all cases shall be full diameter.

(b) Fractures or cracks passing through the barrel or socket.

(c) Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than 1/4 of the thickness of the wall.

(d) Blisters that are either broken, exceed three inches in diameter, or project more than 1/8-inch above the surrounding surface of the pipe.

(e) Variation of more than 1/16-inch per lineal foot in alignment of pipe intended to be straight.

Rejected pipe shall be plainly marked by the Inspector and immediately removed from the site of the work by the Contractor, without cost to the City.

D. Manholes:

All sanitary sewer manholes shall be constructed of precast reinforced concrete sections. Precast drainage structures shall be designed to accommodate HL-93 Modified Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed. For the purposes of design, a HL-93 Modified Live Load shall consist of 1.2 times the design truck or 1.2 times a single 60 kip load, whichever produces the greater stresses.

Precast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat top slabs shall conform to the requirements of ASTM C 478. Joints on precast manholes used on all sanitary sewers shall meet ASTM C 443, rubber O-ring gasket.

Concrete brick shall conform to the requirements for concrete building brick, ASTM C 55, Grade N-1.

Cast iron frames and covers for manholes shall conform to the requirements for grey iron castings, ASTM A 48, Class No. 30. Specific, approved castings are listed in the Special Provision for "Dr Structure Covers."

Plastic coated manhole steps shall be injection molded of copolymer, polypropylene, encapsulating a 1/2 inch grade 60 steel reinforcing bar. Plastic-coated manhole steps shall meet the performance test described in ASTM C-478, Paragraph II, and shall have an impact resistance of 300 ft.-lbs., with only minor deflection and no cracking or breaking.

The steps shall resist pull out forces of 1500 lbs.

E. Manhole Connections:

Sewer pipe to precast manhole connections shall be through: 1) a flexible neoprene rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacture and shall be accurately located within 1/2-inch of proposed sewer centerline; or, 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient, flexible, and infiltration-proof joint; or, 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole as approved in writing by the Engineer.

Neoprene rubber for manhole boots shall meet the requirements of ASTM C 443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.

c. Construction.

1. Material Handling:

Pipe, fittings and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such material be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

In distributing the material at the site of the work, each piece shall be stored off of the ground surface by means of skids or bunks, and stacked neatly. Pipe may be "strung-out" for only the length which, in the opinion of the Engineer, will be installed within 24 hours, if maintained such that the pipe interior will remain free of dirt, mud, and debris.

2. Excavation:

The Contractor shall dig-up and expose all utility crossings prior to laying any sanitary sewer pipe or lead. This will allow the Engineer to adjust the grade of the sanitary sewer or lead, if possible, to avoid the existing utilities. The costs of the dig-ups, and related costs, shall be included in the unit price of the sanitary sewer or lead. The Engineer may require that some dig-ups be performed out-of the staging area where the sewer work is taking place in order to aid in alignment decisions.

Excavation shall include the removal and disposal of all materials of every kind, including rock, boulders, or buried obstructions necessary to be removed in the construction work.

The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and the Contractor shall be held responsible for the repair of such structures when broken or otherwise damaged.

Excavation normally shall be by open cut from the surface, except as otherwise specified, or in special cases where crossing under trees, pavements, or structures. The Contractor may use tunnel methods if permitted in writing by the Engineer, provided his method of backfill is such, in the judgment of the Engineer, as to avoid any present or future injury to the tree, pavement, or structure. All excavation shall be performed in such a manner as to provide adequate room for the construction and installation of the work to the lines, grades and dimensions shown on the Plans.

The trench shall be excavated to a minimum of four inches below the final location of the pipe. This cut shall be filled to the level of the bottom quadrant of the pipe with Coarse Aggregate, 6A as specified herein, shaped and compacted to the pipe barrel.

Bell holes shall be provided in the trench bottom at each joint to permit the joints to be made properly.

Whenever, in the opinion of the Engineer, it is necessary to explore and excavate to determine the location of existing underground structures, the Contractor shall make explorations and excavations for such purposes. These excavations will not be paid for separately, but shall be included in the cost of the item of work being performed. Any backfilling that may be required to be performed as a result of an exploratory excavation that is not part of the backfill associated with the work being undertaken, shall be included in the item of work being performed, with the exception of final trench restoration, which shall be paid for separately using appropriate items of work contained within the contract documents.

All excavated material approved by the Engineer as backfill material and imported backfill material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways or clear vision areas along roadways, driveways, or parking areas. All excavated material which is unsuitable for backfill shall be immediately removed from the site by the Contractor. Hydrants under pressure, manholes of any kind, valve boxes, curb stop boxes, fire and police call boxes, and other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear, or other satisfactory provisions made, for proper drainage. Natural and man-made water courses shall not be obstructed. Disposal of excavated material, if required, shall be the Contractor's responsibility.

Hand methods for excavation shall be employed in locations shown on the Plans. In other locations the Contractor may use trench-digging machinery or employ hand methods.

