

# **PUBLIC IMPROVEMENT REQUEST FOR PROPOSAL**

**RFP# 25-12**

## **State Street Improvements Project**

City of Ann Arbor  
Public Services / Engineering



**Due Date: February 27, 2025, by 2:00 p.m. (local time)**

Issued By:

City of Ann Arbor  
Procurement Unit  
301 E. Huron Street  
Ann Arbor, MI 48104

# TABLE OF CONTENTS

SECTION I: GENERAL INFORMATION .....	3
SECTION II: SCOPE OF WORK.....	11
SECTION III: MINIMUM INFORMATION REQUIRED .....	12
SECTION IV: ATTACHMENTS .....	24

## **SECTION I - GENERAL INFORMATION**

### **A. OBJECTIVE**

The purpose of this Request for Proposal (RFP) is to select a firm to provide construction services to reconstruct State Street from South University Avenue to East William Street. The scope of work involves earth excavation, water main (both within the public right of way and internal plumbing work for Angell Hall owned by the University of Michigan), drainage improvements, concrete curb and gutter and sidewalks, HMA paving, street illumination, traffic signal work, pavement markings, and turf/site restoration.

### **B. BID SECURITY**

Each bid must be accompanied by a certified check or Bid Bond by a surety licensed and authorized to do business within the State of Michigan, in the amount of 5% of the total of the bid price.

***Proposals that fail to provide a bid security upon proposal opening will be deemed non-responsive and will not be considered for award.***

### **C. QUESTIONS AND CLARIFICATIONS / DESIGNATED CITY CONTACTS**

All questions regarding this Request for Proposal (RFP) shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this RFP.

**All questions shall be submitted on or before February 13, 2025, at 4 p.m. (local time)**, and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to **Christopher Wall, P.E., Project Manager, [cwall@a2gov.org](mailto:cwall@a2gov.org)**.

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - [CSpencer@a2gov.org](mailto:CSpencer@a2gov.org)

Should any prospective bidder be in doubt as to the true meaning of any portion of this RFP, or should the prospective bidder find any ambiguity, inconsistency, or omission therein, the prospective bidder shall make a written request for an official interpretation or correction by the due date for questions above.

All interpretations, corrections, or additions to this RFP will be made only as an official addendum that will be posted to [a2gov.org](http://a2gov.org) and [MITN.info](http://MITN.info) and it shall be the prospective bidder's responsibility to ensure they have received all addenda before

submitting a proposal. Any addendum issued by the City shall become part of the RFP, and must be incorporated in the proposal where applicable.

#### **D. PRE-PROPOSAL MEETING**

A pre-proposal conference for this project will be held on **February 12, 2025 at 3 p.m.**, at **Ann Arbor City Hall located at 301 East Huron Street, Ann Arbor, MI 48104.**

Attendance at this conference is highly recommended. Administrative and technical questions regarding this project will be answered at this time. The pre-proposal conference is for information only. Any answers furnished will not be official until verified in writing by the Financial Service Area, Procurement Unit. Answers that change or substantially clarify the proposal will be affirmed in an addendum.

#### **E. PROPOSAL FORMAT**

To be considered, each firm must submit a response to this RFP using the format provided in Section III. No other distribution of proposals is to be made by the prospective bidder. An official authorized to bind the bidder to its provisions must sign the proposal. Each proposal must remain valid for at least one hundred and twenty (120) days from the due date of this RFP.

Proposals should be prepared simply and economically providing a straightforward, concise description of the bidder's ability to meet the requirements of the RFP. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

#### **F. SELECTION CRITERIA**

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised primarily of staff from the City will complete the evaluation.

If interviews are desired by the City, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The City further reserves the right to interview the key personnel assigned by the selected bidder to this project.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the proposal response shall be documented and included as part of the final contract.



## G. SEALED PROPOSAL SUBMISSION

**All proposals are due and must be delivered to the City on or before February 27, 2025, by 2:00 p.m. (local time).** Proposals submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

**Each respondent should submit in a sealed envelope**

- **one (1) original proposal**
- **one (1) additional proposal copy**
- **one (1) digital copy of the proposal preferably on a USB/flash drive as one file in PDF format**

Proposals submitted should be clearly marked: **“RFP No. 25-12 – State Street Improvements Project”** and list the bidder’s name and address.

Proposals must be addressed and delivered to:  
City of Ann Arbor  
c/o Customer Service  
301 East Huron Street  
Ann Arbor, MI 48107

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered proposals may be dropped off in the Purchasing drop box located in the Ann Street (north) vestibule/entrance of City Hall which is open to the public Monday through Friday from 8am to 5pm (except holidays). The City will not be liable to any prospective bidder for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal.

Bidders are responsible for submission of their proposal. Additional time will not be granted to a single prospective bidder. However, additional time may be granted to all prospective bidders at the discretion of the City.

**A proposal may be disqualified if the following required forms are not included with the proposal:**

- **Attachment B – General Declarations**
- **Attachment D - Prevailing Wage Declaration of Compliance**
- **Attachment E - Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - Non-Discrimination Declaration of Compliance**

***Proposals that fail to provide these forms listed above upon proposal opening may be deemed non-responsive and may not be considered for award.***

## **H. DISCLOSURES**

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

## **I. TYPE OF CONTRACT**

A sample of the Construction Agreement is included as Attachment A. Those who wish to submit a proposal to the City are required to review this sample agreement carefully. **The City will not entertain changes to its Construction Agreement.**

For all construction work, the respondent must further adhere to the City of Ann Arbor General Conditions. The General Conditions are included herein. Retainage will be held as necessary based on individual tasks and not on the total contract value. The Contractor shall provide the required bonds included in the Contract Documents for the duration of the Contract.

The City reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the City's sole judgment, the best interests of the City will be so served.

This RFP and the selected bidder's response thereto, shall constitute the basis of the scope of services in the contract by reference.

## **J. NONDISCRIMINATION**

All bidders proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Attachment G shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

## **K. WAGE REQUIREMENTS**

The Attachments provided herein outline the requirements for payment of prevailing wages or of a "living wage" to employees providing service to the City under this contract. The successful bidder must comply with all applicable requirements and provide documentary proof of compliance when requested.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. Use of Michigan Department of Transportation Prevailing Wage Forms (sample attached hereto) or a City-approved equivalent will be required along with wage rate interviews.

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based upon the work including within this contract. **The wage determination(s) current on the date 10 days before proposals are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: [www.sam.gov](http://www.sam.gov).

For the purposes of this RFP the Construction Type is Building, Heavy and Highway.

#### **L. CONFLICT OF INTEREST DISCLOSURE**

The City of Ann Arbor Purchasing Policy requires that the consultant complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected bidder unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Conflict of Interest Disclosure Form is attached.

#### **M. COST LIABILITY**

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the bidder prior to the execution of an Agreement. The liability of the City is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, bidder agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

#### **N. DEBARMENT**

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

## O. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the Purchasing Manager within five (5) business days of any notices of intent, including, but not exclusively, divisions on prequalification of bidders, shortlisting of bidders, or a notice of intent to award. Only bidders who responded to the solicitation may file a bid protest. The bidder must clearly state the reasons for the protest. If any bidder contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the bidder to the Purchasing Manager. The Purchasing Manager will provide the bidder with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee, whose decision shall be final.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated City Contacts provided herein. Attempts by the bidder to initiate contact with anyone other than the Designated City Contacts provided herein that the bidder believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

## P. SCHEDULE

The following is the schedule for this RFP process.

<b>Activity/Event</b>	<b>Anticipated Date</b>
Pre-Proposal Conference	February 12, 2025, 3:00 p.m. (Local Time)
Written Question Deadline	February 13, 2025, 4:00 p.m. (Local Time)
Proposal Due Date	February 27, 2025, 2:00 p.m.. (Local Time)
Selection/Negotiations	March 2025
Expected Council Authorizations	April 21, 2025

The above schedule is for information purposes only and is subject to change at the City's discretion.

## Q. IRS FORM W-9

The selected bidder will be required to provide the City of Ann Arbor an IRS form W-9.

## R. RESERVATION OF RIGHTS

1. The City reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The City reserves the right to waive, or not waive, informalities or irregularities in terms or conditions of any proposal if determined by the City to be in its best interest.

3. The City reserves the right to request additional information from any or all bidders.
4. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within RFP.
5. The City reserves the right to determine whether the scope of the project will be entirely as described in the RFP, a portion of the scope, or a revised scope be implemented.
6. The City reserves the right to select one or more contractors or service providers to perform services.
7. The City reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this RFP, unless clearly and specifically noted in the proposal submitted.
8. The City reserves the right to disqualify proposals that fail to respond to any requirements outlined in the RFP, or failure to enclose copies of the required documents outlined within the RFP.

## **S. IDLEFREE ORDINANCE**

The City of Ann Arbor adopted an idling reduction Ordinance that went into effect July 1, 2017. The full text of the ordinance (including exemptions) can be found at: [www.a2gov.org/idlefree](http://www.a2gov.org/idlefree).

Under the ordinance, No Operator of a Commercial Vehicle shall cause or permit the Commercial Vehicle to Idle:

- (a) For any period of time while the Commercial Vehicle is unoccupied; or
- (b) For more than 5 minutes in any 60-minute period while the Commercial Vehicle is occupied.

In addition, generators and other internal combustion engines are covered

- (1) Excluding Motor Vehicle engines, no internal combustion engine shall be operated except when it is providing power or electrical energy to equipment or a tool that is actively in use.

## **T. ENVIRONMENTAL COMMITMENT**

The City of Ann Arbor recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The City further recognizes that the products and services the City buys have inherent environmental and economic impacts and that the City should make procurement decisions that embody, promote and encourage the City's commitment to the environment.

The City strongly encourages potential vendors to bring forward tested, emerging, innovative, and environmentally preferable products and services that are best suited to the City's environmental principles. This includes products and services such as those with lower greenhouse gas emissions, high recycled content, without toxic

substances, those with high reusability or recyclability, those that reduce the consumption of virgin materials, and those with low energy intensity.

As part of its environmental commitment, the City reserves the right to award a contract to the most responsive and responsible bidder, which includes bids that bring forward products or services that help advance the City's environmental commitment. In addition, the City reserves the right to request that all vendors report their annual greenhouse gas emissions, energy consumption, miles traveled, or other relevant criteria in order to help the City more fully understand the environmental impact of its procurement decisions.

#### **U. MAJOR SUBCONTRACTORS**

The Bidder shall identify each major subcontractor it expects to engage for this Contract if the work to be subcontracted is 15% or more of the bid sum or over \$50,000, whichever is less. The Bidder also shall identify the work to be subcontracted to each major subcontractor. The Bidder shall not change or replace a subcontractor without approval by the City.

#### **V. LIQUIDATED DAMAGES**

A liquidated damages clause, as given on page C-2, Article III of the Contract, provides that the Contractor shall pay the City as liquidated damages, and not as a penalty, a sum certain per day for each and every day that the Contractor may be in default of completion of the specified work, within the time(s) stated in the Contract, or written extensions.

Liquidated damages clauses, as given in the General Conditions, provide further that the City shall be entitled to impose and recover liquidated damages for breach of the obligations under Chapter 112 of the City Code.

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.

## **SECTION II - SCOPE OF WORK**

**Please see the plan set for more details.**

## **SECTION III - MINIMUM INFORMATION REQUIRED**

### **PROPOSAL FORMAT**

The following describes the elements that should be included in each of the proposal sections and the weighted point system that will be used for evaluation of the proposals.

Bidders should organize Proposals into the following Sections:

- A. Qualifications, Experience and Accountability
- B. Workplace Safety
- C. Workforce Development
- D. Social Equity and Sustainability
- E. Schedule of Pricing/Cost
- F. Authorized Negotiator
- G. Attachments

*Bidders are strongly encouraged to provide details for all of the information requested below within initial proposals. Backup documentation may be requested at the sole discretion of the City to validate all of the responses provided herein by bidders. False statements by bidders to any of the criteria provided herein will result in the proposal being considered non-responsive and will not be considered for award.*

Pursuant to Sec 1:325 of the City Code which sets forth requirements for evaluating public improvement bids, Bidders should submit the following:

#### **A. Qualifications, Experience and Accountability - 20 Points**

1. Qualifications and experience of the bidder and of key persons, management, and supervisory personnel to be assigned by the bidder.
2. References from individuals or entities the bidder has worked for within the last five (5) years including information regarding records of performance and job site cooperation.
3. Evidence of any quality control program used by the bidder and the results of any such program on the bidder's previous projects.
4. A statement from the bidder as to any major subcontractors it expects to engage including the name, work, and amount.



**B. Workplace Safety – 20 Points**

1. Provide a copy of the bidder's safety program, and evidence of a safety-training program for employees addressing potential hazards of the proposed job site. Bidder must identify a designated qualified safety representative responsible for bidder's safety program who serves as a contact for safety related matters.
2. Provide the bidder's Experience Modification Rating ("EMR") for the last three consecutive years. Preference within this criterion will be given to an EMR of 1.0 or less based on a three-year average.
3. Evidence that all craft labor that will be employed by the bidder for the project has, or will have prior to project commencement, completed at least an authorized 10-hour OSHA Construction Safety Course.
4. For the last three years provide a copy of any documented violations and the bidder's corrective actions as a result of inspections conducted by the Michigan Occupational Safety & Health Administration (MIOSHA), U.S. Department of Labor – Occupational Safety and Health Administration (OSHA), or any other applicable safety agency.

**C. Workforce Development – 20 Points**

1. Documentation as to bidder's pay rates, health insurance, pension or other retirement benefits, paid leave, or other fringe benefits to its employees.
- 2.. Documentation that the bidder participates in a Registered Apprenticeship Program that is registered with the United States Department of Labor Office of Apprenticeship or by a State Apprenticeship Agency recognized by the USDOL Office of Apprenticeship. USDOL apprenticeship agreements shall be disclosed to the City in the solicitation response.
3. Bidders shall disclose the number of non-craft employees who will work on the project on a 1099 basis, and the bidders shall be awarded points based on their relative reliance on 1099 work arrangements with more points assigned to companies with fewer 1099 arrangements. Bidders will acknowledge that the City may ask them to produce payroll records at points during the project to verify compliance with this section.

**D. Social Equity and Sustainability – 20 Points**

1. A statement from the bidder as to what percentage of its workforce resides in the City of Ann Arbor and in Washtenaw County, Michigan. The City will consider in

evaluating which bids best serve its interests, the extent to which responsible and qualified bidders employ individuals in either the city or the county.

Washtenaw County is prioritized for evaluation purposes for this solicitation.

2. Evidence of Equal Employment Opportunity Programs for minorities, women, veterans, returning citizens, and small businesses.
3. Evidence that the bidder is an equal opportunity employer and does not discriminate on the basis of race, sex, pregnancy, age, religion, national origin, marital status, sexual orientation, gender identity or expression, height, weight, or disability.
4. The bidder's proposed use of sustainable products, technologies, or practices for the project, which reduce the impact on human health and the environment, including raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and waste management.
5. The bidder's environmental record, including findings of violations and penalties imposed by government agencies.

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
<b>General</b>					
01000.00	General Conditions, Max. \$ 300,000.00	Lump Sum	1	\$ _____	\$ _____
01001.00	Project Supervision, Max. \$ 120,000.00	Lump Sum	1	\$ _____	\$ _____
01002.70	DS_Project Clean-up	Lump Sum	1	\$ _____	\$ _____
01002.71	DS_Pavt, Cleaning	Lump Sum	1	\$ _____	\$ _____
01003.00	Digital Audio Visual Coverage	Lump Sum	1	\$ _____	\$ _____
01021.00	Erosion Control, Inlet Protection, Fabric Drop	Each	8	\$ _____	\$ _____
01022.00	Erosion Control, Silt Fence	Foot	1,497	\$ _____	\$ _____
01030.00	Tree Protection Fence	Foot	200	\$ _____	\$ _____
01040.00	Minor Traffic Control, Max \$ 80,000.00	Lump Sum	1	\$ _____	\$ _____
01041.00	Traffic Regulator Control	Lump Sum	1	\$ _____	\$ _____
01050.00	Sign, Type B, Temp, Prismatic, Furn & Oper	Square Foot	895	\$ _____	\$ _____
01051.00	Sign, Type B, Temp, Prismatic, Special, Furn & Oper	Square Foot	380	\$ _____	\$ _____
01062.00	Lighted Arrow, Type C, Furn and Oper	Each	2	\$ _____	\$ _____
01070.00	Sign, Portable, Changeable Message, Furn & Oper	Each	2	\$ _____	\$ _____
01080.00	Plastic Drum, High Intensity, Lighted, Furn & Oper	Each	100	\$ _____	\$ _____
01092.00	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn & Oper	Each	20	\$ _____	\$ _____
01100.00	Pedestrian Type II Barricade, Temp, Furn & Oper	Each	30	\$ _____	\$ _____
01101.00	Pedestrian Channelizer Device, Furn & Oper	Foot	5,157	\$ _____	\$ _____
01103.71	Temporary Pedestrian Ramp, Furn & Oper	Each	6	\$ _____	\$ _____
01103.72	DS_Pedestrian Path, Temp	Foot	400	\$ _____	\$ _____
01122.00	Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., Crosswalk	Foot	300	\$ _____	\$ _____
01126.00	Pavt Mrkg, Wet Reflective, Type R, Tape, 24 In., Stop Bar	Foot	60	\$ _____	\$ _____
01127.00	Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., White, Temp	Foot	100	\$ _____	\$ _____
01128.00	Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., Yellow, Temp	Foot	100	\$ _____	\$ _____
01160.70	DS_Steel Bollard	Each	2	\$ _____	\$ _____
01161.70	DS_Perforated Steel Square Tube Breakaway System, Modified	Each	22	\$ _____	\$ _____
01162.70	DS_Fnd, Perforated Steel Square Tube Breakaway System, Rem	Each	19	\$ _____	\$ _____
01163.70	DS_Sign, Type III, Rem	Each	37	\$ _____	\$ _____
TOTAL THIS PAGE (BF-1)					\$ _____