3. Pipe Undercut:

In locations where in the opinion of the Engineer, the soil at the bottom of the trench is unstable, the Contractor shall excavate below the trench bottom to such depth as directed by the Engineer and refill with compacted Aggregate, 6A (limestone), or compacted Granular Material, Class II, as directed by the Engineer, to the level of the bottom quadrant of the pipe. If refill with compacted Aggregate, 6A (limestone) is required during sewer construction, it shall be placed for the entire sewer run, from manhole to manhole.

4. Trench Opening:

The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, to permit the convenient placing of timber supports, sheeting and bracing, and handling of special fittings. For each size of pipe, the minimum trench width shall provide clearance of four inches on each side of the bell of the pipe or fitting or six inches on each side of the pipe barrel, whichever is greater. The maximum trench width shall be in keeping with good construction practice, such that existing structures are not undermined.

In excavating for pipe lines, the excavation shall at all times be finished to the required grade in advance of the pipe line, but unless otherwise permitted in writing by the Engineer, not more than 50 feet of trench shall be open at one time in advance of the pipe. At no time shall more than 200 feet of trench be opened and incompletely backfilled. At the end of each day, no more than 25 feet of trench may be left open, and access to all drives shall be restored. This opening shall be surrounded by fencing and lighted barricades, or plated. The remainder of the trenching operation shall be available for safe vehicular and pedestrian traffic at all times.

The trench shall be so braced and drained that the workers may work therein safely and efficiently. It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains, or storm sewers. If trench water is pumped to natural drainage channels or drains, approved soil erosion and sedimentation controls shall be installed and maintained at the point of discharge. If trench water is pumped into storm sewers, filters shall be provided to prevent the flow of rocks, mud and other debris into the storm sewer line.

The length of street which may be occupied by the construction work at any one time shall be subject to the approval of the Engineer and will be based on the requirements of use of the street by the public.

The Contractor shall fully comply with all laws and regulations governing construction methods and the furnishing and use of all safeguards, safety devices, protective equipment, and pollution controls. Particular care shall be taken to conform to all applicable rules of the Michigan Department of Labor, Construction Safety Standards Commission, "Safety Standards". Part 9 of the above document should be particularly noted.

Where required to support the surfaces of adjacent throughfares, structures, or excavations, or to protect the construction work, adjacent work, or workmen; sheeting, bracing, and shoring shall be provided. The placing of such supports shall not release the Contractor of the responsibility for the sufficiency and integrity of the trench opening. In the removing of sheeting and bracing after the construction has been completed, special care shall be taken to prevent any caving of the sides of the excavation and injury to the completed work or to adjacent property.

Sheeting, bracing, and shoring shall not be left in place after completion of the work except as required by the Engineer. Where the Engineer requires the sheeting, bracing, or shoring to be left in place it shall be cut off below the established surface grade as required by the Engineer.

5. Disposal of Water and Sewage:

The Contractor shall remove by well points, pumping, bailing, or other acceptable method any water which may accumulate or be found in the trenches or other excavations to be made. The Contractor shall take all necessary precautions to keep the trenches and other excavations entirely clear of water and sewage during construction of pipe lines and structures. Newly placed concrete shall be adequately protected from injury resulting from ground water or sewage. No drainage ditches shall be placed within the area to be occupied by any structure except as permitted in writing by the Engineer.

The Contractor shall at all times have upon the work sufficient pumping equipment ready for immediate use to carry out the intent of this section.

Where existing sewers, drains, or ditches are encountered in this work, adequate provisions shall be made for diverting their flow, so that the excavation will be kept dry. Upon completion of the construction work, the existing sewers, drains, or ditches shall be restored as directed by the Engineer.

6. Crossing Existing Structures & Facilities:

During the construction it may be necessary to cross under or over certain sewers, service leads, drains, culverts, water lines, gas lines, electric lines, and other underground structures or facilities, known or unknown. The Contractor shall make every effort to prevent damage to such underground structures and facilities. The Contractor shall not intentionally "dig through" existing facilities with the intention of replacing or repairing them after the proposed work is completed. Wherever such structures or facilities are disturbed or broken, they shall be restored to a condition equal to, or better than, the condition that existed prior the work being performed. All repairs shall acceptable to the owner and the City and shall be at the Contractor's sole expense. These crossings shall be made with a minimum of twelve inches of vertical clearance between facilities.

7. Laying Pipe:

Each pipe shall be inspected for defects prior to being lowered into the trench. The inside of each pipe and outside of each spigot shall be cleaned of any earth or foreign matter.

Proper implements, tools, and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe and fittings shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment as recommended by the manufacturer, in such a manner as to prevent damage to them and their protective coatings and linings. Under no circumstances shall materials be dropped or dumped into the trench.

New sewer construction shall be plugged at the outlet, so as to not be connected into the existing system until it has been tested and accepted. Construction of sewers shall begin

at the outlet end and proceed upgrade, unless otherwise directed by the plans or the Engineer. Pipe shall be laid on the prepared subgrade with the bell ends facing the direction of laying, unless otherwise directed by the Engineer.

The Contractor shall take every precaution to prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. This provision shall apply during the break period as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Pipe shall be jointed as specified elsewhere herein. The pipe shall be secured in place with approved backfill material tamped under it except at the bells. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space.

All pipe shall be laid at the correct line and grade as indicated by the grade stakes and offset line. The correct line and grade shall be maintained by the use of a laser alignment system. The staking shall be provided by the Engineer. No pipe shall be laid until a cut sheet for that pipe has been approved by the Engineer. Each pipe, as laid, shall be checked by the Contractor to insure that this result is obtained. The grade as shown on the Plans is that of the pipe invert for sewers; the work must conform to this profile. A variation of 1/4 inch from this profile grade will be deemed sufficient reason to cause the work to be rejected and re-laid. Sewer pipe alignment shall be maintained so as to not vary more than one-half inch from the correct line on pipes up to 36 inches in diameter nor more than one inch on pipes 42 inches in diameter and larger. Any pipe found out of line shall be re-laid properly by the Contractor.

Due to conditions in the field, changes to the proposed vertical and horizontal alignment of the proposed sanitary sewer may become necessary. The Contractor shall, where directed by the Engineer, excavate up to 60 feet in advance of the pipe laying operation to expose existing underground facilities thereby enabling the Engineer to make alignment decisions. The Contractor is required to realign (re-lay) the sanitary sewer up to 2 feet vertically and/or horizontally as directed by the Engineer at no extra cost to the project. The excavation in advance of the pipe laying is intended to help eliminate the need for re-laying pipe.

8. Making Joints

   A. General:

   Mechanical means shall be used for pulling home all rubber-gasket pipe regardless of trench condition where manual means will not result in pushing and holding the pipe home. When a trench box or liner is used, a cable shall be used to pull the joints home and hold them in position.

   Where work is performed in wet trenches or trenches with running sand, the Contractor shall provide and use mechanical means for pulling the pipe home in making up the

joint and for holding the pipe joints tight until completion of the line. Mechanical means shall consist of a cable placed inside or outside of the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding the pipe in position.

Where not required by these Specifications, manual means will be acceptable only if the joints can be pushed home and held.

Sewer pipe may not be cut when the cut end will be used in making a pipe joint. Cut ends may only occur in situations such as a manhole or headwall. Cut ends shall be carefully and neatly made with a saw, pipe cutter, or other approved means.

B. Vitrified Clay Pipe:

Compression-type joints shall be made in accordance with manufacturer's standards and ASTM C 425. The jointing surfaces of the pipe shall be wiped clean, and lubricated using lubricants supplied by the pipe manufacturer. The socket and spigot shall be lined up and joined together with a steady, uniformly applied force.

C. Polyvinyl Chloride (PVC) Pipe:

Elastomeric gasket, push-on joints, shall be made in accordance with manufacturer's standards, and ASTM D2321 and D3212. The jointing surfaces of the pipe shall be wiped clean, and lubricated using lubricant supplied by the pipe manufacturer. The spigot end is to be inserted into the bell so that it is in contact with the gasket. The bell is to be braced while the spigot end is pushed in under the gasket, so that previously completed joints will not be altered. The spigot shall be pushed into the bell until the reference mark on the pipe barrel is flush with the end of the bell.

9. Backfilling

A. General:

Backfilling shall not be performed in freezing weather except by written permission of the Engineer, and it shall not be composed of frozen material. No fill shall be placed where the material already in the trench is frozen.

B. Vitrified Clay Pipe:

All pipe shall be bed on a four inch or thicker layer of compacted Granular Material Class II or compacted Aggregate, 6A (limestone) as specified herein.

From the bedding to the pipe centerline backfill shall be carefully placed Granular Material Class II placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods, to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. Each lift shall extend the full width of the space between the pipe and trench, and the fill shall be brought up evenly on both sides of the pipe. The backfill under the haunches of the pipe shall be consolidated by the use of a tee-bar.

When the pipe is greater than 48 inch diameter, or when permitted in writing by the Engineer, the Granular Material Class II from the bedding to the centerline may be replaced by Aggregate, 6A (limestone) as specified. A suitable granular filter, designed by the Contractor and approved by the Engineer, shall be provided above the coarse aggregate to prevent intrusion of succeeding backfill materials.

From the pipe centerline to the top of the pipe, backfill shall be Granular Material, Class II placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods, to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557 Method C, or AASHTO T-180.

From the top of the pipe to two feet above the top of the pipe backfill shall be Granular Material, Class II uniformly spread and machine tamped. Machine tamping shall include manually operated vibrating plate compactors. The backfill material shall be compacted in lifts of twelve inches, loose measure.

From two feet above the top of the pipe to the grade shown on the Plans and Details, or to the subgrade of roadway materials, or to the subgrade of surface structures, backfill shall be Granular Material, Class II uniformly spread and machine tamped. If machine tamping includes manually operated vibrating plate compactors or self propelled vibrating rollers the backfill material shall be compacted in lifts not exceeding twelve inches, loose measure. If a backhoe mounted compactor is employed, the backfill material shall be compacted in lifts of thirty-six inches, loose measure. Approval to use a particular machine tamping method will be withdrawn by the Engineer if the method causes injury to the pipe or adjacent structures or movement of the pipe. Each lift shall be thoroughly compacted to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. The Engineer may give consideration to giving written permission to increase the thickness of the lifts specified in this paragraph if satisfactory compaction is achieved and no undesirable side effects occur.