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
01164.70	DS_Sign, Type IIIA, Modified	Square Foot	18	\$	\$
01165.70	DS_Sign, Type IIIB, Modified	Square Foot	132	\$	\$
01166.70	DS_Reflective Panel For Permanent Sign Support, 3 foot, Modified	Each	8	\$	\$
01167.70	DS_Ground Mtd Sign Support, Rem	Each	22	\$	\$
01168.70	DS_Qwick Kurb Sign	Each	9	\$	\$
01169.70	DS_Trapezoid Delineator, Any Size	Foot	988	\$	\$
01170.70	DS_Bikeway Delineator Post	Each	137	\$	\$
01171.70	DS_Bus Stop Shelter Assembly and Installation	Each	1	\$	\$
<b>Removals</b>					
02000.01	Tree, Rem, 6 In. - 12 In.	Each	3	\$	\$
02025.71	DS_Pavement, Remove	Square Yard	7,156	\$	\$
02030.00	Curb, Gutter, and Curb and Gutter, Any Type, Rem	Foot	2,033	\$	\$
02040.00	Sidewalk, Sidewalk Ramp, and Driveway Approach, Any Thickness, Rem	Square Foot	32,655	\$	\$
02050.00	Sign, Rem, Salv	Each	24	\$	\$
02060.70	DS_Trolley Track, Remove	Square Yard	1,832	\$	\$
02070.70	DS_Parking Post, Rem	Each	33	\$	\$
<b>Earthwork</b>					
03000.70	DS_Machine Grading, Modified	Station	11.20	\$	\$
03021.00	Subgrade Undercutting, Type II	Cubic Yard	200	\$	\$
03022.00	Subgrade Undercutting, Type III	Cubic Yard	200	\$	\$
03030.01	Exploratory Excavation, SD-TD-1 , (0-10' deep)	Each	10	\$	\$
03060.00	Non-Hazardous Contaminated Material Handling and Disposal	Cubic Yard	200	\$	\$
<b>Sanitary Sewer</b>					
04060.00	Sanitary Structure Cover	Each	7	\$	\$
04061.00	Sanitary Structure Cover, Adjust	Each	7	\$	\$
04061.71	DS_Sanitary Structure Adjust, Additional Depth	Foot	10	\$	\$
<b>Sewer and Manhole Rehab</b>					
05050.00	Internal Chimney Seal	Each	7	\$	\$
05051.00	External Chimney Seal	Each	32	\$	\$
TOTAL THIS PAGE (BF-2)					\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
<b>Storm and Drainage</b>					
06000.01	12 In., CL IV RCP Storm Sewer, SD-TD-1	Foot	483	\$	\$
06050.01	Storm Manhole, 48 In. Dia., (0-8' deep)	Each	4	\$	\$
06050.02	Storm Manhole, 48 In. Dia., Additional Depth	Foot	10	\$	\$
06050.03	Storm Manhole, 60 In. Dia., (0-8' deep)	Each	1	\$	\$
06050.04	Storm Manhole, 60 In. Dia., Additional Depth	Foot	10	\$	\$
06070.01	Storm Single Inlet, 24 In. Dia., (0-8' deep)	Each	11	\$	\$
06070.02	Storm Single Inlet, 24 In. Dia., Additional Depth	Foot	20	\$	\$
06120.03	Storm Sewer Pipe, 12 In. Dia, Rem	Foot	188	\$	\$
06140.00	Storm Sewer Structure, Rem	Each	7	\$	\$
06160.01	Storm Structure Cover	Each	4	\$	\$
06160.02	Storm Structure Cover, Adjust	Each	4	\$	\$
06160.03	Storm Structure Adjust, Additional Depth	Foot	20	\$	\$
06182.02	Underdrain, Edge, 6 In.	Foot	1,120	\$	\$
06300.70	DS_Infiltration Trench	Foot	461	\$	\$
06301.70	DS_Solid HDPE Pipe, 12 inch	Foot	42	\$	\$
06302.70	DS_Storm Control Structure, 60 In. Dia., (0-8' deep)	Each	1	\$	\$
06303.70	DS_Storm Pretreatment Structure, CS-4 Inlet	Each	4	\$	\$
06303.71	DS_Storm Pretreatment Structure, CS-4 Manhole	Each	2	\$	\$
<b>Water Mains</b>					
7000.01	4 In., PC 350, DIP w/ polywrap, SD-TD-1	Foot	101	\$	\$
07000.02	6 In., PC 350, DIP w/ polywrap, SD-TD-1	Foot	243	\$	\$
07000.03	8 In., PC 350, DIP w/ polywrap, SD-TD-1	Foot	138	\$	\$
07000.04	10 In., PC 350, DIP w/ polywrap, SD-TD-1	Foot	50	\$	\$
07000.05	12 In., PC 350, DIP w/ polywrap, SD-TD-1	Foot	1,203	\$	\$
07005.70	DS_12 In., PC 350, DIP, Jacked in Place	Foot	80	\$	\$
07009.70	DS_4 In. 45° DIP Bend	Each	2	\$	\$
07009.71	DS_4 In. 90° DIP Bend	Each	1	\$	\$
07010.02	6 In. 45° DIP Bend	Each	8	\$	\$
	TOTAL THIS PAGE (BF-3)				\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
07011.02	8 In. 45° DIP Bend	Each	11	\$	\$
07011.03	8 In. 22.5° DIP Bend	Each	1	\$	\$
07013.02	12 In. 45° DIP Bend	Each	27	\$	\$
07013.03	12 In. 22.5° DIP Bend	Each	4	\$	\$
07020.03	8 In. x 6 In. DIP Reducer	Each	7	\$	\$
07020.08	12 In. x 6 In. DIP Reducer	Each	1	\$	\$
07020.09	12 In. x 8 In. DIP Reducer	Each	1	\$	\$
07020.10	12 In. x 10 In. DIP Reducer	Each	1	\$	\$
07030.07	10 In. x 10 In. x 4 In. DIP Tee	Each	1	\$	\$
07030.11	12 In. x 12 In. x 4 In. DIP Tee	Each	1	\$	\$
07030.12	12 In. x 12 In. x 6 In. DIP Tee	Each	1	\$	\$
07030.13	12 In. x 12 In. x 8 In. DIP Tee	Each	8	\$	\$
07030.15	12 In. x 12 In. x 12 In. DIP Tee	Each	4	\$	\$
07050.01	Gate Valve in Box, 6 In.	Each	2	\$	\$
07050.02	Gate Valve in Box, 8 In.	Each	1	\$	\$
07050.03	Gate Valve in Box, 10 In.	Each	2	\$	\$
07050.04	Gate Valve in Box, 12 In.	Each	2	\$	\$
07050.70	DS_Gate Valve in Box, 4 In.	Each	2	\$	\$
07060.04	Gate Valve in Well, 12 In.	Each	13	\$	\$
07080.00	Excavate & Backfill for Water Service Tap and Lead	Foot	75	\$	\$
07090.00	Water Structure Cover	Each	1	\$	\$
07091.00	Water Structure Cover, Adjust	Each	1	\$	\$
07100.00	Fire Hydrant Assembly, Complete	Each	8	\$	\$
07102.00	Fire Hydrant Assembly, Rem	Each	7	\$	\$
07110.01	Sacrificial Anode, 17-pound	Each	7	\$	\$
07110.02	Sacrificial Anode, 32-pound	Each	6	\$	\$
07130.01	Temporary Water Main Line Stop, 8 In. or Less	Each	6	\$	\$
07130.02	Temporary Water Main Line Stop, 10 In.	Each	3	\$	\$
07130.03	Temporary Water Main Line Stop, 12 In.	Each	3	\$	\$
TOTAL THIS PAGE (BF-4)					\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
07131.00	Temporary Water Main Line Stop, Additional Rental Day	Each	12	\$	\$
07140.01	Water Main Pipe, 4 In. Dia, Abandon	Foot	179	\$	\$
07140.02	Water Main Pipe, 6 In. Dia, Abandon	Foot	338	\$	\$
07140.03	Water Main Pipe, 8 In. Dia, Abandon	Foot	20	\$	\$
07140.04	Water Main Pipe, 10 In. Dia, Abandon	Foot	1,078	\$	\$
07140.05	Water Main Pipe, 12 In. Dia, Abandon	Foot	1,943	\$	\$
07150.01	Water Main Pipe, 4 in. Dia., Rem	Foot	14	\$	\$
07150.02	Water Main Pipe, 6 in. Dia., Rem	Foot	14	\$	\$
07150.03	Water Main Pipe, 8 in. Dia., Rem	Foot	14	\$	\$
07150.04	Water Main Pipe, 10 in. Dia., Rem	Foot	20	\$	\$
07150.05	Water Main Pipe, 12 in. Dia., Rem	Foot	30	\$	\$
07170.01	Gate Valve in Box, 4 In. Dia, Rem	Each	1	\$	\$
07170.02	Gate Valve in Box, 6 In. Dia, Rem	Each	4	\$	\$
07170.04	Gate Valve in Box, 10 In. Dia, Rem	Each	4	\$	\$
07170.05	Gate Valve in Box, 12 In. Dia, Rem	Each	5	\$	\$
07190.01	Gate Valve in Well, 4 In. Dia, Rem	Each	1	\$	\$
07190.02	Gate Valve in Well, 6 In. Dia, Rem	Each	2	\$	\$
07190.03	Gate Valve in Well, 8 In. Dia, Rem	Each	1	\$	\$
07190.04	Gate Valve in Well, 10 In. Dia, Rem	Each	3	\$	\$
07190.05	Gate Valve in Well, 12 In. Dia, Rem	Each	4	\$	\$
07200.70	DS_Abandon Irrigation Pit	Lump Sum	1	\$	\$
07201.70	DS_10' x 10' x 7' Valve Pit	Each	1	\$	\$
07202.70	DS_Internal Plumbing	Lump Sum	1	\$	\$
<b>Streets, Driveways, &amp; Sidewalks</b>					
08000.00	Subbase, CIP	Cubic Yard	600	\$	\$
08010.70	DS_Aggregate Base, 5 In., 21AA, Modified	Square Yard	1,644	\$	\$
08010.72	DS_Aggregate Base, 6 In., 21AA, Modified	Square Yard	49	\$	\$
08010.74	DS_Aggregate Base, 10 In., 21AA, Modified	Square Yard	5,977	\$	\$
08060.00	Hand Patching	Ton	10	\$	\$
TOTAL THIS PAGE (BF-5)					\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
08070.11	HMA, 3EML	Ton	919	\$	\$
08070.15	HMA, 4EML	Ton	612	\$	\$
08070.19	HMA, 5EML	Ton	612	\$	\$
08072.70	DS_HMA, Temp Pavt (4EML)	Ton	199	\$	\$
08080.03	Conc Pavt, Non-Reinf, 8 In.	Square Yard	109	\$	\$
08093.70	DS_Lane Ties, Epoxy Anchored	Each	70	\$	\$
08093.71	DS_Joint, Contraction, Cp	Foot	76	\$	\$
08093.72	DS_Joint, Contraction, Crg	Foot	12	\$	\$ -
08110.00	Conc, Curb or Curb & Gutter, All Types	Foot	2,126	\$	\$ -
08110.71	DS_Mountable Curb and Gutter	Foot	70	\$	\$ -
08110.72	DS_Planter Curb	Foot	60	\$	\$ -
08133.70	DS_Conc, Sidewalk, Fibermesh, 8 In.	Square Foot	25,625	\$	\$ -
08133.71	DS_Conc, Sidewalk Ramp, Fibermesh, 8 In.	Square Foot	3,295	\$	\$ -
08133.72	DS_Conc, Sidewalk, Fibermesh, 9 In., Raised	Square Foot	2,752	\$	\$ -
08133.73	DS_Perforated Concrete Base, 6 In.	Square Foot	27	\$	\$ -
08140.00	Brick Pavers, Sidewalk, Rem and Reinstall	Square Foot	489	\$	\$ -
08150.00	Detectable Warning Surface	Foot	525	\$	\$ -
08150.71	DS_Tactile Directional Indicator	Foot	60	\$	\$ -
08150.72	DS_Detectable Warning Surface, Temp	Square Foot	60	\$	\$ -
08190.72	DS_Pavt Mrkg, Polymer Cement Surface, Bike, Small Sym	Each	4	\$	\$ -
08190.73	DS_Pavt Mrkg, Polymer Cement Surface, Bike Thru Arrow Sym	Each	4	\$	\$ -
08190.76	DS_Pavt Mrkg, Polymer Cement Surface, Bike Lane, Green	Square Foot	1,770	\$	\$ -
08190.78	DS_Pavt Mrkg, Polymer Cement Surface, Bus Lane, Red	Square Foot	3,200	\$	\$ -
08190.79	DS_Pavt Mrkg, Polymer Cement Surface, Bus	Each	5	\$	\$ -
08191.70	DS_Pavt Mrkg, Polymer Cement Surface, Only	Each	5	\$	\$ -
08191.71	DS_Scarification, for Polyurea Spec Mrkg	Square Foot	20	\$	\$ -
08200.05	Pavt Mrkg, Polyurea, 12 inch, Cross Hatching, White	Foot	414	\$	\$ -
08200.09	Pavt Mrkg, Polyurea, 24 Inch, Stop Bar	Foot	75	\$	\$ -
08200.10	Pavt Mrkg, Polyurea, 12 Inch, Crosswalk	Foot	786	\$	\$ -
TOTAL THIS PAGE (BF-6)					\$



**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
08200.13	Pavt Mrkg, Polyurea, 6 Inch, White	Foot	3,538	\$	\$ -
08200.14	Pavt Mrkg, Polyurea, 6 Inch, Yellow	Foot	1,904	\$	\$ -
08200.30	Pavt Mrkg, Polyurea, Yield Triangle Sym	Each	28	\$	\$ -
08200.31	Pavt Mrkg, Polyurea, Speed Hump Chevron, White	Each	12	\$	\$ -
08251.00	Recessing Pavt Mrkg, Longit	Foot	4,668	\$	\$ -
08252.00	Recessing Pavt Mrkg, Transv	Square Foot	966	\$	\$ -
08300.00	Monument Box, Adjust	Each	2	\$	\$ -
<b>Lighting and Electrical</b>					
09010.01	Conduit, Schedule 80 PVC, 2 In.	Foot	1,130	\$	\$ -
09010.02	Conduit, Schedule 80 PVC, 3 In.	Foot	40	\$	\$ -
09010.73	DS_Conduit, Schedule 80 PVC, 6 In.	Foot	200	\$	\$ -
09020.00	Handhole, Rem	Each	2	\$	\$ -
09030.01	Handhole Assembly, 17 In. x 30 In. x 18 In.	Each	1	\$	\$ -
09030.02	Handhole Assembly, 24 In. x 36 In. x 18 In.	Each	1	\$	\$ -
09030.03	DS_U of M Handhole	Each	3	\$	\$ -
09050.70	DS_Light Pole Foundation	Each	19	\$	\$ -
09050.71	DS_DTE Street Light Pole Foundation	Each	8	\$	\$ -
09060.00	Foundation, Light Pole, Rem	Each	8	\$	\$ -
09150.70	DS_10'x10'x7' Pre-cast Power Manhole	Each	1	\$	\$ -
09150.71	DS_Duct Bank, 6H x 1V	Foot	82	\$	\$ -
09160.70	DS_Controller and Cabinet, Rem	Each	1	\$	\$ -
09161.70	DS_Pedstrian Signal System, Accessible, Rem	Each	1	\$	\$ -
09162.70	DS_Wireless Vehicle Detection System, Rem	Each	1	\$	\$ -
09163.70	DS_Wireless Vehicle Sensor Node, Rem	Each	1	\$	\$ -
09164.70	DS_TS, Pedestrian, Pedestal Mtd, Rem	Each	1	\$	\$ -
09165.70	DS_TS, Mast Arm Mtd, Rem	Each	6	\$	\$ -
09166.70	DS_Pushbutton Station, Rem	Each	1	\$	\$ -
09167.70	DS_Pedestal, Rem	Each	1	\$	\$ -
09168.70	DS_Pedestal Fdn, Rem	Each	1	\$	\$ -
TOTAL THIS PAGE (BF-7)					\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
09169.70	DS_Conduit, Rem	Foot	10	\$	\$ -
09170.70	DS_Cable, Rem	Foot	2,300	\$	\$ -
09171.70	DS_Cabinet, NEMA Type	Each	1	\$	\$ -
09172.70	DS_Controller, NEMA, ATC Type, City of Ann Arbor	Each	1	\$	\$ -
09173.70	DS_Controller Fdn, Base Mtd	Each	1	\$	\$ -
09174.70	DS_Serv Disconnect	Each	1	\$	\$ -
09175.70	DS_Pedestrian Signal System, Accessible, Salv	Each	1	\$	\$ -
09176.70	DS_Wireless Vehicle Detection System, Salv	Each	1	\$	\$ -
09177.70	DS_Wireless Vehicle Sensor Node	Each	2	\$	\$ -
09178.70	DS_Wireless Vehicle Sensor Node, Salv	Each	1	\$	\$ -
09179.70	DS_Wireless Repeater	Each	1	\$	\$ -
09180.70	DS_TS, Pedestrian, One Way Pedestal Mtd, Salv	Each	1	\$	\$ -
09181.70	DS_TS, One Way Mast Arm Mtd (LED)	Each	7	\$	\$ -
09182.70	DS_Backplate, TS	Each	7	\$	\$ -
09183.70	DS_Pushbutton Station and Sign, Salv	Each	1	\$	\$ -
09184.70	DS_Pedestal, Alum, Salv	Each	1	\$	\$ -
09185.70	DS_Pedestal, Fdn	Each	1	\$	\$ -
09186.70	DS_Pelco Sign-Brac, Galaxy Cable Mount, Formed Tube	Each	1	\$	\$ -
09186.70	DS_Recable, TS	Foot	2,300	\$	\$ -
09187.70	DS_Conduit, Schedule 40 PVC, 1-1/4 In.	Foot	2,175	\$	\$ -
09187.70	DS_Cable, Sec, 600V, 1, 3/C#6	Foot	100	\$	\$ -
09188.70	DS_Temporary Audible Message Device	Each	20	\$	\$ -
<b>Landscaping</b>					
10000.01	Tree, Medium, B&B	Each	2.00	\$	\$ -
10006.71	DS_Turf Establishment, Performance	Square Yard	1,500.00	\$	\$ -
10007.71	DS_Planting Soil and Mulch	Cubic Yard	78.00	\$	\$ -
10008.71	DS_Bike Hoop, Cored	Each	5.00	\$	\$ -
10031.00	Fence, Salvage and Re-erect	Foot	259.00	\$	\$ -
10050.00	Underground Sprinkling System, Restore	Dollar	25,000.00	\$ 1.00	\$ 25,000.00
TOTAL THIS PAGE (BF-8)					\$

**E. Schedule of Pricing/Cost – 20 Points**

**Company:**

**Project: State Street Improvements**

**File #: 2023-023**

**RFP#: 25-12**

ITEM NUMBER	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
	TOTAL FROM PAGE (BF-1):				\$ _____
	TOTAL FROM PAGE (BF-2):				\$ _____
	TOTAL FROM PAGE (BF-3):				\$ _____
	TOTAL FROM PAGE (BF-4):				\$ _____
	TOTAL FROM PAGE (BF-5):				\$ _____
	TOTAL FROM PAGE (BF-6):				\$ _____
	TOTAL FROM PAGE (BF-7):				\$ _____
	TOTAL FROM PAGE (BF-8):				\$ _____
	<b>TOTAL BASE BID:</b>				\$ _____

## **F. AUTHORIZED NEGOTIATOR / NEGOTIATIBLE ELEMENTS (ALTERNATES)**

Include the name, phone number, and e-mail address of persons(s) in your organization authorized to negotiate the agreement with the City.

The proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the bidder wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

If the Bidder takes exception to the time stipulated in Article III of the Contract, Time of Completion, page C-2, it is requested to stipulate its proposed time for performance of the work.

Consideration for any proposed alternative items or time may be negotiated at the discretion of the City.

## **G. ATTACHMENTS**

General Declaration, Legal Status of Bidder, Conflict of Interest Form, Living Wage Compliance Form, Prevailing Wage Compliance Form and the Non-Discrimination Form should be completed and returned with the proposal. These elements should be included as attachments to the proposal submission.

## **PROPOSAL EVALUATION**

1. The selection committee will evaluate each proposal by the above-described criteria and point system. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation. A proposal with all the requested information does not guarantee the proposing firm to be a candidate for an interview if interviews are selected to be held by the City. The committee may contact references to verify material submitted by the bidder.
2. The committee then will schedule interviews with the selected firms if necessary. The selected firms will be given the opportunity to discuss in more detail their qualifications, past experience, proposed work plan (if applicable) and pricing.
3. The interview should include the project team members expected to work on the project, but no more than six members total. The interview shall consist of a

presentation of up to thirty minutes (or the length provided by the committee) by the bidder, including the person who will be the project manager on this contract, followed by approximately thirty minutes of questions and answers. Audiovisual aids may be used during the oral interviews. The committee may record the oral interviews.

4. The firms interviewed will then be re-evaluated by the above criteria and adjustments to scoring will be made as appropriate. After evaluation of the proposals, further negotiation with the selected firm may be pursued leading to the award of a contract by City Council, if suitable proposals are received.

The City reserves the right to waive the interview process and evaluate the bidder based on their proposal and pricing schedules alone.

The City will determine whether the final scope of the project to be negotiated will be entirely as described in this RFP, a portion of the scope, or a revised scope.

Work to be done under this contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents.

Any proposal that does not conform fully to these instructions may be rejected.

## **PREPARATION OF PROPOSALS**

Proposals should have no plastic bindings but will not be rejected as non-responsive for being bound. Staples or binder clips are acceptable. Proposals should be printed double sided on recycled paper.

Each person signing the proposal certifies that they are a person in the bidder's firm/organization responsible for the decisions regarding the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

## **ADDENDA**

If it becomes necessary to revise any part of the RFP, notice of the addendum will be posted to Michigan Inter-governmental Trade Network (MITN) [www.mitn.info](http://www.mitn.info) and/or the City of Ann Arbor web site [www.A2gov.org](http://www.A2gov.org) for all parties to download.

Each bidder should acknowledge in its proposal all addenda it has received on the General Declarations form provided in the Attachments section herein. The failure of a bidder to receive or acknowledge receipt of any addenda shall not relieve the bidder of the responsibility for complying with the terms thereof. The City will not be bound by oral responses to inquiries or written responses other than official written addenda.

## **SECTION IV - ATTACHMENTS**

Attachment A – Sample Standard Contract

Attachment B – General Declarations

Attachment C - Legal Status of Bidder

Attachment D – Prevailing Wage Declaration of Compliance Form

Attachment E – Living Wage Declaration of Compliance Form

Attachment F – Living Wage Ordinance Poster

Attachment G – Vendor Conflict of Interest Disclosure Form

Attachment H – Non-Discrimination Ordinance Declaration of Compliance Form

Attachment I – Non-Discrimination Ordinance Poster

Sample Certified Payroll Report Template

# ATTACHMENT A SAMPLE STANDARD CONTRACT

*If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors of service to the City of Ann Arbor such as the following:*

## CONTRACT

THIS CONTRACT is between the CITY OF ANN ARBOR, a Michigan Municipal Corporation, 301 East Huron Street, Ann Arbor, Michigan 48104 ("City") and \_\_\_\_\_  
\_\_\_\_\_ ("Contractor")

\_\_\_\_\_  
(An individual/partnership/corporation, include state of incorporation) (Address)

Based upon the mutual promises below, the Contractor and the City 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 titled **State Street Improvements Project, RFP #25-12** 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:

Non-discrimination and Living Wage  
Declaration of Compliance Forms (if  
applicable)  
Vendor Conflict of Interest Form  
Prevailing Wage Declaration of  
Compliance Form (if applicable)  
Bid Forms  
Contract and Exhibits  
Bonds

General Conditions  
Standard Specifications  
Detailed Specifications  
Plans  
Addenda

### ARTICLE II - Definitions

**Administering Service Area/Unit** means **Public Services Area, Engineering Unit.**

**Project** means **State Street Improvements Project, RFP #25-12**

**Supervising Professional** means the person acting under the authorization of the manager of the Administering Service Area/Unit. At the time this Contract is executed, the Supervising Professional is: **Christopher Wall**, whose job title is **Project Manager**. If there is any question concerning who the Supervising Professional is, Contractor shall confirm with the manager of the Administering Service Area/Unit.