C. PVC Pipe:

All pipe shall be bed on a four inch or thicker layer of compacted Coarse Aggregate, 6A (limestone) as specified herein.

From the bedding to the pipe centerline backfill shall be carefully placed Coarse Aggregate, 6A (limestone), placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other approved methods. Each lift shall extend the full width of the space between the pipe and trench, and the fill shall be brought up evenly on both sides of the pipe. The backfill under the haunches of the pipe shall be consolidated by the use of a tee-bar.

From the pipe centerline to the top of the pipe, backfill shall be Aggregate, 6A (limestone) placed in maximum lift thicknesses of six inches, loose measure. Each lift shall be thoroughly compacted by hand tamps, pneumatic "pogo-sticks", or other

approved methods. A layer of geotextile separator, meeting the requirements of Section 910, extending the full width of the trench, shall be provided above the coarse aggregate to prevent intrusion of succeeding backfill materials.

From the top of the pipe to two feet above the top of the pipe, unless otherwise specified, backfill shall be Granular Materia Class II placed in a maximum lift thickness of twelve inches, loose measure. These lifts shall be thoroughly compacted by manually operated vibrating plate compactors, to at least 95% of the material's maximum dry density at optimum moisture content, as determined by ASTM D 1557, Method C, or AASHTO T-180.

From two feet above the top of PVC pipe to the grade shown on the Plans and Details, or to the subgrade of roadway materials, or to the subgrade of surface structures, backfill shall be Class II granular material uniformly spread and machine tamped. If machine tamping includes manually operated vibrating plate compactors or self propelled vibrating rollers the backfill material shall be compacted in lifts not exceeding twelve inches, loose measure. If a backhoe mounted compactor is employed, the backfill material shall be compacted in lifts of thirty-six inches, loose measure. Approval to use a particular machine tamping method will be withdrawn by the Engineer if the method causes injury to the pipe or adjacent structures or movement of the pipe. Each lift shall be thoroughly compacted to at least 95% of the material's maximum dry density at optimum moisture content as determined by ASTM D 1557, Method C, or AASHTO T-180. The Engineer may give consideration to giving written permission to increase the thickness of the lifts specified in this paragraph if satisfactory compaction is achieved and no undesirable side effects occur.

11. Concrete Cradle and Encasement for Sewers:

Where shown on the Plans, pipe shall be installed with a concrete cradle or encasement of Concrete, Grade X as shown on the Standard Details or plan sheets. Cradle or encasement shall be for the full run of the sewer, from manhole to manhole. Each pipe shall rest on a bed of Concrete, Grade X, shaped to fit the bottom of the pipe. After setting the pipe, the space between the outside of the pipe and the undisturbed trench bank shall be completely filled with Concrete, Grade X. Concrete, Grade X used for this purpose shall have a slump not exceeding two inches.

12. Riser Pipe for Service Leads:

Where shown on the Plans or directed by the Engineer, the Contractor shall furnish and place risers extending from the branch opening of the sewer up to within eight to ten feet of the proposed finished grade. These pipes shall be laid with joints as specified above. These risers shall be laid up and held in place as required by the Standard Details. The connection fitting when a riser is to be used shall be a tee fitting. Openings in the top of the riser pipe shall be closed, marked, and staked as specified above.

13. Service Lead Connections and Fittings:

Service lead connections shall be provided at such points as shown on the Plans or as directed by the Engineer. These shall be of the size and character indicated on the Plans. House service leads shall be a minimum of four inches in diameter. Service lead connections shall be formed by the use of standard wye or tee fittings of the same material called for use on the main sewer being constructed. Wye fittings are not to be used for connections with riser pipes. All wye and tee fittings shall be encased in Concrete, Grade X. All leads which will not have pipe connected to them immediately shall be closed by the use of a watertight plug manufactured specifically for that purpose and approved by the Engineer.

Branch connections to existing sewers shall be made by the City of Ann Arbor – Field Operations Personnel. Scheduling of these taps shall be made with Field Operations by the Contractor. All applicable tap fees must be paid in full prior to this scheduling.

Connections for sewer service leads connecting to existing sewer mains or sewer mains of a different pipe material shall be at a core-drilled tap into the sewer pipe. The joint at this tapped connection shall be made using either a gasketed sewer saddle, a flexible neoprene rubber boot securely clamped into the core-drilled tap, or approved equal. The end of the sewer service lead pipe shall be flush with the inside wall of the sewer main. Gasketed sewer saddles shall meet the following requirements:

(a) The castings shall be ductile iron per ASTM 536, Grade 65-45-12, protected with a yellow shopcoat.

(b) The adjustable strap shall be 3.5" wide, stainless steel per ASTM A 240, type 304.

(c) The bolts shall be 0.5" UNC rolled thread, lubricant coated, stainless steel per ASTM A 1943, type 304.

(d) The nuts shall be per ASTM A 194, type 304.