**Contractor's Representative** means \_\_\_\_\_ [Insert name] whose job title is \_\_\_\_\_

**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 City.
- (B) The entire work for this Contract shall be completed within \_\_\_\_\_ ( ) consecutive calendar days.
- (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 City, as liquidated damages and not as a penalty, an amount equal to \$\_\_\_\_\_ for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the City 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 City 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:

\_\_\_\_\_ Dollars (\$\_\_\_\_\_)

- (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 City 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 City. Notwithstanding any consent by the City 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 City.



## **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 City 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 City. Nothing contained in this Contract shall be deemed to constitute any other relationship between the City 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 City for any Contract, debt, or any other obligation to the City including real or personal property taxes. City 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 City, 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 City for losses or damages caused by or resulting from the City'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 City 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 City and the Contractor.

#### **ARTICLE XI – Electronic Transactions**

The City 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.

[Signatures on next page]

***[INSERT CONTRACTOR NAME HERE]***

**CITY OF ANN ARBOR**

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

Name: \_\_\_\_\_

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

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

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

Name: Milton Dohoney Jr.

Title: City Administrator

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

**Approved as to substance:**

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

Name: Jordan Roberts

Title: Public Services Area  
Administrator

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

**Approved as to form:**

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

Name: Atleen Kaur

Title: City Attorney

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

*(Signatures continue on following page)*

**CITY OF ANN ARBOR**

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

Name: \_\_\_\_\_

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

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

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

Name: \_\_\_\_\_

Title: City Clerk \_\_\_\_\_

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

**PERFORMANCE BOND**

- (1) \_\_\_\_\_ of \_\_\_\_\_ (referred to as "Principal"), and \_\_\_\_\_, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), 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 City entitled \_\_\_\_\_, for RFP No. \_\_\_\_\_ 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 City 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 City 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 City, 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 City 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 City 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 \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_.

\_\_\_\_\_  
(Name of Surety Company)  
By \_\_\_\_\_  
(Signature)  
Its \_\_\_\_\_  
(Title of Office)

\_\_\_\_\_  
(Name of Principal)  
By \_\_\_\_\_  
(Signature)  
Its \_\_\_\_\_  
(Title of Office)

Approved as to form:

Name and address of agent:

\_\_\_\_\_  
Atleen Kaur, City Attorney

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## LABOR AND MATERIAL BOND

- (1) \_\_\_\_\_  
of \_\_\_\_\_ (referred to as "Principal"), and \_\_\_\_\_, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), 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 \$ \_\_\_\_\_, 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 City entitled \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_, for RFP No. \_\_\_\_\_; 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 City 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 \_\_\_\_\_ day of \_\_\_\_\_, 202\_\_

\_\_\_\_\_  
(Name of Surety Company)  
By \_\_\_\_\_  
(Signature)  
Its \_\_\_\_\_  
(Title of Office)

\_\_\_\_\_  
(Name of Principal)  
By \_\_\_\_\_  
(Signature)  
Its \_\_\_\_\_  
(Title of Office)

Approved as to form:

\_\_\_\_\_

Atleen Kaur, City Attorney

Name and address of agent:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **GENERAL CONDITIONS**

### **Section 1 - Execution, Correlation and Intent of Documents**

The contract documents shall be signed in 2 copies by the City 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 City 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 City, 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 and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. A sample Prevailing Wage Form is provided in the Appendix herein for reference as to what will be expected from contractors. Use of the Prevailing Wage Form provided in the Appendix section or a City-approved equivalent will be required along with wage rate interviews.

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 City 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 City 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 City, 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 City harmless from loss on account of infringement except that the City shall be responsible for all infringement loss when a particular process or the product of a particular manufacturer or manufacturers is specified, unless the City 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 City 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 City. The Contractor shall obtain and maintain sufficient insurance to cover damage to any City 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 City 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 City 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 City 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 City or of its employees or by other Contractors employed by the City;
- (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 City's Finance Department - Accounting Division. 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 City will retain a percentage of the estimate in accordance with Act 524, Public Acts of 1980. The City 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 180 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 City 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 10 days after written notice, the City 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 City 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 City 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 City 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 City within 30 days after the date of the final certificate.

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

- (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 City 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 City 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 City 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 City to the Contractor to do so. The City 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 City 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 City'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 City 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 City 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 City for any excess cost to the City. If the Contractor's right to proceed is terminated, the City 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 City, 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 City 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 City for any excess cost incurred. The expense incurred by the City, 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 City, terminate this Contract and recover from the City payment for all acceptable work executed plus reasonable profit.



## **Section 23 - City'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 City, 3 days after giving written notice to the Contractor and its surety may, without prejudice to any other remedy the City 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 City, shall promptly remove any part or all of its equipment and supplies from the property of the City, failing which the City 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 City and, if all costs of removal and storage are not paid by the Contractor within 10 days of invoicing, the City 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 City for damages to materials and equipment from any cause except negligence or willful act of the City. 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 City 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 City, the Supervising Professional shall issue to the Contractor a certificate of partial completion, and immediately the City 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 City 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 City 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 City which will protect the City 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 City 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 City documentation satisfactory to the City, through City-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 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 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, which, notwithstanding anything to the contrary herein, shall be maintained for three years from the date the Project is completed.

- (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 City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements that diminish the 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 City may possess, including any self-insured retentions the City may have; and any other insurance the 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 City for any insurance listed herein.

- (3) Insurance companies and policy forms are subject to approval of the City 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 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 City, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the City 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 City. 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 City.
- (5) City 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 City of Ann Arbor for the amount of the bid(s) accepted;
- (2) A Labor and Material Bond to the City of Ann Arbor for the amount of the bid(s) accepted.

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

## **Section 30 - Damage Claims**

The Contractor shall be held responsible for all damages to property of the 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 City.

## **Section 33 - Rights of Various Interests**

Whenever work being done by the 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 City. The approval will not be given until the Contractor submits to the City a written statement concerning the proposed award to the subcontractor. The statement shall contain all information the City may require.

The Contractor shall be as fully responsible to the City 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 City 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 City.

## **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 City 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 City 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 City, 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 City 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 City approval) will be permitted except in the case of an emergency and then only to the extent absolutely necessary. The City 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 City is exempt from the assessment of State Sales Tax on its direct purchases. Contractors who acquire materials, equipment, supplies, etc. for incorporation in City 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 City, 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 City of Ann Arbor, 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 City of Ann Arbor.

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 City of Ann Arbor.

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>

## **DETAILED SPECIFICATIONS**

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**INSURANCE  
REQUIREMENTS**

State St:MHM

Page 1 of 1

2/03/2025

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

- University of Michigan
- Ann Arbor Area Transportation Authority (AAATA)

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PROJECT COORDINATION**

State St:MHM

Page 1 of 1

1/30/2025

The Contractor is hereby notified that there will be coordination efforts that will need to occur as part of the State Street project, and efforts that may need to be made with work not associated with this project. [Please note that this listing may not be complete, and the Contractor shall verify any other projects within the local vicinity that may impact this project.

- University of Michigan Angell Hall Roofing Project (May – August, 2025)
- South University Street Resurfacing Project (East University to Church; June 2025)
- State Street Sanitary Lining Project (South University to East William; April – May 2025)
- University of Michigan lighting coordination (refer to lighting plans for details)
- DTE Outdoor Lighting coordination (refer to lighting plans for details).

The Contractor shall coordinate its work with Contractors of other projects, internal and external to the construction influence area, as directed by the Engineer. No additional compensation will be allowed for costs incurred by the Contractor due to coordinating with or delays caused by other projects.

DETAILED SPECIFICATION  
FOR  
**PROGRESS CLAUSE**

WT:MHM

1 of 4

01/31/25

**a. Description.-**

**Examination of Plans, Specifications, and Work Site:** Bidders shall carefully examine the Bid Form, plans, specifications, and the work site until the Bidder is satisfied as to all local conditions affecting the Contract and the detailed requirements of construction. The submission of the bid shall be considered prima facie evidence that the Bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and all requirements of the Contract.

This Contract requires water main, storm sewer, concrete curb and gutters, concrete sidewalks, bituminous paving, signal work, and associated work on State Street from South University Avenue to East William Street.

The entire work under this Contract shall be completed in accordance with, and subject to, the scheduling requirements as outlined below, in the Maintenance of Traffic and Sequence of Construction Detailed Specification, and all other requirements of the Contract Documents.

1. The Contractor is expected to be furnished with an electronic copy of the Contract, for his/her execution, on or before **March 7, 2025**. The Contractor shall electronically execute the Contract and return it, with the required Bonds and Insurance Certificate, to the City within **fourteen (14) days**. City Council review and approval of the Contract is expected on **April 21, 2025**. The Notice of Award would be provided after the Council approval. The Contractor shall not begin the work on-site before the applicable date(s) as described herein without approval from the Project Engineer, and in no case before the receipt of the fully executed Contract.
2. The Contractor shall only begin the work of this project upon receipt of the fully executed Contract and Notice to Proceed, which anticipated to be on or before **May 5, 2025**. Appropriate time extensions shall be granted if the Notice to Proceed is delayed beyond this date. Given the need to start the project on-time and meet deadlines, time extensions for Phase 1 will not be granted for delays associated with material procurement. The Contractor may elect to procure materials at their own risk prior to the Notice to Proceed being issued in order to meet the schedule if material delays are anticipated. Work on this project may not begin without an Engineer approved project schedule submitted by the Contractor that includes details of guaranteed material delivery dates. In the event that material delays result in a project start date or Phase completion dates that do not allow for the completion of work within the timeframe listed herein, the Engineer may elect to delay the project or selected phases of the project to 2026. All bid prices shall be held per the approved contract regardless of delays and/or schedule changes.

DETAILED SPECIFICATION  
FOR  
**PROGRESS CLAUSE**

WT:MHM

2 of 4

01/31/25

3. **Phase 1 Work** – All water main installation shall be completed in Phase 1 as depicted in the plans. Pavement, curb and gutter, and sidewalk removals will be limited to only install the water main. Note that the Engineer may request watermain shutdowns to occur during non-standard hours to ensure minimal interruption to businesses along State Street. All services shall be installed and connected during this phase. Existing watermain shall be abandoned once the proposed Phase 1 watermain is tested, accepted, and put in service. Install aggregate and HMA to open road and sidewalks to traffic per description below.

Phase 1 shall be completed in its entirety and open to traffic by **July 11, 2025**. All Phase 1 work shall be completed prior to the beginning of Phase 2 work.

4. **Ann Arbor Art Fair Week (July 14, 2025 – July 20, 2025)** - This project falls within the limits of the Ann Arbor Art Fair. No work is allowed from July 12, 2025, to July 20, 2025. Phase 1 shall be completed, and the site shall be left in a clean, safe and orderly condition and all equipment and stored material shall be relocated off-site. Prior to 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 temporary HMA surface, and all unnecessary barricades removed. If the milestones, adjusted for approved extensions of time, are delayed, temporary pavement and provisions needed to ensure the site meets conditions listed above will be at the sole cost of the Contractor.
5. **Phase 2 Work** – Phase 2 work shall not begin until Monday, July 21, 2025, unless otherwise approved by the Engineer. Work includes pavement removal, installation of storm sewer, paving, curb and gutter, sidewalks, traffic signals, restoration, pavement markings, signage and all other work included in the Contract for this intersection. It is understood that turf establishment will take place in April 2026. However, the Contractor shall be responsible to use approved soil erosion and sedimentation control measures (SESC) to cover and maintain disturbed areas throughout the winter of 2025-2026.

Phase 2 shall be completed in its entirety and open to traffic by **November 15, 2025**.

6. **Phase 3 Work** – All turf establishment shall be in place and approved by the Engineer by **May 23, 2026**.

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 throughout all authorized hours to complete the project by the final completion date. Should the Contractor

DETAILED SPECIFICATION  
FOR  
**PROGRESS CLAUSE**

WT:MHM

3 of 4

01/31/25

demonstrate that they must work on some Sundays in order to maintain the project schedule, they may do so between the hours of 9:00 a.m. and 5:00 p.m. with prior approval from the City. There will be no additional compensation due to the Contractor for work performed on Sundays.

Prior to the start of any construction, the Contractor shall submit a detailed schedule of work for the Engineer's review and approval. Work shall not be started until a schedule is approved in writing by the Engineer. The proposed schedule must fully comply with the scheduling requirements contained in this Detailed Specification. The Contractor shall update the approved work schedule upon request by the Engineer and present it to the Engineer within seven days of said request.

The City selected contractor will provide written weekly construction updates to the City, AAATA, the University of Michigan, and the Engineer. Equally, the contractor will consult with the City, the University of Michigan and the Engineer on any unanticipated scope changes that impact the City, AAATA, and the University of Michigan properties or operations.

The Engineer may delay or stop the work due to threatening and/or inclement weather conditions. The Contractor shall not be compensated for unused materials or downtime due to weather conditions. The Contractor is solely responsible for protecting utilities, repairing all damages to the work and to the site, including road infrastructures, road subgrades, utilities, and any adjacent properties, which are caused as a result of working in the inclement weather conditions.

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 protecting utilities, repairing all damages to the work and to the site, including road infrastructures, road subgrades, utilities, and any adjacent properties, which are caused as a result of working in the dark.

Failure to complete all work as specified herein within the times specified herein, including time extensions granted thereto as determined by the Engineer, shall entitle the City to deduct from the payments due the Contractor, **\$3,000.00** in Liquidated Damages, and not as a penalty, for delays in the completion of the work for each and every calendar day beyond the "Open to Traffic" dates for each phase and "Calendar Days to Complete" for



DETAILED SPECIFICATION  
FOR  
**PROGRESS CLAUSE**

WT:MHM

4 of 4

01/31/25

each sub-phase, as required by this Detailed Specification and the Maintenance of Traffic Detailed Specification.

Liquidated Damages will be assessed until the required work is completed in the current construction season. If, with the Engineer's approval, work is extended beyond seasonal limitations, the assessment of Liquidated Damages will be discontinued until the work is resumed in the following construction season. Liquidated Damages will be assessed until all required work is completed for each phase as defined herein. There are no maximum limit on the Liquidated Damages amounts that may be charged to the Contractor.

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

1 of 8

01/23/25

**a. Description.-**

Traffic shall be maintained in accordance with the City of Ann Arbor Public Services Department Standard Specifications and as specified in Sections 104.11, 812, and 922 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, the 2011 Michigan Manual of Uniform Traffic Control Devices (MMUTCD), and as described herein.

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, 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 barricade lights as required on the project for the safety and protection of local traffic. This includes, but is not limited to, temporary advance, regulatory, and warning signs; barricades and channelizing devices at intersections and on streets where traffic is to be maintained; barricades at the ends of the project and at right-of-way lines of intersecting streets, and traffic control devices for moving construction operations.

**B. Materials.-**

The materials and equipment shall meet the requirements specified in the corresponding sections of the MDOT 2020 Standard Specifications for Construction and the 2011 MMUTCD.

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 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.

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

2 of 8

01/23/25

**MAINTENANCE OF LOCAL TRAFFIC**

Local access shall be maintained at all times for emergency vehicles (24 hours), refuse pick-up, mail delivery, business deliveries if vehicles are unable to access businesses from rear, and ingress/egress to public and private properties.

Contractor must accommodate the safe access to the buildings and businesses located within construction area. Pedestrian access to all buildings must be maintained throughout the construction period. An ADA compliant width of sidewalk shall be maintained along State Street and South University Avenue throughout the duration of the project, with continuous pedestrian barricades between the pedestrian path and work zone. When it is necessary to close a section of sidewalk for a short period of time, temporary pedestrian ramps and pathways shall be implemented to maintain continuous and safe pedestrian access along the corridor. 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. For work affecting pedestrian crossings, use the included staging sheets and typical details to maintain pedestrian traffic.

Pedestrian building entrances shall not be blocked for extended periods of time unless arrangements can be made with the affected property owner(s). When it becomes necessary to temporarily block building entrances, the Contractor shall notify the Engineer seventy-two (72) hours in advance of any work planned on or near business entrances, 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 during any phase of construction, unless agreed upon with the property owner(s).

At times, when it becomes necessary to temporarily obstruct local traffic during the performance of the work, the Contractor shall provide traffic regulator control in conformance with Chapter 6E of the MMUTCD, Sections 6E.01 thru 6E.08. A minimum of two traffic regulators are required. The cost of traffic regulator control shall be included in the Contract pay item "Minor Traffic Devices, Max \$80,000".

A lane-closure permit shall be obtained by the Contractor from the Engineering Unit, at least 48 hours in advance of any proposed lane or street closing. No lane closures shall be permitted during the following weekends, unless approved by the engineer:

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

3 of 8

01/23/25

- Memorial Day (3:00 PM Friday May 23, 2025 – 7:00 AM Tuesday, May 27, 2025)
- Independence Day (3:00 PM Friday July 3, 2025 – 7:00 AM Monday, July 7, 2025)
- Labor Day (3:00 PM Friday August 29, 2025 – 7:00 AM Tuesday, September 2, 2025)
- If the project is delayed, no work or lane closures, shall be performed during University of Michigan home football games.

All streets and sidewalks that can be open shall be open to motorized and non-motorized traffic. The Engineer will also not permit any trucking on or off site during these times.

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.

The hours of work on all Local streets are 7:00 a.m. to 8:00 p.m., Monday through Saturday, or as specified on the lane-closure permit. No equipment will be allowed in the street before or after these hours. Local streets may only be closed to through traffic (local access only) with written authorization of the Engineer. Work must be completed each day such that all streets are re-opened to through traffic by 8:00 p.m. unless otherwise specified, directed, or authorized in writing by the Engineer. All major changes in traffic control shall be made either between 9:30 a.m. and 3:30 p.m. or between 7:00 p.m. and 6:30 a.m. in order to minimize interference with rush-hour traffic. All traffic controls must be in-place and ready for traffic each day by 6:30 a.m. and 3:30 p.m.

The Contractor shall temporarily cover conflicting traffic and/or parking signs when directed by the Engineer included in the pay item "Minor Traffic Devices, Max \$80,000".

The Contractor shall use quantities of dust palliative, maintenance aggregate, and cold patching/HMA mixtures for use as temporary base, surfacing, and dust control at utility crossings, side roads and driveways (wherever required to maintain traffic), and where directed by the Engineer to maintain local access. The cost for the use of dust palliative, maintenance aggregate, cold patch and/or hot mix asphalt mixtures, as required and directed by the Engineer for maintenance of traffic and local access, shall be included in Contract pay item "General Conditions, Max \$300,000", and it will not be paid for separately.

The work of maintaining and relocating existing warning, regulatory and/or guide signs; and of removing, salvaging and reinstalling existing signs and supports is included in the bid price for the Contract pay item "Minor Traffic Devices, Max \$80,000".

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

4 of 8

01/23/25

Mailboxes and newspaper boxes that are in the way of the construction shall be removed and reset immediately in a temporary location per the detailed specification "Mailbox, Temporary Relocate" and as approved by the Engineer. Mail and paper delivery shall not be interrupted during the construction. Upon completion of the construction, all mailboxes and newspaper boxes, including their supports, shall be repositioned in their permanent locations as approved by the Engineer. This work shall be included the Contract unit price for the Contract pay item "General Conditions, Max \$300,000", and it will not be paid for separately.

The Contractor shall perform the work of this Contract while maintaining traffic in accordance with the 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.

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 Contractor shall furnish, erect, maintain, and upon completion of the work, remove any and all traffic control devices utilized on the project.

**Construction Influence Area (CIA).**- The CIA shall include the area from POB to POE within the Right-of-way of State Street, South University Avenue and East William Street as shown in the plans. The CIA shall 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.**

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

5 of 8

01/23/25

Signal Modifications

Signal timing and phasing modifications are anticipated for construction at East William and State Street, North University and State, and Liberty and State. The Contractor shall coordinate work with the City ahead of any decided 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.

The Contractor shall remove the signs as indicated on the plans. The Contractor will have all proposed signs, posts, and associated mounting materials delivered to the City of Ann Arbor Public Works, W.R. Wheeler Service Center, 4251 Stone School Road, Ann Arbor, MI. After construction is complete, but before opening any roadway to traffic, City of Ann Arbor Signs and Signals will install all signs in their proper, permanent location. To coordinate sign 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 installation/reinstallation of all signs shall be completed by the City of Ann Arbor Signs and Signals Unit.

**PROJECT SCHEDULE MILESTONES:**

In general, the project will proceed in three Phases. The project takes place within a heavy university pedestrian environment. The Contractor is required to work with the City of Ann Arbor to minimize disruptions as much as possible.

**Phase 1 Work** – All water main installation shall be completed in Phase 1 as depicted in the plans. Pavement, curb and gutter, and sidewalk removals will be limited to only install the water main. Note that the Engineer may request watermain shutdowns to occur during non-standard hours to ensure minimal interruption to businesses along State Street. All services shall be installed and connected during this phase. Existing watermain within Phase 1 limits shall be abandoned once the proposed Phase 1 watermain is tested, accepted, and put in service.

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

6 of 8

01/23/25

Phase 1 shall be completed in its entirety and open to traffic by **July 11, 2025**. All Phase 1 work shall be completed prior to the beginning of Phase 2 work.

Sub-Phase 1 Maintenance of Traffic – State Street from South University Avenue to East William Street will be closed to thru traffic in both directions. Access for emergency traffic will be maintained at all times. One midblock crosswalk shown on the plans shall remain open at all times.

Sub-Phase 1A Maintenance of Traffic – State Street from South University Avenue to East William Street, and the intersection of State Street and South University Avenue will be closed to thru traffic in all directions **for no more than 14 calendar days**. Access for emergency traffic will be maintained at all times. This phase will be used for the connection to the existing watermain in the South University Avenue intersection to the Michigan Union and tie-in to the existing water main. One midblock crosswalk shown on the plans shall remain open at all times.

Sub-Phase 1B Maintenance of Traffic - State Street from South University Avenue to East William Street, and North University Avenue from State Street to 200 feet east of State Street will be closed to thru traffic in all directions **for no more than 3 calendar days**. Access for emergency traffic will be maintained at all times. The intersection of State Street and North University shall not be closed to traffic during the subphase. This phase will be used for the connection to the existing fire hydrant to remain in service on North University Avenue. One midblock crosswalk shown on the plans shall remain open at all times.

**Note: Phase 1A and 1B shall not occur at the same time.**

**Ann Arbor Art Fair Week (July 14, 2025 – July 20, 2025)** - This project falls within the limits of the Ann Arbor Art Fair. No work is allowed from July 12, 2025 to July 20, 2025. Phase 1 shall be completed, and the site shall be left in a clean, safe and orderly condition and all equipment and stored material shall be relocated off-site. Prior to 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 temporary HMA surface, and all unnecessary barricades removed. If the milestones, adjusted for approved extensions of time, are delayed, temporary pavement and provisions needed to ensure the site meets conditions listed above will be at the sole cost of the Contractor.

**Phase 2 Work** – All Phase 2 work shall not begin until after the Ann Arbor Art Fair unless otherwise approved by the Engineer. Work includes pavement removal, installation of storm sewer, paving, curb and gutter, sidewalks, traffic signals, restoration, pavement markings, signage and all other work included in the Contract for this intersection. It is

DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

7 of 8

01/23/25

understood that turf establishment will take place in April 2026. However, the Contractor shall be responsible to use approved soil erosion and sedimentation control measures (SESC) to cover and maintained disturbed areas throughout the winter of 2025-2026.

Phase 2 shall be completed in its entirety and open to traffic by **November 15, 2025**.

Phase 2 Maintenance of Traffic – State Street from South University Avenue to East William Street will be closed to thru traffic in both directions. Access for emergency traffic will be maintained at all times. The Contractor shall apply for a permit from the City of Ann Arbor to partially close the East William Steet intersection to install traffic signal items depicted on the plans. One midblock crosswalk shown on the plans shall remain open at all times.

The contractor should also be aware of the following events within the project area. If the project is delayed, the contractor will be required to make provisions following the “**Ann Arbor Art Fair**” paragraph herein:

- Ann Arbor Summer Festival & Top of the Park; June 13 – July 6, 2025
- Ann Arbor Pride, August 2, 2025

**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.

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

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
Traffic Regulator Control .....	Lump Sum
Minor Traffic Devices, Max \$80,000.00 .....	Lump Sum
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn and Oper .....	Ea
Plastic Drum, High Intensity, Lighted, Furn and Oper .....	Ea
Sign, Type B, Temp, Prismatic, Furn and Oper .....	Sft
Sign, Type B, Temp, Prismatic, Spec, Furn and Oper .....	Sft
Sign, Portable, Changeable Message, Furn & Oper .....	Ea
Lighted Arrow, Type C, Furn & Oper .....	Ea
DS_Temporary Pedestrian Ramp, Furn and Oper .....	Each
Temporary Pedestrian Mat, Furn and Oper .....	Foot
DS_Detectable Warning Surface, Temp .....	Sft
DS_Pedestrian Path, Temp .....	Foot



DETAILED SPECIFICATION  
FOR  
**MAINTAINING TRAFFIC AND SEQUENCE OF CONSTRUCTION**

WT:MHM

8 of 8

01/23/25

DS_Temporary Audible Message Device.....	Each
Pedestrian Channelizer Device, Furn and Oper.....	Each
Pedestrian Type II Barricade, Temp, Furn and Oper .....	Each
Pavt Mrkg, Wet Reflective, Type R, Tape, 24 In., Stop Bar.....	Foot
Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., Crosswalk.....	Foot
Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., White, Temp.....	Foot
Pavt Mrkg, Wet Reflective, Type R, Tape, 6 In., Yellow, Temp.....	Foot

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  
**PAVT, CLEANING**

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to clean pavement as described herein and at the frequency directed by the Engineer in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.** None.

**c. Construction.**

The Contractor will utilize equipment to minimize dust production, such as a street sweeper with vacuum and watering capabilities, and employ all dust control measures deemed necessary by the Engineer to clean pavement surfaces immediately prior to commencing paving operations, as directed by the Engineer, prior to installing pavement markings, and after all contract work is complete in accordance with section 501.03.C.2 of the Michigan Department of Transportation 2020 Standard Specifications Construction.

The Engineer may direct suspension of watering capabilities prior to paving operations.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Pavt, Cleaning.....	Lump Sum

Payment for **DS\_Pavt, Cleaning** will be measured by the lump sum for all pavement cleaning operations and will include all costs for labor, material, and equipment required to complete the work, including employing a vacuum and watering capable street sweeper.

Payment will be made after completing each operation listed according to the following schedule, regardless of the number of times pavements are cleaned:

<b>Operation</b>	<b>Payment Amount</b>
Leveling Course	50%
Top Course	25%
Project Clean-up	25%

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PROJECT CLEAN-UP**

WT: AJK:MHM

1 of 2

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to perform project cleanup in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein.

**b. Materials.** The materials will meet the requirements specified in the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

**c. Construction.**

### **Clean-up**

The Contractor will ensure the project site is left in a condition that is clean and free of all project generated debris and to the satisfaction of the Engineer. This work will consist of removing and disposing of miscellaneous packing materials and debris, soil erosion control fences, protective fences, fallen timber, logs, brush, rocks, boulders, and any rubbish generated from the Contractor's operations within the project limits, or areas impacted by their operations or areas impacted by their operations.

Immediately after completion of the construction phase or segment, the Contractor will 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.

Inlet filters will be removed from inlets and catch basins only after all pavement surfaces have been cleaned of debris and at the direction of the Engineer.

Provide project cleanup as an ongoing operation. Perform project cleanup within the right-of-way of all roadways and any other areas impacted by the project work.

Clean existing culverts, ditches, depressions, or other areas that contain sediment or debris from the work operations.

Neatly fill any ruts, holes, or depressions resulting from removal of soil erosion control materials with Engineer approved materials after their removal. Maintenance of silt fencing and other soil erosion control materials until such time as they are no longer needed, then removal and proper disposal of them from the site, will be included in the bid price for the related soil erosion control device.

All backfill materials will be compacted, and ruts and holes restored to the surrounding

contour as directed by the Engineer.

The project site will be left in a condition that is clean and free of all project-generated debris to the satisfaction of the Engineer.

**d. Measurement and Payment.** The completed work, as described, will be paid at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Project Clean-Up .....	Lump Sum

Payment for **DS\_Project Clean-up** will include all costs for labor, materials, and equipment required to complete the work for all project clean up work, as specified herein and will be paid on a lump sum basis per phase as described in the plans and specifications. The Contractor will not receive payment until the Contractor has cleaned and restored the project limits to the satisfaction of the Engineer.

Pavement cleaning utilizing a street sweeper for paving operations will be paid as DS\_Pavt, Cleaning.

The Contractor will be exclusively responsible for maintaining a clean project site. The Engineer may direct additional clean up operations throughout each project phase. Payment will be made after completing each project milestone listed according to the following schedule, regardless of the number of times the Contractor conducts clean up operations:

<u><b>Milestone</b></u>	<u><b>Payment Amount</b></u>
Phase 1	45%
Phase 2	45%
Phase 3	10%

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PEDESTRIAN PATH, TEMP**

WT:VCM/CEW:MHM

1 of 2

01/28/19  
REV. 12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish, install, maintain, and remove 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.

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 paid for at the contract unit price using the following contract item (pay item):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Pedestrian Path, Temp.....	Foot

Payment for **DS\_Pedestrian Path, Temp** will be measured along the centerline of the path for units installed and will include costs for all labor, materials, and equipment required to install, maintain, restore, and remove the path and disposal of all associated materials throughout the life of the contract.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**STEEL BOLLARD**

WT:AJK

1 of 2

01/13/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct steel bollards where indicated and as detailed on the plans in accordance with City of Ann Arbor 2025 Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Bollards will be Helio Security Bollard, Series 600, 6" column, non-illuminated with stainless steel finish by Forms+Surfaces or Engineer approved equal.

Forms+Surfaces contact: Chris Thomas, 874 250-8030, [chris.thomas@forms-surfaces.com](mailto:chris.thomas@forms-surfaces.com), <https://www.forms-surfaces.com>

Bollards will meet minimum level of K2.7 impact kinetic energy designation as identified by the ASTM Standard Test Method for Vehicle Crash Testing of Perimeter Barriers. Manufacturer must provide documentation confirming that a finite element analysis has been completed for this product. A K2.7 rating is equivalent to stopping a 5,500 lb. vehicle traveling at 40 mph.

Bollards will meet the requirements of ASTM A53 –Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc Coated, Welded and Seamless and ASTM A123 Specification for Zinc (hot-dip galvanized) Coatings on Iron and Steel Products.

Provide submittals for bollards including:

1. Manufacturer's standard product literature
2. Shop drawings
3. Installation instructions
4. Maintenance instruction
5. Manufacturer's qualifications: list of at least ten major transportation authorities, municipalities, universities, or other high-use public environments currently using site products fabricated by manufacturer
6. Warranty items: three years from date of invoice against defects in materials and workmanship

The bollard will be 40" tall and 6" in diameter and will have:

1. Stainless steel body with satin stainless steel finish
2. Aluminum base
3. Stainless steel casting head cap
4. 02 chain loop accessories

- 5. Mounted with stainless steel hardware on cast in place extra-heavy wall steel security core with welded cross supports. 48” security core minimum 24” embedded into concrete and 24” internal to bollard.
- 6. Heavy steel wall security core set in 18” x 18” x 30” concrete footer minimum

**c. Construction.**

The Contractor will construct bollards in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, the manufacturer’s written instructions, and as directed by the Engineer following the guidelines below.

**A. Examination**

- 1. Verify that substrates are stable and capable of supporting the weight of items covered under this section.
- 2. Verify that foundation, applied finishes, and adjacent construction are ready to receive bollards and are level, plumb, and square within tolerances acceptable to manufacturer.
- 3. Verify that required utilities are in correct location and are of correct capacities for specified products.

**B. Installation**

- 1. Install in accordance with manufacturer's installation instructions.
- 2. Install in conformance to applicable ADA guidelines and End User’s established accessibility policies.

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

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Steel Bollard.....	Each

Payment for **DS\_Steel Bollard** will be measured by each unit completely installed and will include all costs for labor, materials, and equipment required to complete this work, including furnishing and installing steel bollard and hardware.



CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PERMANENT TRAFFIC SIGNS AND SUPPORTS**

WT:CGT:VCM:IMG:MHM

1 of 3

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish permanent traffic signs and supports to the City of Ann Arbor and coordinating with the City for installation and removing signs and associated supports and foundations 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.** All materials required for the proposed permanent regulatory signage as shown on the plans shall be delivered to the City of Ann Arbor Public Works, W.R. Wheeler Service Center, 4251 Stone School Road, Ann Arbor, MI 48108. The Contractor shall be responsible for all coordination with the City of Ann Arbor Signs and Signals Supervisor at 734.794.6361 for delivery. The contractor will not be entitled to extra compensation due to delays caused by City of Ann Arbor personnel.

The Contractor will furnish materials in accordance with the following sections of the Michigan Department of Transportation Standard Specifications for Construction, except where otherwise noted below:

Anchor bolts, nuts, and washers – materials as specified in section 908

Sign, Type IIIA – materials as specified in section 919

Sign, Type IIIB – materials as specified in section 919

All materials for **Perforated Steel Square Tube Breakaway System, Modified** follow MDOT Standard Detail SIGN-207-D, and as noted below for the post, concrete base and anchor. The following materials shall be Unistrut or approved equal and shall include the following:

1. Post: exterior dimensions measure 2" x 2" square x 10', 14 gauge with 7/16" pre-punched holes, corner welded. Square tubing to allow for mounting on all four sides. Steel to conform to ASTM A1011 Grade 50, galvanizing to meet ASTM A-653. Must be able to mount signs with drive rivets to provide tamper resistance. Provide a smooth unbroken appearance for posts and anchors. Inline zinc coating to comply with AASHTO M-120 standard. Breakaway installation to meet FHWA approval standard.
2. Concrete Mount Base: interior dimensions measure 2" x 2" square x 6", 12 Gauge sleeve welded to 6"x6" square, 1/4" thick plate with four 3/4" holes. Centerpoint of each hole shall be 7/8" from each side of the plate. Edge of each hole shall be 1/2" from each side of plate.

Anchor: exterior dimensions measure 2" x 2" square x 3', 7 Gauge sleeve.

**Qwick Kurb Sign** will be manufactured by Qwick Kurb, Inc, model number L60 in yellow or white color to match pavement markings where installed in roadway. End sections shall be model number L61. The assembly shall include L65 reflective arcs, a reboundable flex boot with bolt in construction, with a 224 sq. in. reflective crosswalk marker panel MDOT sign R1-6. All pavement mounting hardware shall be stainless steel meeting the dimensional and strength capacity of the manufacturer's recommendation.

**Pelco Sign-Brac, Galaxy Cable Mount, Formed Tube** for a mast arm sign install will be exclusively procured and no substitutions will be allowed. The following Pelco part numbers and specifications apply:

- Galaxy Cable Mount, Formed Tube Complete Kit
  - AG-0142
  - Sign CTC 15 inches
  - Provide 84-inch uncoated stainless-steel cable
  
- Astro-Bracket
  - AG-3055
  - 84-inch uncoated stainless-steel cable
  - 15 inch CTC
  - No color
  
- Sign Bracket
  - AB-0507
  - 15 inch CTC
  - No color

**c. Construction.** The Contractor will furnish signs, sign supports, and hardware in accordance with Section 810 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein.

Remove signs of the type indicated and sign supports in accordance with section 810.03.U Michigan Department of Transportation 2020 Standard Specifications for Construction.

Remove foundations for perforated steel square tube breakaway systems in accordance with section 810.03.V Michigan Department of Transportation 2020 Standard Specifications for Construction.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Sign, Type III, Rem.....	Each
DS_Fdn, Perforated Steel Square Tube Breakaway System, Rem.....	Each
DS_Ground Mtd Sign Support, Rem.....	Each
DS_Sign, Type IIIA, Modified .....	Square Foot
DS_Sign, Type IIIB, Modified .....	Square Foot
DS_Reflective Panel for Permanent Sign Support, 3 foot, Modified .....	Each
DS_Perforated Steel Square Tube Breakaway System, Modified.....	Each
DS_Pelco Sign-Brac, Galaxy Cable Mount, Formed Tube .....	Each
DS_Qwick Kurb Sign.....	Each

Payment for permanent **Sign, Type III, Modified**, supports, and associated hardware will be measured by the square foot for signs furnished and will include all costs for labor, material, and equipment required to furnish permanent signs and supports materials to the City and coordinate installation with the City as shown on the plans and as specified herein.

Payment for permanent Reflective Panel for **Permanent Sign Support, 3 foot, Modified** and **Perforated Steel Square Tube Breakaway System, Modified, Qwick Kurb Sign** supports, and associated hardware will be measured by each for units furnished and will include all costs for labor, material, and equipment required to furnish permanent signs and supports materials to the City and coordinate installation with the City as shown on the plans and as specified herein.

Payment for permanent Reflective Panel for **Sign, Type III, Rem, Fdn, Perforated Steel Square Tube Breakaway System, Rem**, and **Ground Mtd Sign Support, Rem** and removal of associated hardware will be measured by each for units completely removed and will include all costs for labor, material, and equipment required to remove, haul away, and dispose of signs, supports, and hardware.

Payment for bases, posts, and mounting hardware shall not be paid for separately but shall be included in the corresponding pay item(s).

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**TRAPEZOID DELINEATORS**

WT:AJK

1 of 2

01/13/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install trapezoid delineators where shown and detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, the manufacturer's instructions, except as modified herein, and as directed by the Engineer.

**b. Materials.** The Contractor will furnish TekWay Trapezoid Delineators manufacture by StrongGo or an Engineer approved equal.

The Contractor will ask Owner for color information prior to providing submittals and ordering materials.

**c. Construction.** The Contractor shall engage an experienced installer qualified for installation of this type and who has successfully completed detectable warning installations similar in material, design and extent to that indicated for this project.

### **Preparation**

During all concrete pouring and tile installation procedures, the Contractor shall ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

The physical characteristics of the concrete will be consistent with these Specifications while maintaining a slump range of 4 inches to 7 inches to permit solid placement of the cast-in-place tactile tile system.

The concrete will be poured and finished, true and smooth to the required dimensions and slope prior to tile placement.

### **Installation**

The Contractor will not be allowed to install Trapezoid Delineator Tiles until all submittals have been reviewed and approved by the Engineer.

The Contractor will install Trapezoid Tactile Warning Delineator tiles in accordance with the manufacturer's instructions.

The largest size tile manufactured will be used to minimize the amount of installation-seams, unless directed by the Engineer otherwise. The tiles will be placed in accordance with the drawings. Cutting of the tiles may be required. Tile to tile joints

between Trapezoid Tactile Warning Delineator tiles must be laid out by adjoining factory edges.

The Contractor will install tiles into the fresh concrete using a rubber mallet to ensure that there are no voids or air pockets, and the edges of tile are to be flush with the adjacent surface or as the drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

While the concrete is workable, the Contractor will use a 1/8 inch radius edging tool to create a finished edge of concrete, and then a steel trowel will be used to finish the concrete around the tile’s perimeter.

**Cleaning and Protection**

The Contractor will protect trapezoid tactile warning delineators against damage during construction to comply with tile manufacturer’s Specifications.

During and after the tile installation and the concrete curing stage, the Contractor will exhaust all efforts to prevent walking, leaning, or other external forces from loading the tile and/or to displace the tile, causing a void between the underside of tile and its concrete substrate.

The Contractor will protect trapezoid tactile warning delineators against damage from rolling loads following installation by covering with plywood or hardwood.

The Contractor will clean tiles prior to the date scheduled for inspection and remove protective covering.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Trapezoid Delineator, Any Size.....	Foot

Payment for **DS\_Trapezoid Delineator, Any Size** will be measured by the foot for units installed and will include all costs for labor, materials, and equipment required to furnish and install the materials as shown on the plans and as specified herein.

The quantity of 48-inch segments is estimated to be X each. The quantity of 12 inch end sections is estimated to be Y each.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**BIKEWAY DELINEATOR POST**

WT:CGT:VCM:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install bikeway delineator posts in accordance with the Section 810 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, as shown on the plans, and as specified herein.

**b. Materials.** The Contractor shall furnish materials in accordance with Section 807 of the Michigan Department of Transportation Standard Specifications for Construction, except where otherwise noted below.

All materials for Bikeway Delineator Post shall be manufactured by Pexco. Model shall be 28-inch City Post Surface Mount Model SM, 3" OF Flexible, Bolt-Down Anchor. Color shall be black with white sheeting where white edgeline is indicated on the plans or yellow post with yellow sheeting where yellow edgeline is indicated on the plans.

**c. Construction.** Bikeway Delineator Post shall be laid out for approval by the Engineer prior to installation. Install Bikeway Delineator Post per manufacturer's recommendations. Bikeway Delineator Posts 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 delineator posts as the dimensions noted on the plans. Bikeway Delineator Posts must be installed plumb and in line with each other and shall be firmly connected to the anchor system.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Bikeway Delineator Post .....	Each

Payment for **DS\_Bikeway Delineator Post** will be measured by each complete unit installed and will include all costs for labor, materials, and equipment required for furnishing and installing the materials as shown on the plans and as specified herein.

Payment for bases and mounting hardware shall not be paid for separately but shall be included in the corresponding pay item(s).

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**BUS STOP SHELTER ASSEMBLY AND INSTALLATION**

WT: MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to assemble and install a bus stop shelter assembly and bench provided by the Ann Arbor Area Transit Authority (AAATA) where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, the manufacturer's written instructions, and as directed by the Engineer.

The Contractor will coordinate material pick up with Ken Anderson at 734 973-6500.

**b. Materials.**

Shelter will be Duo-Gard 6' x 12' 3-sided transit style shelter with acrylic walls (open front).

Bench will be Duo-Gard perforated 7' bench with metal mesh seat & seat partitions.

All hardware will be concrete anchors and meet the requirements of the manufacturer's specifications and the City of Ann Arbor 2025 Public Services Standard Specifications.

**c. Construction.**

The Contractor will assemble and install bench and shelter according to the manufacturer's written instructions.

The Contractor will disassemble and reassemble bench and shelter until the bench and shelter are constructed to the satisfaction of the Engineer.