(e) The washers shall be stainless steel per ASTM A 240, type 304 and plastic lubricating washers.

(f) The gaskets shall be SBR per ASTM D 2000 MBA 710, compounded for water and sewer service.

In order to properly mark the location of every branch connection, the Contractor shall take accurate measurement of all branches before the sewer trench is backfilled. The measurements shall indicate the distance from each branch to the center of the nearest

downstream and upstream manhole. When leads are run to the property line, they shall be perpendicular to the main sewer. The Contractor shall also report the location of the point where the lead ends, relative to the nearest property corners. The Contractor shall furnish the Engineer with a copy of these measurements immediately upon the completion of each section of sewer.

In addition to measurements, the Contractor shall furnish and place a minimum two inch by two inch cedar or treated lumber marking stick at the end of each lateral extension or service lead connection of such length that it will reach from the end of the pipe vertically up to a minimum of two inches above the proposed finished grade. Each marker shall be set in a vertical position. Markers will not be required on the main run of sewer at fittings. The visible end of each marker stake must be plainly painted red if sanitary or white if storm.

The service lead pipes shall also be marked for identification in order to prevent cross connection of the leads: sanitary leads - red, storm leads - white. The last two lengths of pipe shall be marked by wrapping the appropriate colored tape twice around the barrel. This wrapping shall take place at any point in the lead whenever the lead is terminated. This taping (wrapping) must be performed under the inspection of the Inspector.

14. Manholes:

Excavation shall be carried to the depth and width required to permit the construction of the required base. The excavation width shall be greater than the base. The bottom of the excavation shall be trimmed to a uniform horizontal bed and be completely dewatered before any concrete is placed therein. Concrete shall be Grade S2. Precast manhole bases and precast bottom sections are allowed.

Precast concrete manholes shall be constructed of Concrete, Grade S2.

Circular precast manhole sections shall be constructed in accordance with the Standard Detail Drawings. Manhole stack units shall be constructed on level poured-in-place bases, precast concrete bases, or precast concrete bottom sections.

Precast cone sections shall be constructed in accordance with the Standard Details. These units shall be eccentric for all manholes. All structures shall be topped with a minimum of one and a maximum of three brick or precast adjustment ring courses.

Manholes shall be constructed within 2-1/2 inches of plumb.

Frames and cover castings shall be set in full mortar beds and pointed on the structure interior to a smooth, brushed finish. The covers shall be set flush with sidewalk, roadway pavement, or ground surfaces. City of Ann Arbor Project Management Personnel shall be notified prior to the final paving of all private roads and parking lots so as to allow inspection of the final casting adjustments for all City utility structures. In gravel streets, covers shall be set six to eight inches below finished gravel surface.

Sewer pipes shall extend into structures a minimum of 1/2 inch and a maximum of 3 inches.

Flow channels for sewer structures shall be finished in accordance with the Standard Details. All flow channels shall be screeded and floated to a smooth, uniform surface and troweled to a hard surface finish. In vitrified clay sewers, the manhole may be constructed around the pipe, then the top half of the pipe broken out with concrete fillets provided to fill in between the pipe and manhole.

Stubs for future sewer connections shall be furnished and placed by the Contractor as shown on the Plans and as directed by the Engineer. Connections shall be properly supported and braced when not resting on original ground so that any settlement will not disturb the connection. Stubs shall consist of one length of sewer pipe, of the size indicated on the Plans, with a watertight plug.

See Sewer Testing section for the requirement of the installation of a pipe nipple through the sewer manhole wall.

15. Drop Connections:

Where shown on the Plans or directed by the Engineer where a branch sanitary sewer is brought into a manhole more than 24 inches above the invert elevation in the manhole, a drop connection shall be provided in accordance with the Standard Detail Drawings.

16. Backfilling Around Manholes:

As soon as practicable after a precast structure has been set, forms and debris have been removed from the structure, and the structure has been inspected and approved, the excavated area around the structure shall be backfilled up to the specified grade with Granular Material, Class II. No boulders, rocks, stones, masonry, lumber, or debris shall be allowed within the backfill.

17. Sewer Testing:

All sanitary sewers, including leads, 36 inches and smaller shall be air tested by the Contractor. All sanitary sewers greater than 36 inches shall be infiltration or exfiltration tested by the Contractor. The Engineer will decide whether inflitration or exfiltration testing is performed based upon ground water conditions. All sewers, except 4-inch and 6-inch leads, shall be television inspected by the Contractor. All PVC sanitary sewer mains shall be mandrel tested. All sewer must meet each test, in order (mandrel testing, air or infiltration/exfiltration, television inspection), before the next test is performed. The Contractor shall furnish all labor, equipment and materials necessary for testing. Only after all tests have been successfully completed, and acknowledged by the Engineer in writing, may the sewer be placed in service.

A. Mandrel Testing:

All PVC sanitary sewer mains shall be mandrel tested for deflection by the Contractor.