The Contractor will coordinate layout for the bench and shelter with the Engineer.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Bus Stop Shelter Assembly and Installation .....	Each

Payment for **DS\_Bus Stop Shelter Assembly and Installation** will be measured by each complete unit installed and will include all costs for labor, materials, and equipment required for furnishing and installing the materials as shown on the plans and as specified herein.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PAVEMENT, REMOVE**

WT:IMG:AJK:MHM

1 of 3

12/20/24

**a. Description.** This work consists of providing all labor, materials, and equipment required to remove, and dispose of off-site, roadway and drive approach pavements, regardless of thickness and material type, and excavate and furnish compacted granular material outside of Machine Grading, Modified areas as shown on the plans, in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as specified herein, and as directed by the Engineer.

**b. Materials.** The Contractor will furnish MDOT Class II Granular Material in accordance with Section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

Pavement materials are anticipated to include asphalt, concrete, brick, aggregate and composite pavement sections. Also included is bituminous overlay pavement on the concrete gutter without disturbing the curb and gutter remaining in place.

Prior to the start of work, the Engineer and Contractor together will identify and field measure all items to be removed. The Engineer will approve of all removal limits prior to any removals being performed by the Contractor.

In areas where pavement removal is to be performed adjacent to existing pavement that is to remain in place, the pavement will be sawcut prior to removal. Backhoe teeth, jackhammers equipped with spike points, milling machines, and backhoe mounted wheel cutters will not be used.

All saw cutting will be performed under wet conditions to prevent excessive airborne dust. All resulting slurry and debris will be cleaned up the satisfaction of the Engineer.

The Contractor will cut steel reinforcement bars as directed by the Engineer at all areas of removal.

The Contractor will perform full-depth saw cutting at removal limits, including those necessary to construct 2-foot wide MDOT Type M drive openings, as shown on the Plans, as directed by the Engineer, and as marked for removal. All pavement cuts will be made full depth and perpendicular to, or parallel with, the centerline of the pavement. Butt joints must be saw cut straight and a clean edge will be maintained.

The Contractor will excavate and furnish and place compacted granular material embankment where required to establish the subgrade elevations to accommodate the proposed subbase, aggregate base, and pavement sections.



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

Excavated / removal areas will be adequately protected with barricades and/or fencing at all times.

Removed or excavated materials which are not incorporated into the work will become the property of the Contractor and will be immediately removed and properly disposed of off-site.

The proper disposal of asphalt, concrete, and all other excess excavated material will be the responsibility of the Contractor. At no time will the Contractor stockpile removed or excavated materials overnight on or adjacent to the site.

Base, subbase, or subgrade materials removed without authorization by the Engineer will be replaced and compacted by the Contractor at the Contractor's expense, with materials specified by the Engineer.

Damage to adjacent pavement, pavement base, subbase, curb and gutter, sidewalk, utility structures, or other site features, due to removal operations will be repaired by the Contractor at the Contractor's expense, as directed by the Engineer.

Paving bricks within the right-of-way will be salvaged and neatly stacked/stockpiled by the Contractor. Paving bricks not reinstalled will be delivered by the Contractor to a City-owned facility as directed by the Engineer.

At various times throughout the work, the Engineer may direct the Contractor to use smaller and/or lighter equipment, or to defer certain work tasks in order to protect the grade and/or adjacent areas. The Contractor will swap equipment to the satisfaction of the Engineer at no additional cost to the Owner.

For utility construction patches or repair, the existing pavement will be removed to provide for a replacement of not less than 1 foot wider and longer than the utility trench on each side. All patches will be rectangular (four-sided in shape) and performed in accordance with the details shown on the plans or as directed by the Engineer. If these removals will result in existing pavement less than 5 feet wide from the patch to a lane line, gutter line, edge-of-metal, or existing patch, this existing pavement will also be removed to the lane line, gutter line, edge-of-metal, or existing patch.

**d. Measurement and Payment.** The completed work, as described, will be for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Pavement, Remove .....	Square Yard

All saw cutting required for removals will be included in DS\_Pavement, Remove and will not be paid for separately.

Payment will be measured in square yards for the area of pavement removed, regardless of thickness, or if it is composite.

Payment for **DS\_Pavement, Remove** will be measured by the square yard for pavements removed and will include all costs for labor, material, and equipment required to remove and dispose of existing pavement and driveway approaches, regardless of pavement thickness and type of material and will excavate and furnish and place compacted granular material to establish the subgrade elevations required to accommodate the proposed cross section, install utilities, or as approved by the engineer.

Excavation and granular material included in payment for **DS\_Pavement, Remove** will be limited to sections outside of the influence of Machine Grading, Modified areas indicated on the plans and cross sections.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**TROLLEY TRACK, REMOVE**

AA:JKA  
WT:AJK:CGT:MHM

1 of 2

12/20/2024

**a. Description.** This work shall consist of furnishing all labor, tools, equipment, and material to remove, and dispose of off-site, any concrete curb, gutter, curb and gutter, integral curb, sidewalk, sidewalk ramps, pavement, drive openings, and drive approach pavements as shown on the plans, in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as specified herein, and as directed by the Engineer.

**b. Materials.** Granular Material, Class II shall be furnished in accordance with Michigan Department of Transportation 2020 Standard Specifications for Construction section 902.

**c. Construction.** Remove and dispose of bituminous and/or composite pavement overlay and to break up and remove the trolley track concrete base, steel reinforcement, ties, rails, and hardware where necessary for utility installation, pavement cross section or any other item of work as approved by the Engineer. Concrete base foundation is anticipated to be 7-ft wide by 12-14 inches deep.

Prior to the start of work, the Engineer and Contractor shall work together to identify and field measure all items to be removed. The Engineer shall approve of all removal limits prior to any removals being performed by the Contractor.

The Contractor shall perform full-depth saw cutting at removal limits as shown on the Plans, as marked for removal, or as directed by the Engineer.

The Contractor shall cut steel reinforcement as directed by the Engineer at all areas of removal.

All saw cutting shall be performed under wet conditions to prevent excessive airborne dust. All resulting slurry and debris shall be cleaned up the satisfaction of the Engineer.

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

Excavated / removal areas shall be adequately protected with barricades and/or fencing at all times.

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.

Base, subbase, or subgrade materials removed without authorization by the Engineer shall be replaced and compacted by the Contractor at the Contractor's expense, with materials specified by the Engineer.

**d. Measurement and Payment.** The completed work, as described, will be for at the contract unit price for the following contract items (pay items):

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
DS_Trolley Track, Remove.....	Square Yard

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

Payment for **DS\_Trolley Track, Remove** will be measured by the square yard for foundations removed and will include all costs for labor, material, and equipment required to remove and dispose of existing pavement, steel reinforcement, rails, ties, and hardware, regardless of pavement thickness and type of material and shall excavate and furnish and place compacted granular material to establish the subgrade elevations required to accommodate the proposed cross section, install utilities, or as approved by the engineer

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PARKING POST, REM**

WT:MHM

1 of 1

12/20/24

**a. Description.** This work shall consist of removing parking meter post in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.** All sand shall meet the gradation of MDOT Class II granular material in accordance with Section 902 of the 2020 MDOT Standard Specifications for Construction.

Concrete shall be Grade 3500 in accordance with Section 1004 of the MDOT 2020 Standard Specifications for Construction.

**c. Construction.** The City will locate and mark meter standards and pay stations requiring removal. Prior to removal, contact PCI Municipal Services at (734) 761-3582 for the removal of the parking meter heads.

The Contractor shall removal, haul away, and dispose of the post and concrete foundation.

The void will be backfilled with Class II Granular Material or Engineer approved backfill.

The surface will be restored in-kind to adjacent material.

Concrete sidewalk shall comply with plans and specifications.

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

<u>Pay Item</u>	<u>Pay Unit</u>
DS_Parking Post, Rem.....	Each

Payment for **DS\_Parking Post, Rem** will be measured by each unit completely removed will include all costs for labor, material, and equipment required to remove, haul away, and dispose of existing parking posts, bases, and hardware and furnishment and placement of granular materials and concrete.

CITY OF ANN ARBOR

DETAILED SPECIFICATION  
FOR  
**MACHINE GRADING, MODIFIED**

WT:AJK:MHM

1 of 7

12/20/2024

**a. Description.** This work consists of providing all labor, material, and equipment required to excavate, fill, and grade to establish proposed subgrade elevations as described in Section 205 of the Michigan Department of Transportation Standard 2020 Specifications for Construction with the following exceptions: includes hauling, disposal, storing and stockpiling topsoil, salvaging and stockpiling of aggregate base, miscellaneous removals, furnishing and compacting granular material, subgrade manipulation, proof rolling, temporary lowering of drainage structures, removing, salvaging, storing, and reinstalling site furnishings with new hardware, protecting existing utilities, site preparation for plantings, and all work described herein within the grading limits indicated on the plans.

Earth grades will be constructed by saw cutting and excavating and disposing of existing bituminous pavement, concrete pavement, sidewalks, curbs, gutters, culverts, soil, rock, vegetation (including trees, stumps, brush, shrubs, roots, and logs) or other deleterious materials; removing and salvaging or disposing of topsoil; and by placing and compacting existing approved fill material or imported MDOT Class II Granular Material.

All work will be completed in accordance with Sections 204, 205, 403, 501, 815 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein.

**b. Materials.** All materials will meet the requirements as specified in Sections 205 and 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

Fill material will be suitable material obtained from the site approved by the Engineer or imported MDOT Class II granular material.

Hardware furnished for site furnishings will match the existing in-kind and will have anchors appropriate for the fastening application.

**c. Soils Information.** Soil information provided as part of the contract documents is for informational purposes only and will not relieve the Contractor of the responsibility of investigating all local conditions before bidding.

**d. Contractor's Calculations.** Existing and proposed cross sections are provided in the plans. The Contractor will perform his/her own computations and is responsible to inspect the site to determine his/her own estimate of the quantities of work involved. Deviations between the existing and proposed cross-sections shown on the plans will not be cause for additional compensation.

**e. Permit to Place.** The Engineer will issue to the Contractor a "Permit to Place" for the aggregate base. If the Contractor does not immediately place the aggregate base, the Contractor will be solely responsible for the protection of the subgrade and will

conduct operations and provide the necessary equipment to ensure the satisfactory completion of the work without damaging the subgrade. This may require the transportation and movement of materials over additional distances in lieu of driving upon the unprotected or partially unprotected subgrade.

**f. Suspension of Work.** The Engineer will have the authority to suspend the work wholly or in part for any periods of time as may be deemed necessary due to unsuitable weather or such other conditions which are considered unfavorable for the prosecution of the work or for any other condition or reason deemed to be in the best interest of the project. The Contractor will not suspend work without giving prior written notification to the Engineer.

**g. Coordination.** The Contractor will coordinate all work with utility companies and others where work by others is within the areas indicated for Machine Grading on the plans or at the direction of the Engineer.

**h. Access.** The Contractor will maintain access to all driveways and other entrances and mailboxes at all times for all users and USPS workers.

The Engineer may direct temporary relocation of mailboxes. This work will be paid for separately as Mailbox Post.

**i. Removal and Salvaging of Topsoil and Aggregate Base.** The Contractor will remove, salvage, and stockpile topsoil and/or aggregate base and perform all related work in accordance with Section 205.03.A.1 and/or 205.03.A.2 of the Michigan Department of Transportation Standard Specifications for Construction to prepare for the existing surface for placement of 4 inches of topsoil to accommodate turf establishment in the areas indicated on the plans.

**j. Miscellaneous Removals.** The Contractor will remove bituminous, aggregate, and concrete materials around manholes, structures, and utility covers, remove bituminous curbs, driveway wedges, overlays on existing curb and gutter, and other miscellaneous bituminous surfaces, and remove any surface feature located within the grading limits indicated on the plans or as directed by the Engineer for which there is no specific pay item in the proposal for its removal.

The Contractor will remove and dispose of all abandoned cables, conduit, and pipe encountered within the limits of any earthwork excavation including undercuts at the direction of the Engineer. Where the inverts of abandoned, or to be abandoned or removed, conduits or pipe are less than 16 inches below the bottom of any earth excavation or undercut, the conduits and/or pipe will be removed and the resulting void filled with an Engineer approved material. The fill material will be compacted to 95% of its maximum unit weight in lifts not exceeding 12 inches.

The Contractor will remove aggregate base furnished as temporary aggregate to cover utility trenches. The Contractor may elect to reuse aggregate base at the approval of the Engineer.

**k. Protection of the Grade.** The work will be kept well drained at all times. The Contractor will repair all areas of the work that become damaged due to rain at the Contractor's expense as directed by the Engineer.

The Contractor will be responsible for the maintenance of the foundation, roadway embankment, and subgrade. Any damage caused by traffic or the Contractor's operations, to the foundation, roadway embankment or subgrade will be remedied by the Contractor at his/her sole expense.

The Contractor will conduct his/her operations and provide the necessary equipment to ensure the satisfactory completion of the work without damaging the foundation, roadway embankment or subgrade. This may require the transporting and movement of materials over additional distances.

**l. 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 will excavate around, above and/or below the utility lines, as directed, to complete the machine grading or subgrade undercutting operations.

**m. Foundation Preparation.** The Contractor will prepare the earth grade in accordance with Section 205.03.A of the Michigan Department of Transportation 2020 Standard Specifications for Construction as shown on the plans, and as specified herein.

The earth grade will be compacted to 95% of its maximum unit weight, as measured by the AASHTO T-180 method, to a depth of at least 10 inches. If this cannot be achieved, in the opinion of the Engineer, he/she will direct the Contractor to perform Subgrade Undercutting of the type specified or as directed by the Engineer.

**n. Subgrade Construction.** The Contractor will construct the subgrade by performing earth excavation and placing roadway embankment work in accordance with Sections 205.03.G and 205.03.H of the Michigan Department of Transportation 2020 Standard Specifications for Construction, as shown on the plans, and as specified herein.

The Contractor will shape and prepare the subgrade outside of proposed utility trench areas to the grades and cross-sections, shown on the plans, including sidewalk, driveways, and landscape areas, or as directed by the Engineer, and as specified herein. The subgrade will be prepared to ensure uniform support for the pavement structure. To achieve this, the work will include, but not be limited to:

1. Excavate, remove, haul away, and dispose of any surplus or unsuitable materials.
2. Import and furnish any additional Engineer approved fill materials necessary.
3. Move existing and/or furnished materials longitudinally and transversely as necessary.
4. Cut, place, compact, and trim existing and/or furnished materials to construct the roadway embankment and subgrade to the specified elevations within tolerances.
5. Stockpiling, and moving again, any cut materials which cannot be immediately placed upon excavation due to construction staging.



6. Grade around mailboxes, trees, utilities poles, other utility features, and all other distinguished permanent features. The Contractor will be responsible for any damaged caused to such features.
7. Maintain the work in a finished smooth condition until it is accepted by the Engineer.

If the Contractor's equipment should cause any rutting or other damage in the base, subbase or subgrade, the equipment will be immediately restricted from the grade and the Contractor will restore the area to the satisfaction of the Engineer at the Contractor's expense.

The Contractor will excavate, fill, and grade the subgrade to accommodate all proposed subbases, aggregate bases, pavements, swales and adjacent planting beds, curb and gutter, driveways, sidewalks, bicycle paths, other similar structures, bioswale planting mix, topsoil, and any other features which the subgrade supports.

The Contractor will prepare the subgrade to ensure uniform support for the pavement structure. The finished subgrade will be placed to within 1 inch below and  $\frac{3}{4}$  inch above the plan grade. Variations will be corrected with the placement of compacted granular material. The tolerances for the pavement structure strata are not additive.

In areas where the existing grade is to be cut to achieve proposed subgrade elevation (cut sections), rubber tire equipment including scrapers, wheel loaders, and graders may be used by the Contractor but only to within 2 feet above the proposed subgrade elevation.

After the grade has been cut to within 2 feet above the subgrade elevation, the Contractor will install all proposed underground utilities and underdrains within the 1:1 influence of the proposed pavement section.

Following the installation of utilities, the Contractor will perform the remaining cutting using tracked equipment only. The Contractor will only excavate an amount that the Contractor can maintain and protect and keep well drained at all times.

In areas where the existing grade is to be filled to achieve the proposed subgrade elevation (fill-sections), filling will not take place until all proposed underground utilities within the 1:1 influence of the proposed pavement have been installed. However, if the existing grade does not provide the required minimum cover for a portion of any utility, filling for the road subgrade will be performed to provide such minimum cover. This filling will be for the entire width of the roadway (to 1 foot behind the curb) at a length as determined by the Engineer.

The Contractor will place fill materials only on stable earth grade approved by the Engineer.

The Contractor will place fill in 6-inch lifts and compacted to 95% of the maximum unit weight as determined by the AASHTO 180 test.

**o. Proof Roll to Establish Subgrade.** Immediately following the completion of the grading and compaction of the subgrade as required above, the Contractor will notify and allow the Engineer to inspect the finished subgrade for soft or uncompacted areas, and for areas of unsuitable and deleterious soils.

The Contractor will proof roll the grade or other surfaces as directed by the Engineer. Equipment for proof rolling will be a pneumatic-tired roller and will have suitable body for ballast loading with such capacity that the gross load may be varied between 25 and 40 tons. The Contractor may use an appropriately loaded single axle or tandem axle dump truck in lieu of the specified roller to achieve the loads specified above. The proof rolling vehicle will be operated at walking speed. The proof roller will make one or more passes to complete coverage of the completed subgrade. Where proof rolling shows the subgrade to be unstable, such areas will be undercut and repaired as determined by the Engineer. Following the completion and approval of all undercuts required based on the proof rolling, the subgrade will be considered established.

The Contractor will not operate rubber-tired equipment on the established subgrade unless specifically authorized in writing by the Engineer.

The Contractor will be responsible for the maintenance of the subgrade. Any damage to the subgrade due to the Contractor's activities or the activities of its subcontractors, will be repaired by the Contractor at the Contractor's expense including any additional undercuts required after the subgrade had been established.

**p. Subgrade Manipulation.** The Contractor will perform Subgrade Manipulation on the foundation or subgrade in accordance with Section 205.03.F of the Michigan Department of Transportation 2020 Standard Specifications for Construction where indicated on the plans, as specified herein, and as directed by the Engineer.

Where subgrade manipulation is required, the foundation or subgrade will be thoroughly scarified, blended, and mixed to a depth of 12 inches. The work will be accomplished by means of a large diameter disc, motor grader, or other equipment approved by the Engineer. After the foundation or subgrade has been manipulated to the satisfaction of the Engineer and allowed to dry, the soil will be compacted to 95% of its maximum dry density as measured by the AASHTO T-180 method. The time required for drying the soil will not be a basis for an extension of time.

**q. Site Preparation.** The Contractor will perform Site Preparation for tree plantings in accordance with Section 815.03B of the Michigan Department of Transportation 2020 Standard Specifications for Construction where indicated on the plans, as specified herein, and as directed by the Engineer.

**r. Rock Excavation.** The Contractor will perform Rock Excavation for boulders 1/2 cubic yard in volume or less in accordance with Section 205.03.B of the Michigan Department of Transportation 2020 Standard Specifications for Construction where shown on the plans, as specified herein, and as directed by the Engineer.

**s. Lowering Structures.** Prior to cutting the subgrade, the Contractor will remove structure covers, lower the structures to a point between 8 inches and 12 inches below the proposed subgrade, and cover the structures with a steel plate. Structures shall not be raised prior to placing roadway embankment.

The steel plates for covering structure openings shall conform to the plan detail, be anchored in place, and properly placed to prevent their movement under all traffic, be thick enough to carry all traffic, and prevent the infiltration of debris into the structures.

The Contractor will lower valve boxes to a point between 8 inches and 12 inches below the proposed subgrade. Valve boxes shall not be raised prior to placing roadway embankment.

The void in the grade above the steel plates used for structure lowerings and valve box lowerings will be backfilled, and compacted to 95% of its maximum dry density, with an Engineer approved coarse aggregate.

The Contractor will coordinate the lowering of private utility structures with the corresponding utility company.

**t. Structure and Sewer Cleanliness.** All sewers and structures, including manholes, gate wells, valve boxes, inlet structures, and curbs will be protected from damage and contamination by debris and construction materials. Structures will be maintained clean of construction debris and properly covered at all times throughout construction. The Contractor will immediately clean any structures and/or sewers that become contaminated with construction debris. The Contractor will be responsible for all direct and indirect damages which are caused by sewers or structures which have been made unclean or have been damaged by the Contractor.

**u. Site Furnishings.** The Contractor will remove, salvage, and reinstall all site furnishings which conflict with proposed site work. Expected site furnishings include bicycle racks, wayfinding signage, trash cans, bollards, and decorative signage. The contractor will furnish new hardware for the reinstallation.

**v. Measurement and Payment.** The completed work, as described, will be paid for by planned quantities at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Machine Grading, Modified .....	Station

Payment for **DS\_Machine Grading, Modified** will include all costs for labor, materials, and equipment necessary to complete the work described herein except when separate pay items are provided in the proposal to compensate for the work.

Quantities paid for **DS\_Machine Grading, Modified** will be planned quantities by the station, measured along the proposed State Street construction centerline from right-of-way to right-of-way, including temporary grading permits, from POB to POE, which may be adjusted due to changes in the limits of work as issued in writing by the Engineer.

Granular material backfill required for utility trenches will be paid for as part of the corresponding utility pay items.

The Contractor is advised that due to the phasing of the project and the probable unsuitability of some or all of the excavated material for use as approved fill material, there may be imbalances between the amount of earth cut which is suitable for reuse as fill, and the amount of earth needed to construct the lines and grades shown on the plans, or as directed by the Engineer. The Contractor will make provisions for such imbalances and will include in the bid price for this work the cost of importing/furnishing, placement, and compaction of MDOT Class II granular material, as well as the cost of stockpiling and re-handling of imported and/or on-site Engineer approved materials as necessary to complete the work of constructing the embankment and subgrade to the cross sections shown on the plans.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**SANITARY STRUCTURE ADJUST, ADDITIONAL DEPTH**

WT:AJK

1 of 1

01/15/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to adjust additional depth for sanitary manholes where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Masonry units will meet the requirements of section 913 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Mortar Type R-2 will meet the requirements of section 1005 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Backfill will be class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will perform work in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and sections 403 and 825 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

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

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
DS_Sanitary Structure Adjust, Additional Depth .....	Foot

Payment for **DS\_Sanitary Structure Adjust, Additional Depth** will be measured by the foot for completed work and will include all costs for labor, materials, and equipment required to complete all the work described herein, removing, hauling, and disposing of existing materials and furnishing and installing brick, block, collars, mortar, and backfill.

Measurement for payment by the foot will be measured from the bottom of the frame to the lowest extent of the adjustment less 12 inches.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**INFILTRATION TRENCH**

WT:AJK

1 of 3

01/15/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct an infiltration trench where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Geotextile separator will be non-woven and meet the requirements of section 910.03.C of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Aggregate bedding and fill will be 6A limestone and meet the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Granular material will be class II and meet the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Pipe and fittings will be 12-inch perforated or solid dual wall corrugated high-density polyethylene (HDPE) and meet the requirements of AASHTO M-294.

Mortar will be type R-2 and meet the requirements of section 1005 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will perform the following sequence of construction to complete this work:

1. Excavate to the limits shown on the plans and haul away and dispose of spoils.
2. Notify the Engineer and allow the Engineer time to inspect the existing subgrade. The Engineer may direct subgrade undercutting.
3. Place geotextile separator to be smooth and taut, flush with the subgrade surfaces, and plan to completely enclose (wrap) the entirety of the trench with a lap joint accounting for pipe and backfill. Lap joints will be a minimum of 24 inches.

4. Notify the Engineer and allow the Engineer time to inspect the geotextile to ensure it is installed properly and free of perforations, frays, or other damage. Remove and reset geotextile and/or remove and replace geotextile at the direction of the Engineer at no additional cost to the Owner.
5. Place 12 inches of 6A aggregate compacted to the satisfaction of the engineer.
6. Install pipe and drainage structures. Install solid pipe and perforated pipe where indicated on the plans. Connect pipe to drainage structures with mortar joints. Join all pipe sections with couplers.
7. Notify the Engineer and allow the Engineer time to inspect the pipe to ensure it is properly installed, free of humps or bellies, and free of damage. Remove and reset and/or remove and replace pipe and/or fittings at the direction of the Engineer at no additional cost to the Owner.
8. Backfill with 6A aggregate in 12-inch layers compacted to the satisfaction of the engineer. Finish the top layer to be consistently smooth.
9. Completely enclose the finished aggregate surface with geotextile separator and ensure a minimum 24-inch lap joint.
10. Backfill with class II granular material in 12-inch layers compacted to a minimum of 95% of the maximum density to establish the proposed subgrade elevation.

**Compaction of 6A Aggregate**

The Contractor will compact 6A aggregate layers to a minimum of 95% of the maximum density. If the aggregate cannot be accurately tested with a nuclear gauge, then the Engineer will develop a procedural specification at the time of construction utilizing a required number of passes based on the Contractor’s compaction equipment and visual movement of the aggregate.

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

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Infiltration Trench.....	Foot
DS_Solid HDPE Pipe, 12 inch.....	Foot

Payment for **DS\_Infiltration Trench** will be measured by the linear foot for the completed work and will include all costs for labor, materials, and equipment required to complete all work described herein, including excavation, hauling, disposal, furnishing and installing geotextile, furnishing and installing pipe, and furnishing, installing, and

compacting granular material and aggregate.

Payment for **DS\_Solid HDPE Pipe, 12 inch** will be measured by the linear foot for the completed work and will include all costs for labor, materials, and equipment required to complete all work described herein, including excavation, hauling, disposal, and furnishing and installing pipe, and granular backfill.

Drainage structures and subgrade undercutting will be paid for separately.



CITY OF ANN ARBOR  
SPECIAL PROVISION  
FOR  
**STORM CONTROL STRUCTURE, 60 IN. DIA., (0-8' DEEP)**

WT:AJK

1 of 4

10/18/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct drainage structures in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and Section 403 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, as shown on the plans, and as specified herein.

**b. Submittal Requirements.** The Contractor will submit to the Engineer for review and approval shop drawings in accordance with Section 104.02 of the Michigan Department of Transportation 2020 Standard Specifications for Construction for all materials related to drainage structures.

For each submittal or resubmittal, the Contractor will allow at least 14 calendar days from the date of the submittal to receive the Engineer's acceptance or request for revisions. The Engineer's comments will be incorporated into the submitted plans, calculations and descriptions. The Engineer's acceptance is required before beginning the work. Resubmittals will be reviewed and returned to the General Contractor within 14 calendar days. Required submittal revisions will not be a basis of payment for additional compensation, extra work, or an extension of contract time.

**c. Materials.** The materials used for this work will conform to Section 403.02 of the Michigan the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

Storm sewer drainage structures will be constructed of precast reinforced concrete sections topped with an eccentric cone or, in situations in which it is not possible to install precast sections, concrete masonry units where approved by Engineer.

All sanitary sewer manholes will be constructed of precast reinforced concrete sections topped with an eccentric cone.

Precast reinforced concrete bases, bottom sections, manhole risers, grade adjustment rings, concentric cones, eccentric cones, and flat slab tops will conform to the requirements of ASTM C478. Joints on precast manholes used on all sanitary sewers will meet ASTM C443, rubber O-ring gasket.

Precast manhole tees and radius pipe sections will conform to requirements for reinforced concrete pipe, ASTM C76, class IV (up to 23 feet of cover) or class V (up to 33 feet of cover). Joints will conform to adjacent pipe. Tees and radius pipe will conform to details indicated on drawings offered by the Concrete Pipe Association of Michigan, Inc., or Engineer approved equal.

All structures will be designed to accommodate HS-20 Live Load requirements as determined by a Professional Engineer licensed by the State of Michigan, regardless of where they are to be installed.

The Contractor will field verify inverts prior to fabricating precast units. No additional payment will be made to the Contractor for precast units that cannot be used due to existing inverts being different than shown on the plans, changes in vertical or horizontal alignment due to conditions found in the field, or similar unforeseen circumstances.

Concrete masonry units will conform to the requirements for concrete masonry units for catch basins and manholes, ASTM C139.

Concrete brick will conform to the requirements for concrete building brick, ASTM C55, Grade N-1.

Plastic coated manhole steps will be injection molded of copolymer, polypropylene, encapsulating a 1/2 inch grade 60 steel reinforcing bar. Plastic-coated manhole steps will meet the performance test described in ASTM C-478, Paragraph II, and will have an impact resistance of 300 ft.-lbs. with only minor deflection and no cracking or breaking. The steps will resist pull out forces of 1,500 lbs.

Backfill will be MDOT class II granular material only and will be compacted to 95% of its maximum unit weight in maximum 10-inch lifts.

Control structures will be precast reinforced concrete sections of the type specified in the details shown on the plans.

Control structure regulator valves will be Contech models FA1012 and as specified in the details shown on the plans or engineer approved equals.

**d. Construction.** The Contractor will construct drainage structures in accordance with Section 403.03 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

Excavation will be carried to the depth and width required to permit the construction of the required base. The excavation width will be greater than the base. The bottom of the excavation will be trimmed to a uniform horizontal bed and be completely dewatered before any concrete is placed therein. Precast manhole bases and precast bottom sections are allowed.

Circular precast manhole sections will be constructed in accordance with the details as shown on the plans. Manhole stack units will be constructed on level poured-in-place bases, precast concrete bases, or precast concrete bottom sections.

Precast cone sections will be constructed in accordance with the details as shown on the plans. These units will be eccentric for all manholes, precast or block. All structures will be topped with a minimum of one, and a maximum of three, 2" tall, brick or precast adjustment courses.

Manholes, inlets, and structures will be constructed within 2-1/2 inches of plumb.

Frames and covers will be set in full mortar beds and pointed on the structure interior to a smooth, brushed finish. The covers will be set flush with sidewalk, roadway pavement, or ground surfaces. The Engineer will be notified prior to the final paving to allow inspection of the final casting adjustments for all utility structures. In gravel streets, covers will be set 6 to 8 inches below finished gravel surface.

Sewer pipes will extend into structures a minimum of 1/2 inch and a maximum of 3 inches.

The excavation will be kept in a dry condition.

All necessary adjustments for new structures will be included in the cost of the structure.

Manhole steps, installed where required, will be spaced 16 inches.

The Contractor will backfill drainage structures only after the exterior mortar coating has cured and approved by the Engineer.

The Contractor will ensure that the completed drainage structure is clean and free of any debris from construction activities.

The Contractor will furnish and install structure covers in accordance with the details on the plans the City of Ann Arbor 2025 Public Services Standard Specifications.

The Contractor will construct control structures in accordance with the details shown on the plans and install control structure regulator (vortex) valves in accordance with the manufacturer's specifications and instructions. Valves will be installed into the weir utilizing appropriate sized sleeves and o-ring gaskets.

The Contractor will install external seals to all manhole chimneys.

**e. Measurement and Payment.** The completed work, as described, will be paid at the contract unit price for the following contract items (pay items):

<u>Pay Item</u>	<u>Pay Unit</u>
DS_Storm Control Structure, 60 In. Dia., (0-8' deep).....	Each

Payment for **DS\_Storm Control Structure, 60 In. Dia., (0-8' deep)** will be paid by each complete unit installed and will include all costs for labor, materials, and equipment required for all necessary excavation, disposing of surplus excavated materials, frame and cover, backfilling, adjusting frame and cover to finished elevation, and constructing the complete structure, regardless of depth, including weir and orifices, regulator (vortex) valve, pipe connections, and structure cleaning.

Measurement and payment for internal and external chimney seals will be paid for separately.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**STORM PRETREATMENT STRUCTURE, \_**

WT:AJK:MHM

1 of 4

12/20/2024

**a. Description.** This work consists of providing all labor, material, and equipment required to furnish and install Contech CS-4 Cascade Separator inlet and manhole as detailed and shown on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, the manufacturer's specifications and written instructions, and as directed by the Engineer.

This item will govern the furnishing and installation of the Cascade Separator® by Contech Engineered Solutions LLC, complete and operable as shown and as specified herein, in accordance with the requirements of the plans and contract documents.

The Contractor will furnish all labor, equipment and materials necessary to install the storm water treatment device(s) (SWTD) and appurtenances specified in the Drawings and these specifications.

The manufacturer of the SWTD will be one that is regularly engaged in the engineering design and production of systems deployed for the treatment of storm water runoff for at least five years and which have a history of successful production, acceptable to the Engineer. In accordance with the Drawings, the SWTD(s) will be a Cascade Separator™ device manufactured by:

Contech Engineered Solutions LLC  
9100 Centre Pointe Drive  
West Chester, OH, 45069  
Tel: 1 800 338 1122

All components will be subject to inspection by the engineer at the place of manufacture and/or installation. All components are subject to being rejected or identified for repair if the quality of materials and manufacturing do not comply with the requirements of this specification. Components which have been identified as defective may be subject for repair where final acceptance of the component is contingent on the discretion of the Engineer.

The manufacturer will guarantee the SWTD components against all manufacturer originated defects in materials or workmanship for a period of twelve months from the date the components are delivered to the owner for installation. The manufacturer will upon its determination repair, correct or replace any manufacturer originated defects advised in writing to the manufacturer within the referenced warranty period. The use of SWTD components will be limited to the application for which it was specifically designed.

The SWTD manufacturer will submit to the Engineer of Record a "Manufacturer's Performance Certification" certifying that each SWTD is capable of achieving the specified removal efficiencies listed in these specifications. The certification will be

supported by independent third-party research.

No product substitutions will be accepted unless submitted 10 days prior to project bid date, or as directed by the Engineer of Record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

**b. Materials.** The Contractor will Furnish all materials required to complete the work in accordance with the Drainage Structures Special Provision, Structure Cover Special Provision, and the manufacturer's specifications and instructions.

**Housing unit** of stormwater treatment device will be constructed of pre-cast or cast-in-place concrete, no exceptions. Precast concrete components will conform to applicable sections of ASTM C 478, ASTM C 857 and ASTM C 858 and the following:

Concrete will achieve a minimum 28-day compressive strength of 4,000 pounds per square-inch (psi);

Unless otherwise noted, the precast concrete sections will be designed to withstand lateral earth and AASHTO H-20 traffic loads;

Cement will be Type III Portland Cement conforming to ASTM C 150;

Aggregates will conform to ASTM C 33;

Reinforcing steel will be deformed billet-steel bars, welded steel wire or deformed welded steel wire conforming to ASTM A 615, A 185, or A 497.

Joints will be sealed with preformed joint sealing compound conforming to ASTM C 990.

Shipping of components will not be initiated until a minimum compressive strength of 4,000 psi is attained or five calendar days after fabrication has expired, whichever occurs first.

**Internal Components and appurtenances** will conform to the following:

Hardware will be manufactured of Type 316 stainless steel conforming to ASTM A 320;

Support brackets will be manufactured of 5052 aluminum

Fiberglass components will conform to applicable sections of ASTM D-4097

Polypropylene copolymer components will conform to a tensile strength of 3,600 psi (ASTM D-638), and Izod impact value of "no break" (ASTM D-256).

Bedding material will be 21AA limestone which meets the requirements of section 902 of

the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Backfill will be class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Performance.**

The SWTD will be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or treat a flow rate designated by the jurisdiction in which the project is located. Both methods should be sized using the OK-110 particle distribution having particles ranging from 53 microns to 212 microns with a d50 of around 110 microns.

The SWTD will be designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The minimum storage capacity provided by the sump chamber will be in accordance with the volume listed in Table 1.

The boundaries of the sump chamber will be limited to that which do not degrade the SWTD's treatment efficiency as captured pollutants accumulate. In order to not restrict the Owner's ability to maintain the SWTD, the minimum dimension providing access from the ground surface to the sump chamber will be 16 inches in diameter.

The SWTD will be designed to capture and retain Total Petroleum Hydrocarbons generated by wet-weather flow and dry-weather gross spills and have a capacity listed in Table 1 of the required unit.

The SWTD will convey the flow from the peak storm event of the drainage network, in accordance with required hydraulic upstream conditions as defined by the Engineer. If a substitute SWTD is proposed, supporting documentation will be submitted that demonstrates equal or better upstream hydraulic conditions compared to that specified herein.

This documentation will be signed and sealed by a Professional Engineer registered in the State of the work. All costs associated with preparing and certifying this documentation will be borne solely by the Contractor.

**d. Construction.** The Contractor will construct the pretreatment structure in accordance with the Drainage Structure Special Provision, Structure Cover Special Provision, and the manufacturer's specifications and instructions.

The contractor will exercise care in the storage and handling of the SWTD components prior to and during installation. Any repair or replacement costs associated with events occurring after delivery is accepted and unloading has commenced will be borne by the contractor.

The SWTD will be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. The manufacturer will provide the contractor

installation instructions and offer on-site guidance during the important stages of the installation as identified by the manufacturer at no additional expense. A minimum of 72 hours notice will be provided to the manufacturer prior to their performance of the services included under this subsection.

The contractor will fill all voids associated with lifting provisions provided by the manufacturer. These voids will be filled with non-shrinking grout providing a finished surface consistent with adjacent surfaces. The contractor will trim all protruding lifting provisions flush with the adjacent concrete surface in a manner, which leaves no sharp points or edges.

The contractor will removal all loose material and pooling water from the SWTD prior to the transfer of operational responsibility to the Owner.

**TABLE 1: Storm Water Treatment Device Storage Capacities**

Cascade Model	Minimum Sump Storage Capacity (yd <sup>3</sup> )	Minimum Oil Storage Capacity (gal)
CS-3	0.41	59.0
CS-4	0.70	141.0
CS-5	1.09	269.3
CS-6	1.57	475.9
CS-8	2.79	1128.0
CS-10	4.36	2203.2
CS-12	6.28	3807.1

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

<u>Pay Item</u>	<u>Pay Unit</u>
DS_Storm Pretreatment Structure, CS-4 Inlet .....	Each
DS_Storm Pretreatment Structure, CS-4 Manhole .....	Each

Payment for **DS\_Storm Pretreatment Structure, \_** will be measured by each complete unit installed and will include all costs for labor, material, and equipment required to complete the work as described herein, including excavation, hauling away and disposal of spoils, furnishing and installing structure, frame and cover, bedding and backfill, adjusting frame and cover to final elevation, and making pipe connections.



CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PERFORATED CONCRETE BASE, 6 IN.**

WT:AJK

1 of 2

2/3/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct perforated concrete base for brick paver areas where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Subbase Material – granular material Class II which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications.

Weep Hole Fill – coarse aggregate 9A which meet the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications.

Concrete Base – concrete Grade 3500 as specified in section 1004 of the Michigan Department of Transportation 2020 Standard Specifications.

Geotextile – provide geotextile fabric which meets the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications for brick pavers, or as directed by the engineer.

Dowels – provide 18-inch-long ½-inch epoxy coated steel dowel which meet the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications.

Curing compound - provide curing compound which meets the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications.

**c. Construction.** The Contractor will construct concrete base in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein.

After existing base materials are removed through other operations, the Contractor will allow the Engineer time to inspect the existing subbase for reuse.

The Contractor will excavate and install subbase material as directed by the Engineer at a minimum of 6-inches-thick compacted to at least 95% of the maximum unit weight.

The Contractor will pour a 6-inch thick concrete base. The Contractor will perforate the concrete base with 2-inch diameter weep holes which extend to a depth to the surface of the subbase. Install perforations 4 foot on center. Fill Weep holes to the top with 9A.

Install geotextile on top of cured concrete base before restoring brick pavers.

**d. Measurement and Payment**

The completed work, as described, will be paid for at the contract unit prices for the following contract items (pay items):

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Unit</u></b>
DS_Perforated Concrete Base, 6 In.....	Square Foot

Payment **DS\_Perforated Concrete Base, 6 In.** will be measured by the square foot for units in place and will include all costs for labor, materials, and equipment required to complete this work, including furnishing, installing, and finishing concrete (including perforations), dowels, curing compound, coarse aggregate, granular material, and geotextiles.

Payment for existing base removals and excavation will be included in payment for other pay items.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**DIP AND CASING JACKED IN PLACE**

WT:AJK

1 of 6

01/31/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to install jacked-in-place steel casing pipe and water main where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, or as directed by the Engineer.

Prior to beginning any tunneling Work, the Contractor will submit to Engineer copies of permits and inspection records obtained from state and local authorities having jurisdiction as described herein.

**b. Submittal Requirements.**

Prior to beginning any Work, the Contractor will prepare and submit to the Engineer for review; detailed plans and Shop Drawings showing the limits and schedules for the proposed tunneling Work, methods of construction, materials and equipment proposed for use in the Work, location and types of excavations, shafts, and structures to be constructed and the safety methods to be implemented for protection of personnel, excavations, structures, public and private property.

Prepare and submit details of proposed pipe, pipe joints, liners, and calculations of jacking pressure and earth loads.

Detailed plans will be prepared by and sealed by a professional engineer registered in the state of Michigan.

Casing pipe/primary liners will be designed for the earth load or jacking pressure, whichever is greater, and a factor of safety of at least 2.5 or greater if appropriate.

Shafts will be designed to take into account the loads and geotechnical considerations (i.e., uplift, bottom stability, hydrostatic pressure, bottom blowout, required safety factors, etc.).

If existing soil boring data is not available within 200 feet of any proposed shaft, Contractor will perform soil borings and provide soils data for the proposed mining shaft.

Soil boring data will be submitted to the Engineer with the proposed shaft design.

The Contractor will be responsible for the complete design of all means, methods, and techniques used in tunneling or boring and jacking Work, including the implementation of all materials, tools and equipment proposed for use in the Work.

Except where shown on the Plans, the Owner has not designated the shaft locations.

The Contractor will select his shaft site (or sites) to conform to his construction program and make all arrangements for occupancy. Should two (2) or more tunneling sections be constructed under one (1) Contract, Owner will review and approve location of the shaft (or shafts) considering the maximum possible lengths of tunnels can be built out of each shaft.

Submit test reports for casings, liners, and compressive strength of precast segmental tunnel liner when requested by Engineer.

### **c. Materials.**

Casing pipe will be non-spiral welded steel and have a minimum yield strength of 35,000 PSI with an inner diameter 4 inches greater than the outside diameter of the water main pipe joints and a minimum wall thickness which meets the requirements of table B in section XXVI of article 1 of the City of Ann Arbor 2025 Public Services Standard Specifications.

Casing pipe joints will be made leak proof using full penetration, continuous welds. Welds will be ground smooth outside and inside (except inside 22 inch diameter and less) to prevent conflict with the soil or carrier pipe placement.