The mandrel shall be a commercially produced, nine-fin mandrel, with the pipe diameter, percent deflection and applicable ASTM or AASHTO standard stamped on the fins. The testing is to take place after the sewers have been in place for a minimum of 30 days. The mandrel shall be pulled from structure to structure. Any portion of the pipe through which the mandrel passes freely shall be deemed to have passed the mandrel test. Sections of pipe through which the mandrel does not pass freely shall be exposed and examined. Based on this examination the pipe zone bedding and backfill shall be improved, or the pipe replaced. The pipe shall then be re-tested before approval is granted.

The Contractor shall not be granted an extension of contract time for the period in which a portion(s) of PVC sanitary sewer is awaiting mandrel and other acceptance tests. This waiting period is understood to be an integral element of the construction of the utility and cannot be eliminated. Further, if a sewer is installed and requires remedial action in order to comply with the requirements of the project specifications, the waiting period associated with the remedial repairs shall also not be considered as a basis for an extension of contract time. The Contractor shall take these requirements into account when preparing their Critical Path Schedule, and any required updates, and shall account for them during the performance of the project.

The mandrel is to be constructed in accordance with the following table:

SDR 26 PVC, Pipe I.D.	Mandrel O.D.
8"	7.28"
10"	9.08"
12"	10.79"
15"	13.20"
18"	N/A
24"	N/A

B. Air Test:

The air test can be dangerous. Lack of understanding, carelessness, or an improperly prepared line must be avoided. It is extremely important that the plugs be installed in such a way as to prevent blowouts. Sudden expulsion of a poorly installed or partially deflated plug can cause serious injury or damage. As a safety precaution, pressurizing equipment must include a relief valve set at not more than 10 psig. No one will be allowed in the manholes during testing.

In areas where ground water is known to exist and the sewer is to be air tested, the Contractor shall install a 1/2-inch diameter by approximately 10 inch long pipe nipple, through the manhole wall above one of the sewer lines entering the manhole. The pipe nipple shall be capped on the inside of the manhole at the time the sewer line is installed. Immediately prior to the performance of the air test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The tube shall be held vertically and a measurement of the height in feet of water above

pipe centerline shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.31 to establish the pressure (in psig) that will be considered to be the average ground water back pressure.

The normal sequence and time requirements for air testing are:

(1) After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing. There shall be three hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

(2) Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the pressurization hose shall be disconnected to prevent air from entering or escaping from the line.

There shall be a pressure gauge for reading the internal pressure of the line being tested. The gauge shall be capable of showing pressure as low as 0 psig up to no greater than 20 psig. In the 0-10 psig range the gauge shall be both calibrated and accurate to one-tenth of one pound and the gauge dial shall cover at least one-half of the complete dial range. This gauge shall have a tee fitting to allow simultaneous pressure reading by a City gauge.

(3) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

	VCP SEWERS	PVC SEWERS	
Pipe Size	Minimum Holding Time Seconds/100 ft. Pipe	Holding Time (Seconds)	Minimum Holding Time (Min:Sec)
4-inch	18	0.380 x Length	3:46
6-inch	42	0.854 x L	5:40
8-inch	72	1.520 x L	7:34
10-inch	90	2.374 x L	9:26
12-inch	108	3.418 x L	11:20
15-inch	126	5.342 x L	14:10
18-inch	144	7.692 x L	17:00

21-inch	180	10.470 x L	19:50
24-inch	216	13.674 x L	22:40
30-inch	288	21.366 x L	28:20
36-inch	360	30.768 x L	34:00

C. Infiltration Test:

The Contractor shall place temporary weirs for testing purposes in such manholes as necessary to measure the amount of infiltration. Test sections shall be no longer than 1,200 feet.

The allowable amount of infiltration shall not be more than 200 gallons per inch of pipe diameter per mile of sewer per 24 hours, including manholes. The Contractor shall repair all visible leaks regardless of the results of the infiltration test.

If the allowable limit of infiltration is exceeded on any test section, the Contractor shall reconstruct or repair the defective portion of the sewer, and re-test.

D. Exfiltration Test:

The standpipe method will be used from manhole to manhole for the length of pipe to be tested. A hydrostatic head of 10 ft. to the sewer's average centerline elevation will be required, with adjustments for external submergence due to water in the trench. The Engineer will establish time durations and procedures for each test. The maximum allowable exfiltration rate will be 200 gallons per inch of pipe diameter per mile of sewer per 24 hours including manholes. Upon completion of this test on a sanitary sewer, the Contractor shall pump all water out of the downstream manhole to a storm sewer.

18. Television Inspection:

A video inspection must be approved prior to the acceptance of the sewers, and prior to any building connections being made. The Engineer shall be given 24 hours notice so that an Inspector may witness the video inspection. All sewer lines are to be thoroughly cleaned prior to video inspection, by jetting of the lines or other approved methods. Video inspection shall consist of wetting the invert of the section by pouring clean water in the upstream manhole until it appears in the downstream manhole, and then, after the water has stopped flowing, passing a video camera through the section. The camera shall be connected to a monitor and the results recorded in DVD format. The inspection record (DVD) shall indicate the date, the section tested, and the actual distance from the beginning manhole to each tee or wye, and each visible defect. The DVD shall be furnished to the Engineer for further review and final approval.

The video inspection will be deemed satisfactory if there are no visible defects, including, but not limited to: dips or low spots, high spots, deviations in horizontal or vertical alignment, joint offsets, leaks or cracks and there is no debris or other foreign material in the sewer system.

19. Sewer Repairs:

If a sewer repair is required as a result of damage during construction operations, air test failure, or video inspection failure, the Contractor shall expose the sewer pipe and perform the required correction(s), as specified herein and as directed by the Engineer. The Contractor shall be fully responsible to provide a written plan of all proposed activities associated with any repair(s) for the review and approval of the Engineer. All repairs proposed shall be effective. The Engineer's acceptance of a proposed repair plan shall not be construed as acceptance of any associated result. The Contractor is, and shall remain responsible, for all work until such time as it is formally accepted in writing by the Engineer.

If the repair is required due to the pipe being out of alignment or off grade, the pipe shall be adjusted so as to be placed in proper alignment and grade. Aggregate, 6A (limestone) shall be carefully placed under the haunches of the realigned pipe and compacted by the use of a tee-bar. From the haunches of the pipe, backfilling shall be performed as specified elsewhere herein.

If the pipe cannot be satisfactorily realigned or an open joint reset; or if the pipe is cracked, broken, or permanently deflected, the affected pipe shall be removed and replaced with the same pipe material. The pipe to be removed is to be sawed on each side of the damaged section in a neat and workmanlike manner without damage to the adjacent pipe. The replacement pipe section shall fit flush to the remaining pipe at each end. These sawed joints shall be coupled using a flexible pipe coupling and stainless steel shear ring. These joints shall be encased to the pipe centerline with Concrete, Grade X one foot on either side of the flexible coupling. The remaining pipe backfill shall be performed as specified elsewhere herein.

d. Measurement and Payment. The completed work, as described, will be paid for at the contract unit prices respectively for the following pay items:

Pay Item	**Pay Unit**
Item 350: Sewer, SDR 35 PVC, ___ inch, Tr Det ___	Foot
Item 351: Sewer, SDR 35 PVC, Service Lead, ___ inch, Tr Det ___	Foot

Sewer pipe as specified shall be measured in place by length in feet from center of manhole to center of manhole.

Payment will include, but not be limited to; excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; connections into existing structures; bulkheading existing connections that are no longer needed in existing manholes; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling per the trench details and the requirements specified herein; cleaning; video inspection; and testing.

Service tees or wyes shall be paid for based on each tee installed. The payment for the service tee will include the material, equipment and labor costs for the connection of the riser or lead to the

tee. Also, the payment for the service tee will include the material, equipment and labor costs for the excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling per the trench details and the requirements specified herein; cleaning; testing; placing the plug or cap placed on the tee, riser or lead; and, the required wooden stake to locate the riser or lead in the future.

Service risers shall be paid for based on the installed height measured in feet from invert of the sewer main to invert of the bend at the top of the riser.

Service leads shall be paid for based on installed length measured feet from the center of the main to the capped end of the lead. If a service riser is installed, this measurement shall be from the center of the bend at the top of the riser to the capped end of the lead. The payment for service leads will include, but not be limited to; excavation; removal and proper disposal off-site of all excess or unsuitable excavated material; any needed sheeting, shoring and bracing; the installation of water-tight plugs; protection of all existing utilities and service connections; connections into existing structures; pipe bedding; by-pass pumping; furnishing an approved geotextile separator; backfilling and compacting per the trench details and the requirements specified herein; cleaning; video inspection; testing; and, the necessary fittings, labor and equipment to connect the lead to a riser.

Manholes of the detail and depth specified will be paid for at the Contract unit price for each unit installed. Payment includes, but shall not be limited to; furnishing the labor, equipment and materials for all necessary excavation; any needed sheeting, shoring and bracing; properly disposing of surplus or unsuitable excavated material; backfilling and compaction; and, constructing the structure complete, including pipe connections and structure cleaning, up to 10 feet of drainage structure depth.

Payment for additional depth for drainage structures includes, but shall not be limited to; furnishing the labor, equipment, and materials for all necessary excavation; any needed sheeting, shoring and bracing; disposing of surplus excavated material; backfilling and compaction; and constructing the structure complete, including pipe connections and structure cleaning, for the portion of the structure which is deeper than 10 feet.

Payment for adjusting of manhole frames and covers shall be included in payment for the manhole. The manhole frames and covers will be paid for separately.

Payment for drop connections shall be based on the installed vertical height measured in feet from the bottom invert of the drop connection to the top invert of the drop connection. Payment includes, but shall not be limited to; furnishing all labor, equipment and materials for all necessary excavation; any needed sheeting, shoring and bracing; proper removal and disposal off-site of surplus and unsuitable excavated material; pipe, fittings, and concrete; backfilling and compaction; and, connections to complete this item of work.

ATTACHMENT B
GENERAL DECLARATIONS

Ann Arbor DDA
150 S. Fifth Ave, Ste #301
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including Notice of Pre-Bid Conference, General Information, Bid, Bid Forms, Contract, Bond Forms, General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it conducted a full investigation at the site and of the work proposed and is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the DDA, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

The undersigned proposes to perform all work shown on the plans or described in the bid documents, including any addenda issued, and to furnish all necessary machinery, tools, apparatus, and other means of construction to do all the work, furnish all the materials, and complete the work in strict accordance with all terms of the Contract of which this Bid is one part.