Pipe will meet the requirements of ASTM A53 (Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless), Type E or S, Grade B or ASTM A139 (Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)), Grade B.

Provide cathodic protection or coating.

Spacers and casings will conform to Typical Pipe Casing Detail, SD-W-6.

Backfill will be class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

### **d. Construction.**

Prior to beginning any tunneling or jacking and boring operations, verify in the field the location of existing structures and active utilities scheduled to remain and requiring protection from damage because of the Work. Notify the Engineer where such conditions directly affect the progress of the Work.

Before excavation is started on tunnel shafts, the location and design as indicated on the Contractor's detailed plans and Shop Drawings will have been reviewed and accepted by the Engineer as described herein.

Boring and jacking consists of the hydraulic advancement of a casing or casing/carrier pipe with the simultaneous advancement of a tunnel boring machine. The general term tunneling includes boring and jacking.

Size of shaft excavations and the method of support will be such that 2 plumb lines hanging from the surface on the centerline of the tunnel will have not less than 8 feet between them.

Tunneling Work will conform to the requirements of all federal, state, and local regulatory agencies having jurisdiction.

The Contractor will obtain approval of local officials for each of the shaft locations. Where applicable, the Contractor will obtain and pay for all permits and inspections for tunneling operations as required. No additional claim for compensation will be allowed because of Contractor's failure to obtain approvals or pay for such approvals, permits and inspections.

Where soil conditions, obstructions or existing structures are encountered which prevent the completion of tunneling operations started or in progress, Contractor will develop and submit to the Engineer for review, alternate methods of performing the Work as described in this Section. Perform no additional tunneling Work until completion of review and acceptance by the Engineer of the alternate method proposed.

Provide and maintain sheeting, shoring, and bracing required in tunnels, shafts, pits, trenches and open cut excavations to insure protection and safety of personnel and to protect adjacent structures, property and Work in place. Where indicated on the Plans and where necessary in the Work, install and leave in place, primary tunnel linings. No additional compensation will be paid to the Contractor for sheeting, shoring, bracing left in place or for providing primary lining of tunnel construction, and will be considered incidental to the Contract.

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. Design of sheeting, shoring, and bracing will be detailed and prepared by and sealed by a professional engineer registered in the state of Michigan.

The design will be appropriate for the soil conditions, will 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 will effectively restrain movement of the adjacent soil.

Prior to installing the sheeting, shoring or bracing, the Contractor will submit plans for this Work to the Engineer for informational purposes only.

Sheeting, shoring, and bracing will conform to the current federal or state regulations for safety.

The furnishing, placing, bracing, maintaining, and removing of sheeting and shoring materials will be at the Contractor's expense unless otherwise indicated. Contractor will not remove the sheeting, shoring and bracing unless the pipe has been properly bedded and backfilled to sufficiently support the external loads.

Sheeting, shoring, and bracing material will not come in contact with the pipe, but will be installed so that no concentrated loads or horizontal thrusts are transmitted to the pipe.

The means and methods of tunnel and/or jacking and boring excavation and support, in whatever conditions encountered or created, will be determined by the Contractor, subject to approval by the Engineer.

Perform excavations required for construction of pits, shafts, entrance trenches, manholes, tunnels and other structures.

Excavations will include materials encountered in the Work, such as topsoil, clay, sand, gravel, cinders, rocks, boulders, ledge rock, fill, old timber, buried trees and roots, abandoned utilities, abandoned foundations and structures, abandoned utilities, metal objects, buried debris, or any combination of these, in whatever condition found.

Excavate as required to perform tunneling and/or jacking and 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 tunnel invert or use other approved methods at no additional cost to the Owner.

Relocations or removal and replacement of utilities, including gas mains, water mains, services, sewers, irrigation systems, signs, pavement, sidewalk and other miscellaneous items required to construct shafts or the jacked pipe will be incidental to the project unless otherwise specified.

Where excavation or Work is conducted under existing utilities which may constitute a hazard to either the utility, excavation or tunneling operations, perform excavation or tunneling operations to prevent damage or rupture to conduits or piping.

When Work is being conducted near a utility under conditions which may result in rupture of such utility, notify the utility of the conditions and do not proceed with the Work until an authorized representative of the utility has examined the conditions. Proceed only after the utility has been adequately protected.

Where tunnel Work constitutes a potential hazard because of adjacent utilities, the tunnel drives will be shortened to a safe length, the headings tight breasted and tunnel grouting done between drives.

Size of special structure excavations will be such that no part of the sheeting or bracing systems will protrude within the neat lines of the structure.

Shaft construction will include complete hoisting equipment, adequate stairways surrounding the hoistway to the bottom of the shaft, drainage sumps at the bottom of the shaft, sheeted, and floored with all necessary pumping equipment to maintain shaft bottoms in satisfactory working condition.

Excavations for shafts below the spring line of any existing sewer will be completely filled between the outside of the sewer barrel and the original ground with brick and masonry mortar or concrete. Materials will be the same grade as those used in the sewer barrel.

Small openings in streets will be covered with strong, steel plates anchored in place when they are not required to be open for construction purposes.

Completely fill voids between outside pipe wall and soil.

Install pipe in pre-tunneled excavations as shown on the Plans. Use care to not disturb or cause caving of the excavation.

Install pipe in jacked excavation as indicated on the Plans. Closely follow mining operations.

Once the Contractor begins the jack and bore operation, Contractor will work as necessary to prevent "freeze-up" of the pipe, until the entire pipeline is complete. If necessary, use bentonite lubricant applied under pressure through fittings in the lead pipe to reduce pipe soil friction.

Use no less than 2 jacks of sufficient power to carefully and accurately install the pipe by pushing or jacking pressure. Use a timber bearing pushing frame, built to fit and match the end of the pipe being jacked, to evenly distribute the jacking force over the

end of the pipe. Use reaction blocks or backstop supports, installed in the jacking pit, shaft or trench, of sufficient strength to handle the thrust of the jacks.

The pipe will be protected against damage due to jacking pressure by the use of wood spacer around the full circumference of the joint.

Any damage to the coating on steel ring joints will be repaired before the pipe is used.

Contractor will measure the bell and spigot of each segment of casing/carrier pipe at the pipe manufacturer’s plant to ascertain that the tolerances are suitable for jacking without inducing undue jacking pressures. Measurement will be made with a suitable jig or template constructed by the Contractor.

Install carrier pipe within casing pipe as indicated on Plans. Use white oak skids wired to carrier pipe.

Use a minimum of 2 skids per pipe length such that carrier pipe bells or joints do not bear against casing pipe. Skids will be notched to prevent wire from riding against the casing pipe.

Supports for pipes, conduits, etc., crossing the excavated area shall conform to the requirements of the owners of such facilities and if necessary, shall be left in place.

Remove sheeting, shoring, and bracing when work is completed and backfill boring pits and shafts with class II granular material compacted to 95% maximum density in 12-inch layers maximum.

**e. Measurement and Payment.** The completed work, as described, will be paid for at contract unit prices for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
--	------------------------

DS_12 In., PC 350, DIP, Jacked in Place .....	Foot
---	------

Payment for **DS\_12 In., PC 350, DIP, Jacked in Place** will be measured by the foot for complete units installed and will include all costs for labor, materials, and equipment required to complete the work as described herein, including design work, excavation, hauling away, and disposal of spoils, furnishing, installing, maintaining and removing sheeting, shoring and bracing, permits and inspection fees, furnishing and installing steel casing pipe, DIP water main and joints, spacers, and compacted backfill.



CITY OF ANN ARBOR

DETAILED SPECIFICATION  
FOR  
**4 IN. \_ ° DIP BEND**

WT:AJK

1 of 1

12/20/24

**a. Description.** This work will consist of providing all labor, material, and equipment required to furnish and install 4-inch ductile iron pipe bends where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.** Pipe fittings will meet the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications, including the following:

ASTM/AWWA C110/A21.10 or C153/A21.53 with:

1. Cement mortar lining with seal coat per ANSI/AWWA C104/A21.4
2. Outside coating per ANSI/AWWA C151/A21.51
3. Polyethylene wrap meeting the requirements of ANSI/AWWA C105/A21.5
4. Restrained push-on rubber gasket joints per ANSI/AWWA C111/A21.11 (unless otherwise required)

**c. Construction.** The Contractor will install pipe fittings in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications.

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

<u>Pay Item</u>	<u>Pay Unit</u>
DS_4 In. 45° DIP Bend.....	Each
DS_4 In. 90° DIP Bend.....	Each

Payment for **DS\_4 In. 45° DIP Bend** and **DS\_4 In. 90° DIP Bend** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work, including furnishing and installing fittings, thrust blocks, joints, and polywrap.

Payment for excavation and backfill will be included in payment for other water main pay items.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**GATE VALVE IN BOX, 4 IN.**

WT:AJK

1 of 1

12/20/24

**a. Description.** This work will consist of providing all labor, material, and equipment require to furnish and install 4-inch gate valve in box where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Gate valves will be resilient wedge type, operate right with a 2-inch square opening nut, push-on by push-on only with restrained gaskets and meet the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications, including AWWA C509 or C515.

Approved gate valves are as follow:

1. American Flow Control Series 2500 Single Resilient Wedge with push-on ends
2. Clow Model 2638 Resilient Wedge Valve, F-6112
3. EJIW FlowMaster Resilient Wedge Valve, Tyton x Tyton
4. Mueller Series A-2361-61 Resilient Wedge Valve SL x SL for Field Lok gaskets
5. US Pipe USP1-61 Resilient Wedge Valve SLxSL for Field Lok gaskets

Valves boxes will be size D, screw type 3-piece, 5-1/4-shaft and a #6 base and meet the requirements of the City of Ann Arbor 2025 Public Services Standard Specifications.

Approved valves boxes are as follow:

1. EJ 8560 Series
2. Tyler Union 6860, 32U (Heavy Duty)

**c. Construction.** The Contractor will install pipe fittings in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications.

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

<u>Pay Item</u>	<u>Pay Unit</u>
DS_Gate Valve in Box, 4 In. ....	Each

Payment for **DS\_Gate Valve in Box, 4 In.** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work, including furnishing and installing gate valve and box with cover and adjusting the box and cover to final grade.

Payment for excavation and backfill will be included in payment for other water main pay items.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**ABANDON IRRIGATION PIT**

WT:AJK

1 of 2

01/15/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to abandon irrigation pits where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, University of Michigan Master Specifications, and Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Backfill material will be Class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Plugs will be 4-inch gasketed mechanical joint fittings which meet the requirements of ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.

**c. Construction.**

The Contractor will perform the following sequence of construction to complete this work:

1. Coordinate with City of Ann Arbor and University of Michigan personnel to ensure that the connected water main is shut down.
2. Disconnect and remove all equipment and appurtenances from within the pit and salvage any materials at the direction of the Engineer. Deliver salvaged materials to the University of Michigan. Haul away and dispose of all other materials not salvaged.
3. Install plugs on all water main protrusions within the pit. Cut water main where necessary to provide a clean interface for the gasket. Remove, haul away, and dispose of any water main materials generated through cutting.
4. Remove, haul away, and dispose of pit overhead, walls, and base with care to protect adjacent utilities including water main protrusions and plugs.
5. Notify the Engineer in advance of backfilling and allow the Engineer time to inspect the existing subgrade for unsuitable conditions. The Engineer may direct subgrade undercutting.

- 6. Backfill with granular material in 12-inch layers compacted to at least 95% maximum unit weight to within 4 inches of the finished grade.
- 7. Protect the area utilizing temporary fence or other traffic control devices and maintain daily to protect pedestrians until turf restoration operations are completed.

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

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Abandon Irrigation Pit.....	Lump Sum

Payment for **DS\_Abandon Irrigation Pit** will be measured by the lump sum for the completed work and will include all costs for labor, materials, and equipment costs required to complete all the work described herein, including coordination with other personnel, removing equipment, pipe, and appurtenances, breakdown and removal of structure, protection of adjacent utilities, excavation, hauling, disposal, salvage and delivery of materials, furnishing and install plugs, furnishing, placing, and compacting backfill, and protection measures.

Subgrade undercutting will be paid for separately.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**VALVE PIT**

WT:AJK:MHM

1 of 2

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install a precast valve pit where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, University of Michigan Master Specifications, and Michigan Department of Transportation 2020 Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Manholes will be precast or cast in place reinforced concrete. Primary manholes shall have inside dimensions of 10' wide by 10' long by 7' high.

Manholes will include EJ Group gray 39-inch diameter iron frame with cover, wall collars, adjustable saddle supports, and a sealed indentation for use of a portable pump, offset to one side to clear pulling iron.

Bedding and backfill will be class II granular material that meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will excavate to the required depth to allow 12 inches of bedding and haul away and dispose of all spoils. The Contractor will overcut to accommodate equipment required for compaction.

Class II bedding and backfill will be placed in maximum 12-inch layers compacted to 98% of the maximum density. Backfill to within 4 inches of the finished grade.

Protect the work utilizing temporary fence and/or other traffic control devices with daily maintenance until turf restoration operations are completed.

Adjust the structure to final grade.

Clean the structure after all work is completed.

**Field Quality Control**

The University shall assign an agent to coordinate Quality Control associated with activities.

The Contractor shall assist with establishing the order, timing, and duration of the activities requiring Quality Control for inclusion in the Project Schedule.

Provide the Quality Control Agent with reports, lists, forms, plans and drawings.

During the Shop Drawing Submittal Process, submit one set of the Shop Drawings to the Quality Control Agent for Review.

Return to the Quality Control Agent one set of the A/E reviewed and stamped Shop Drawings.

Correct the incomplete and non-conforming items that are identified by the Quality Control Agent.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_10' x 10' x 7' Valve Pit .....	Each

Payment for **DS\_10' x 10' x 7' Valve Pit** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work as described herein, including final grade adjustments of the structure and cleaning the structure, excavation, hauling, disposal, furnishing, installing, and compacting granular material, furnishing and installing the structure and appurtenances detailed on the plans, frame and cover, wall collars, adjustable saddle supports, ladder, and protection measures.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**INTERNAL PLUMBING**

WT:AJK

1 of 1

01/30/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to complete the work described in the Angell Hall Replace Domestic Water Service Specifications Manual in accordance with the specifications defined therein, the City of Ann Arbor 2025 Public Services Standard Specifications, the University of Michigan Master Specifications, or as directed by the Engineer.

**b. Materials.**

All materials required to complete this work will meet the requirements of the Angell Hall Replace Domestic Water Service Specifications Manual.

**c. Construction.**

The Contractor will perform all work in accordance with the Angell Hall Replace Domestic Water Service Specifications Manual.

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

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Internal Plumbing .....	Lump Sum

Payment for **DS\_Internal Plumbing** will be measured by the lump sum for all work completed and will include all costs for labor, materials, and equipment required to complete all the work described in the Angell Hall Replace Domestic Water Service Specifications Manual.

Payment will be issued in whole for completed work and will not be issued in part for partially completed work. Work will not be considered complete until approved by inspectors, the University of Michigan, the City of Ann Arbor, and the Engineer.



## Specifications Manual

Angell Hall Replace Domestic Water Service



PBA Project No. 2024.0314.00  
January 31, 2025

5145 Livernois, Suite 100  
Troy, MI 48098-3276  
Tel: 248-879-5666  
Fax: 248-879-0007  
[www.PeterBassoAssociates.com](http://www.PeterBassoAssociates.com)



Division	Section Title
----------	---------------

**SPECIFICATIONS GROUP**

***General Requirements Subgroup***

**DIVISION 01 - GENERAL REQUIREMENTS**

- 01 1000 SUMMARY
- 01 1400 WORK RESTRICTIONS
- 01 3100 PROJECT MANAGEMENT AND COORDINATION
- 01 3200 CONSTRUCTION PROGRESS DOCUMENTATION
- 01 3300 SUBMITTAL PROCEDURES
- 01 3500 SPECIAL PTOCEDURES FOR FIRE MARSHAL REVIEW AND INSPECTION
- 01 4200 REFRENCES
- 01 5000 TEMPORARY FACILITIES AND CONTROLS
- 01 5719 CONSTRUCTION AIR QUALITY
- 01 6000 PRODUCT REQUIREMENTS
- 01 7300 EXECUTION
- 01 7329 CUTTING AND PATCHING
- 01 7420 CONSTRUCTION AND DEMOLITION WASTE TRACKING
- 01 7700 CLOSEOUT PROCEDURES

***Facility Construction Subgroup***

**DIVISION 04 - MASONRY**

- 04 2010 UNIT MASONRY ASSEMBLIES (LIMITED APPLICATIONS)

**DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

- 07 8413 PENETRATION FIRESTOPPING

**DIVISION 09 - FINISHES**

- 09 9100 PAINTING

***Facility Services Subgroup***

**DIVISION 20 – MECHANICAL GENERAL REQUIREMENTS**

- 20 0500 MECHANICAL GENERAL REQUIREMENTS
- 20 0510 BASIC MECHANICAL MATERIALS AND METHODS
- 20 0529 HANGERS AND SUPPORTS

**DIVISION 22 - PLUMBING**

- 22 0500 COMMON WORK RESULTS FOR MECHANICAL
- 22 0519 THERMOMETERS, PRESSURE GAUGES, AND ACCESSORIES
- 22 0523 VALVES
- 22 0553 MECHANICAL IDENTIFICATION
- 22 0719 MECHANICAL SYSTEMS INSULATION
- 22 1113 PIPING MATERIALS AND METHODS
- 22 1119 DOMESTIC WATER PIPING SPECIALTIES

END OF TABLE OF CONTENTS

SECTION 01 1000 – SUMMARY ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED DOCUMENTS ..... 1

    1.2 PROJECT DESCRIPTION ..... 1

    1.3 WORK SEQUENCE ..... 1

    1.4 WORK UNDER OTHER CONTRACTS ..... 1

    1.5 WORK BY OWNER ..... 1

PART 2 - PRODUCTS (NOT APPLICABLE) ..... 2

PART 3 - EXECUTION (NOT APPLICABLE) ..... 2

SECTION 01 1400 - WORK RESTRICTIONS ..... 1

PART 1 - GENERAL ..... 1

    1.1 SUMMARY ..... 1

    1.2 DEFINITIONS: ..... 1

    1.3 USE OF PREMISES ..... 1

    1.4 SECURITY ..... 2

    1.5 PARKING ON U-M PROPERTY ..... 2

    1.6 SCHEDULING OF WORK ..... 2

    1.7 DRONE USE ..... 3

    1.8 NOISE AND VIBRATION CONTROL ..... 3

PART 2 - PRODUCTS (NOT APPLICABLE) ..... 3

PART 3 - EXECUTION (NOT APPLICABLE) ..... 3

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED SECTIONS ..... 1

    1.2 COORDINATION ..... 1

PART 2 - PRODUCTS (NOT APPLICABLE) ..... 1

PART 3 - EXECUTION (NOT APPLICABLE) ..... 1

SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION ..... 1

PART 1 - GENERAL ..... 1

    1.1 SUMMARY ..... 1

    1.2 SUBMITTALS ..... 1

    1.3 COORDINATION ..... 1

PART 2 - PRODUCTS ..... 1

    2.1 SUBMITTALS SCHEDULE ..... 1

    2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL ..... 2

    2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART) ..... 2

PART 3 - EXECUTION ..... 3

    3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE ..... 3

SECTION 01 3300 - SUBMITTAL PROCEDURES ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED DOCUMENTS ..... 1

    1.2 SUMMARY ..... 1

    1.3 DEFINITIONS ..... 1

    1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS ..... 1

PART 2 - PRODUCTS ..... 3

    2.1 SUBMITTAL PROCEDURES ..... 3

PART 3 - EXECUTION ..... 4

    3.1 CONTRACTOR'S REVIEW ..... 4

    3.2 ENGINEER'S ACTION ..... 5

SECTION 01 3500 - SPECIAL PROCEDURES FOR FIRE MARSHAL REVIEW AND INSPECTION ..... 1

PART 1 - GENERAL ..... 1

    1.1 SUMMARY ..... 1

    1.2 RELATED DOCUMENTS ..... 1

    1.3 SUBMITTALS ..... 1

    1.4 COORDINATION ..... 1

PART 2 - PRODUCTS ..... 1

    2.1 FINAL INSPECTION MANUAL ..... 1

PART 3 - EXECUTION (NOT APPLICABLE) ..... 2

SECTION 01 4200 - REFERENCES ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED DOCUMENTS ..... 1

    1.2 DEFINITIONS ..... 1

    1.3 ABBREVIATIONS AND ACRONYMS ..... 1

PART 2 - PRODUCTS (NOT APPLICABLE) ..... 2

PART 3 - EXECUTION (NOT APPLICABLE) ..... 2

SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS ..... 1

PART 1 - GENERAL ..... 1

    1.1 SUMMARY ..... 1

    1.2 QUALITY ASSURANCE ..... 1

PART 2 - PRODUCTS ..... 1

    2.1 ELEVATOR USE AND PROTECTION ..... 1

PART 3 - EXECUTION ..... 2

    3.1 PERFORMANCE ..... 2

    3.2 PROTECTIONS ..... 2

SECTION 01 5719 – CONSTRUCTION AIR QUALITY ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED DOCUMENTS ..... 1

    1.2 SUMMARY ..... 1

    1.3 QUALITY ASSURANCE ..... 1

PART 2 - PRODUCTS ..... 1

    2.1 AIR FILTRATION ..... 1

PART 3 - EXECUTION ..... 1

    3.1 SOURCE/POLLUTION CONTROL ..... 1

    3.2 PATHWAY INTERRUPTION ..... 1

    3.3 HOUSEKEEPING ..... 2

    3.4 SCHEDULING ..... 2

    3.5 DIESEL EXHAUST MITIGATION ..... 2

SECTION 01 6000 - PRODUCT REQUIREMENTS ..... 1

PART 1 - GENERAL ..... 1

    1.1 SUMMARY ..... 1

    1.2 QUALITY ASSURANCE ..... 1

    1.3 PRODUCT DELIVERY STORAGE AND HANDLING ..... 1

PART 2 - PRODUCTS ..... 1

    2.1 PRODUCT SELECTION ..... 1

PART 3 - EXECUTION (NOT APPLICABLE) ..... 2

SECTION 017300 - EXECUTION ..... 1

PART 1 - GENERAL ..... 1

    1.1 RELATED DOCUMENTS ..... 1

1.2	SUMMARY.....	1
1.3	QUALITY ASSURANCE .....	1
	PART 2 - PRODUCTS (NOT APPLICABLE) .....	1
	PART 3 - EXECUTION .....	1
3.1	EXAMINATION .....	1
3.2	PREPARATION .....	2
3.3	INSTALLATION .....	2
3.4	PROTECTION OF INSTALLED CONSTRUCTION .....	3
	SECTION 01 7329 - CUTTING AND PATCHING .....	1
	PART 1 - GENERAL .....	1
1.1	SUMMARY.....	1
1.2	DEFINITIONS .....	1
1.3	QUALITY ASSURANCE .....	1
	PART 2 - PRODUCTS .....	2
2.1	MATERIALS.....	2
	PART 3 - EXECUTION .....	2
3.1	PERFORMANCE .....	2
	SECTION 01 7420 - CONSTRUCTION AND DEMOLITION WASTE TRACKING .....	1
	PART 1 - GENERAL .....	1
1.1	RELATED DOCUMENTS .....	1
1.2	SUMMARY.....	1
1.3	REFERENCES .....	1
1.4	SUBMITTALS .....	1
	PART 2 - PRODUCTS (NOT APPLICABLE) .....	1
	PART 3 - EXECUTION .....	1
3.1	IMPLEMENTATION .....	1
	SECTION 01 7700 – CLOSEOUT PROCEDURES .....	1
	PART 1 - GENERAL .....	1
1.1	SUMMARY.....	1
1.2	SUBSTANTIAL COMPLETION.....	1
1.3	DEFINITIONS .....	1
1.4	FINAL CLEANING .....	1
	PART 2 - PRODUCTS (NOT APPLICABLE) .....	2
	PART 3 - EXECUTION (NOT APPLICABLE).....	2

## SECTION 01 1000 – SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The Drawings and the general provisions of the Contract, including the current edition of the University of Michigan Standard General Conditions apply to each section of this Project's specifications.