In accordance with these bid documents, and Addenda numbered __1___, the undersigned, as Bidder, proposes to perform at the sites in and/or around Ann Arbor, Michigan, all the work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become fully familiar with the liquidated damage clauses for completion times and for compliance with City Code Chapter 112, understands and agrees that the liquidated damages are for the non-quantifiable aspects of non-compliance and do not cover actual damages that may be shown and agrees that if awarded the Contract, all liquidated damage clauses form part of the Contract.

The Bidder declares that it has become fully familiar with the provisions of Chapter 14, Section 1:320 (Prevailing wages) and Chapter 23 (Living Wage) of the Code of the City of Ann Arbor and that it understands and agrees to comply, to the extent applicable to employees providing services to the DDA under this Contract, with the wage requirements. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder encloses a certified check or Bid Bond in the amount of 5% of the total of the Bid Price. The Bidder agrees both to contract for the work and to furnish the necessary Bonds and insurance documentation within 10 days after being notified of the acceptance of the Bid.

If this Bid is accepted by the DDA and the Bidder fails to contract and furnish the required Bonds and insurance documentation within 10 days after being notified of the acceptance of this Bid, then the Bidder shall be considered to have abandoned the Contract and the certified check or Bid Bond accompanying this Bid shall become due and payable to the DDA.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

In submitting this Bid, it is understood that the right is reserved by the DDA to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the DDA believes to be in its best interest.

SIGNED THIS 1st DAY OF June, 2022.

Fonson Company, Inc.
Bidder's Name

Authorized Signature of Bidder

7644 Whitmore Lake Rd, Brighton, MI 48116
Official Address

Kirk Cooley, General Manager
(Print Name of Signer Above)

810-231-5188
Telephone Number

estimating@fonsoninc.com
Email Address for Award Notice

ATTACHMENT C
LEGAL STATUS OF BIDDER

(The bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of Michigan, for whom Kirk Cooley, bearing the office title of General Manager, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

~~• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.~~

~~* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):~~

~~_____~~
~~_____~~
~~_____~~
~~_____~~
~~_____~~

~~* An individual, whose signature with address, is affixed to this Bid: _____~~
~~(initial here)~~

Authorized Official

_____ **Date** June 1st, 2022

(Print) Name Kirk Cooley Title General Manager

Company: Fonson Company, Inc.

Address: 7644 Whitmore Lake Rd, Brighton, MI 48116

Contact Phone (810) 231-5188 Fax (810) 231-5404

Email estimating@fonsoninc.com

ADDENDUM No. 1

RFP No. DDA 2022-05

Catherine and Miller Bikeway Project

Due: Wednesday, June 1, 2022, at 3:00 p.m. (local time)

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. This Addendum includes 2 pages of the addendum notice, 35 attached pages, and 4 plan sheets, as noted below.

The Proposer is to acknowledge receipt of this Addendum No. 1, including all attachments in its Proposal by so indicating in the proposal that the addendum has been received. Proposals submitted without acknowledgement of receipt of this addendum may be considered non-conforming.

I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the RFP documents which are outlined below are referenced to a page or Section in which they appear conspicuously. Offerors are to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

Section/Page(s)	Change
RFP Document; cover page, and pages 4 and 6.	The time of proposal opening and proposal due date has been changed from 11:00 a.m. to 3:00 p.m. Date of the Bid Opening has not changed. Refer to attached Request for Proposal.
RFP Document; page 10	The following requirement has been removed from the RFP: Section III "Item C.4. Documentation of how the bidder assesses the skills and qualifications of any employees who do not have master or journeyperson certification or status, or are not participants in a Registered Apprenticeship Program." Refer to attached Request for Proposal.
Site Preparation Plan	Additional site removals are indicated on the attached drawing C3.1 at the First Street and Miller Avenue intersection.
Water Main Plans	The water main plans have been amended as outlined on the attached drawings, C5.2, and C5.3.
Site Details	Detail 11: Curbed Island on the attached drawing C10.1 has been modified to indicate a two-stage concrete pour for the island. The payment for this pay item remains as specified; i.e., the island curb edges and concrete center are to be paid for as a single pay item.

Detailed Specification Item 278; Pages 1-6	This Detailed Specification has been added to the project requirements, and this work is reflected in the Schedule of Pricing and plans.
Detailed Specification Item 350 and 351; Pages 1-22	This Detailed Specification has been added to the project requirements, and this work is reflected in the Schedule of Pricing and plans.
E. Schedule of Pricing; (3 pages within RFP)	This form has been amended to reflect the addition of pay items 350 and 351, and quantity changes for pay items 222-01, 222-02, 252-01, and 279-14. Also, the pay item reference number for "Insertion Valve, Ductile/Cast Iron Pipe, 14 inch" has been changed to 278-14. These changes are highlighted in bold faced red text on the updated document.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.