#### 1.2 PROJECT DESCRIPTION

- A. The Project: Remove and replace domestic water service and meter assembly in the Angell Hall Building on the University of Michigan's Central Campus in Ann Arbor, Michigan. Major aspects of the work include, but are not limited to:
  - 1. New plumbing work, including potable cold water pipe and indirect waste.
- B. The building in which the project is located is under the jurisdiction of the State of Michigan Bureau of Fire Services (BFS).

#### 1.3 WORK SEQUENCE

- A. Work Sequence (Phasing): Conduct the Project in phases to provide the least possible interference to activities of the Owner's personnel.
  - 1. Install new potable cold water service and piping parallel to existing piping.
  - 2. Perform pressure test on new piping.
  - 3. Have new system inspected.
  - 4. Tie into existing systems.
  - 5. Demolish existing mains. Insulate and install pipe identification on new piping.
- B. Notify Owner's Representative 2 calendar days prior to scheduled date of each phase of the Project.

#### 1.4 WORK UNDER OTHER CONTRACTS

- A. During the Contract Time, additional construction work under separate contract may be taking place. Coordinate construction operations and cooperate with Owner and other contractors to minimize possible conflicts. Contact The University of Michigan Construction Management Department (734) 764-2457 for further information.

#### 1.5 WORK BY OWNER

- A. Shut-down and restoration of utilities, including plumbing, fire protection (and Owner's implementation of Red Tag Permit system), HVAC, electrical, fire alarm, or other services that require temporary discontinuation and later restoration shall be conducted by Owner's Maintenance personnel. Contractors are not authorized to impair any services. Contact the Maintenance Department through the Owner's Representative.
- B. During the Contract Time, additional construction work performed by Owner will be taking place. Major aspects of work under other contracts are indicated on drawings. Coordinate construction operations and cooperate with Owner to minimize possible conflicts.

CITY OF ANN ARBOR  
Angell Hall  
Replace Domestic Water Service

PETER BASSO ASSOCIATES, INC.  
PBA Project No. 2024.0314.00  
January 31, 2025

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 1000

## SECTION 01 1400 - WORK RESTRICTIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Types of special construction requirements include the following:
  - 1. Use of premises.
  - 2. Security.
  - 3. Parking on U-M property.
  - 4. Scheduling of work.
  - 5. Drone use.
  - 6. Noise and vibration control.
- B. This Section contains requirements that apply to Divisions 01, 04, 07, 09 and Divisions 20 and 22 of the specifications.
- C. Related Work of other Sections:
  - 1. Division 01 Section "Summary" for general restrictions on site use.

#### 1.2 DEFINITIONS:

- A. Work Hours: 7:00 AM through 5:00 PM, Monday through Friday.
- B. Business Hours: 8:30 AM through 5:00 PM, Monday through Friday.
- C. Off-Hours: 10:00 PM through 7:00 AM Monday through Friday. Select hours on Saturday & Sunday.
- D. Early morning Hours: 7:00 AM through 8:30 AM, Monday through Friday.

#### 1.3 USE OF PREMISES

- A. Coordinate use of premises under direction of the Owner's Representative.
  - 1. The building in which Project is located will be continuously occupied during construction. Coordinate construction efforts with Owner to minimize interference with Owner's operations.
  - 2. Provide and maintain access of Owner's personnel to toilets, telephone closets and janitor closets on Owner-occupied floors throughout Contract Time.
  - 3. Maintain emergency egress routes for Owner's personnel as directed by Owner's Representative.
  - 4. Existing toilets designated by Owner may be used by Contractor's personnel for personal use only during construction. Do not use toilet facilities to conduct construction operations without written permission of Owner's Representative.
    - a. If use of toilets for construction activities is permitted by Owner's Representative, clean toilet facilities daily.
  - 5. Contractor's staging area is strictly limited to areas indicated on the drawings. Where no staging area is indicated, Contractor's use of site is limited to areas within the Contract bounds, or as reasonably required to complete the Work. Strictly comply with Owner's Representative's directions establishing staging and operation areas, through-building routes, and locations for material delivery and disposal.

6. Smoking is prohibited in all University of Michigan buildings and grounds, including, Project site, mechanical rooms, utility spaces, and roof tops.

#### 1.4 SECURITY

- A. Purchase University-provided photographic identity badges for each person engaged in on-site work and ensure that workers wear badges at all times on University property. Purchase cost per badge is \$4.00. Coordinate through Owner's Representative.

#### 1.5 PARKING ON U-M PROPERTY

- A. Arrange parking for Contractor's personnel in accordance with Article 1.6 of the University of Michigan Standard General Conditions.
- B. The Owner has designated the use of U-M parking lot SC36, located on the northeast corner of Keech & Main St for the Contractor's use on this project. This lot requires each vehicle to display a U-M orange parking permit and is the only U-M parking that will be made available to the Contractor for this project.
  1. The cost and arrangement for purchase of permits for U-M parking shall be the Contractor's responsibility. The Owner will not repay the Contractor for parking for this project. Information regarding current rates and annual price adjustments (traditionally on July 1 each year) for parking permits may be obtained from the U-M Parking Customer Services office located at 523 South Division Street, Ann Arbor, Michigan 48104. Phone 734-764-8291.
  2. The Owner will allow use of standard U-M bus services for contractor personnel between the above designated lot and the jobsite at no cost to the Contractor. The U-M bus follows an existing schedule and route that may not go directly to, nor stop directly in front of the jobsite. The U-M bus frequency and bus routes can be obtained from the U-M Parking Customer Services office or the LPT website (<http://ltp.umich.edu/transit/routes.php>).
- C. The Contractor shall not transport materials or tools on UM or AAATA busses.

#### 1.6 SCHEDULING OF WORK

- A. Schedule work with Owner to fit Owner's operations, to facilitate completion of this work, to coordinate with and expedite new construction work on project, and as follows:
  1. Schedule with Owner work that interferes with facility operation, including shut-off of mechanical and electrical services and encumbrance of Owner's ingress and egress routes and normal operation. Provide the following notice of planned interruption of services:
    - a. Provide not less than 10 working days notice before interruption, with final confirmation not less than 72 hours before interruption.
  2. When permitted by Owner's Representative to deliver items of equipment to Owner's loading dock facilities, schedule such deliveries in advance with Owner. Provide minimum 1 business day notice prior to planned delivery time of equipment.
    - a. Dock hours: 7:00am - 5:00pm
    - b. Permitted delivery hours: 7:00am - 5:00pm
  3. Schedule work during Work Hours unless otherwise approved by Owner.
  4. Schedule and coordinate construction operations to achieve Substantial Completion, ready for Owner's occupancy, by the date listed in the form of proposal.
- B. Start of Operations: Do not commence work before insurance and bonds have been submitted to Owner.



1.7 DRONE USE

- A. The use of unmanned aircraft systems (drones) is regulated by the Regents Ordinance-Article XV. Outdoor use of drones on U-M property is prohibited.

1.8 NOISE AND VIBRATION CONTROL

- A. Noise-Vibration Restrictions: Noise- and vibration-sensitive research will be conducted for the duration of the Project.
  - 1. Demolition operations in public corridors are restricted to Off-Hours.
  - 2. Arrange a system of notification with Owner's Representative that will provide building occupants not less than 24 hours warning of performance of construction operations that will cause noise and vibration.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 1400

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Additional project coordination, phasing, and scheduling requirements are included in Division 01 Sections "Summary" and "Work Restrictions"

1.2 COORDINATION

- A. Project Meetings: Attend regular meetings with Owner and subcontractors as directed by Owner. Location of meetings will be determined by Owner.
- B. Coordinate inspections and testing of concealed Work to occur prior to concealing that Work.
- C. Coordinate sequencing of Work to occur during conditions of temperature, humidity, exposure, forecast weather, and status of Project completion, which will ensure best possible results for each unit of Work. Isolate each unit of Work from non-compatible Work, as required to prevent deterioration.
- D. Coordinate work between trades for the most efficient sequence of installation, to prevent space conflicts, and to provide clearances required by code, Drawings, and the manufacturer.
  - 1. Minor dimension changes (including the need to adjust finish dimensions), difficult installations and/or the addition of off-set fittings will not be considered changes to the Contract.
  - 2. Obtain approval of the Owner's Representative prior to any changes or alternate configurations.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 3100

## SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's Construction Schedule.
  2. Submittals Schedule.

#### 1.2 SUBMITTALS

- A. Submittals Schedule: Submit one copy of schedule. Arrange the following information in a tabular format in chronological order:
1. Scheduled date for first submittal.
  2. Specification Section number and title.
  3. Submittal category (action or informational).
  4. Name of subcontractor.
  5. Description of the Work covered.
  6. Scheduled date for Architect's final release or approval.
- B. Contractor's Construction Schedule: Submit one printed copy of initial schedule, large enough to show entire schedule for entire construction period.

#### 1.3 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### PART 2 - PRODUCTS

#### 2.1 SUBMITTALS SCHEDULE

- A. Submit concurrently with the first complete submittal of Contractor's Construction Schedule. Comply with requirements of individual specification sections.
- B. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
1. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  2. Submittal Review Time: Include review and re-submittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
  3. Startup and Testing Time: Include not less than (insert number) business days for startup and testing.
  4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work Restrictions: Show the effect on the schedule of the following:
    - a. Limitations of continued occupancies.
    - b. Uninterruptible services.
    - c. Use of premises restrictions.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to the following:
1. Notice to Proceed.
  2. State of Michigan Bureau of Fire Services (BFS) milestones:
    - a. Submission of "Application for Fire Safety Plan Examination" and associated fee for fire alarm and fire suppression work.
    - b. Submission of OFS 12A and associated fee.
    - c. BFS 50% inspection.
    - d. Final fire alarm test.
    - e. BFS final inspection.
  3. Delivery of major equipment.
  4. Substantial Completion.
  5. Final Completion.

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities
  - 1. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Owner and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200

## SECTION 01 3300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Standard General Conditions, Supplemental General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, apply to this Section.
- B. Related sections:
  - 1. Division 01 Section "Construction Progress Documentation" for submitting submittal and construction schedules.
  - 2. Division 01 Section "Special Procedures for Fire Marshal Review and Inspection" for submittal requirements for Fire Marshal review.

#### 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

#### 1.3 DEFINITIONS

- A. Facilities Information Center (FIC): Owner's department responsible for tracking and archiving submittals.
- B. ProjectDox: Communications software utilized by Owner that enables members to upload and download electronic files via web based graphical interface. Owner will establish project specific site with project specific members.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized

because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier (UM project number) and Specification Section number followed by a brief description. Resubmittals shall include a decimal point, followed by a sequential number. Example file names:
      - 1) PXXXX 081700 Door hardware schedule.pdf; PXXXX 081700 Door hardware schedule.2.pdf
      - 2) PXXXX 238236 Finned Tube Cover product data.pdf
    - b. Coordinate project specific file naming with Architect prior to first submittal.
  3. Transmittal Form for Electronic Submittals: Use electronic form, containing the following information:
    - a. Project name and Owner's Project Number.
    - b. Date.
    - c. Architect name and address.
    - d. Contractor name, address and telephone number.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Specification Section number and title or Drawing sheet number.
    - h. Description of items included:
      - 1) Brief written description of each item.
      - 2) Indication of full or partial submittal.
      - 3) Action requested (e.g. "for review", "for information only", or other notation).
      - 4) Location(s) where product is to be installed, as appropriate.
- D. Options: Identify options requiring selection by Architect.
- E. Deviations and Additional Information: Clearly note on submittals all deviations from Contract Documents. Do not proceed with work related to the submittal, regardless of Architect/Engineer's action marking, without the Architect/Engineer's specific, written approval of such deviation. Refer to Standard General Conditions for additional requirements and obligations related shop drawings.
- F. Resubmittals: Resubmit in same form as initial submittal.
1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, commissioning agent, Owner and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Upload electronic submittals as PDF electronic files directly to "To be Reviewed" folder on ProjectDox website specifically established for Project.
  2. Notify all website members using ProjectDox automated message system. Include the file name for each submittal uploaded.
  3. Architect/engineer uploads annotated file to the "Reviewed" folder on ProjectDox website.
  4. Architect/engineer notifies all website members using ProjectDox automated message system. Message will include file name for each submittal reviewed and uploaded.
  5. Notify Architect, Owner's Representative and FIC that reviewed files have been retrieved.
- B. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
- D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.



2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings in electronic files formatted for printing to scale on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- H. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- I. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- J. Product / Material Certificates: Submit written statements on manufacturer's letterhead certifying that product / material complies with requirements in the Contract Documents.
- K. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- L. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 01 Section "Closeout Procedures"
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ENGINEER'S ACTION

- A. Engineer's Action: Where action and return is required or requested, Engineer will review each submittal, mark with "Action", and whenever possible return within 2 weeks of receipt.
  - 1. Final Unrestricted Release: Work may proceed, provided it complies with contract documents.
    - a. Marking: "Approved"
  - 2. Final But Restricted Release: Work may proceed, provided it complies with notations and corrections on submittals and with contract documents.
    - a. Marking: "Approved as Noted, Resubmission Not Required"
  - 3. Partial Release: Work may proceed on the indicated portions of the submitted item(s), provided it complies with contract documents. Do not proceed with work on items noted to be resubmitted.
    - a. Marking: "Partial Approval, Resubmit as Noted."
  - 4. Returned for Re-submittal: Do not proceed with work. Revise submittal in accordance with notations and resubmit without delay to obtain a different action marking.
    - a. Marking: "Not Approved, Revise and Resubmit"
  - 5. Returning sample or information: Submittals which were for information only and require no action.
    - a. Marking: "Returning Samples / Information"
  - 6. Submittals Not Requiring Action: Submittals which require no action, such as cleaning and maintenance information; or submittals not required and not reviewed, will be acknowledged as follows:
    - a. Marking: "Action Not Required"
- B. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- C. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION 01 3300

## SECTION 01 3500 - SPECIAL PROCEDURES FOR FIRE MARSHAL REVIEW AND INSPECTION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes special procedures for Fire Marshal review and inspection for construction projects in University of Michigan buildings under the following jurisdiction:
  - 1. State of Michigan Bureau of Fire Services (BFS).
  - 2. University of Michigan Health Environment Health and Safety department, Fire Safety division.
  - 3. State of Michigan Bureau of Fire Services (BFS) for fire alarm and fire suppression work only.

#### 1.2 RELATED DOCUMENTS

- A. Schedule milestones for BFS project are included in Division 01 section "Construction Progress Documentation".

#### 1.3 SUBMITTALS

- A. Copies of all inspection reports.
- B. Final inspection manual as detailed in article 2.1:
  - 1. Draft copy: Submit draft copy to UM Owner's Representative for review concurrent with request for inspection, typically at least four weeks prior to final inspection.
  - 2. Inspection copy: Provide one copy to the Fire Marshal at the final inspection.
  - 3. Final copy: Submit two copies to UM Owner's Representative after final inspection is complete.

#### 1.4 COORDINATION

- A. Coordinate scheduling and timing of required administrative procedures, system testing, and inspections with other construction activities to avoid conflicts and to ensure orderly progress of work and inspections.

### PART 2 - PRODUCTS

#### 2.1 FINAL INSPECTION MANUAL

- A. General: The final inspection manual shall provide the Fire Marshal with information needed to conduct a final inspection.
- B. Contents:
  - 1. Contents of the inspection manual are specific to each project and include those items noted on the BFS "Plan Review Report".
  - 2. Typical contents include but are not limited to the following:
    - a. Details for each through-penetration firestop system from a qualified testing and inspecting agency.

- b. Notarized affidavits of Compliance for all non-labeled interior finish materials attesting to compliance with the specified flame spread and smoke developed ratings. Affidavits shall state:
  - 1) Name of product.
  - 2) Indication that product has been tested by a nationally recognized independent testing laboratory.
  - 3) Name of testing laboratory.
  - 4) Laboratory project or test number.
  - 5) Date of test.
  - 6) Test results.
  - 7) Statement that product was installed as tested.
- c. Construction inspection approval certificates for mechanical and electrical construction.
- d. Light level calculations for required emergency lighting.
- e. Final fire alarm approval certificate.

C. Format:

- 1. Manuals shall be three hole punched and bound.
- 2. Provide heavy paper dividers with plastic tabs to divide the Manual into sections.
- 3. Provide a Table of Contents at the front of the Manual. List each tabbed section of the Manual.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 3500

## SECTION 01 4200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed." No such implied meaning will be interpreted to extend Architect/Engineer's responsibility into Contractor's area of construction supervision.
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Or equal": When the phrase "or equal" is used after a single manufacturer's name, or at the end of a list of manufacturer's names, submit proposed products in strict compliance with the "Owner's Options" clauses of the Standard General Conditions.
  - 1. The Owner will consider only those Contractor-proposed substitutions submitted with the Bid in the "Owner's Options" portion of the Form of Proposal.
  - 2. In all cases, judgments of equality of products will be made solely by the Engineer.

#### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States" and as follows:
  - 1. "AFF": "Above finished floor" level
  - 2. "Mfr"/"Mfr's": "manufacturer" / "manufacturer's"
  - 3. "NIC": "Not in Contract"

4. "OFCI": "Owner furnished, Contractor installed"
5. "w/": "with"

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 4200

## SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes temporary plumbing and electrical services and provisions for protecting personnel and property.

#### 1.2 QUALITY ASSURANCE

- A. Standards and Regulations: Comply with applicable laws and regulations and the following:
  - 1. NFPA Code 241, "Building Construction and Demolition Operations".
  - 2. ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
  - 3. NECA Electrical Design Library "Temporary Electrical Facilities".
- B. Conditions of Use: Keep facilities clean and neat. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

### PART 2 - PRODUCTS

#### 2.1 ELEVATOR USE AND PROTECTION

- A. Existing Elevator Use:
  - 1. Use of designated Owner's existing elevator will be permitted, provided elevator is protected, cleaned and maintained daily in a condition acceptable to Owner's Representative.
  - 2. Elevator will be shared with other users. Coordinate use with Owner's Representative and provide priority to U-M use.
- B. Documentation: Before beginning work, document the condition of the car entries, interior, and controls by photographs. Submit all documentation to Owner's Representative.
- C. Protection
  - 1. Do not exceed 25% of elevator load capacity with any one piece of material, equipment, or hand truck. Do not exceed elevator load capacity. Coordinate and schedule heavy usage with Owner's Representative prior to loading.
  - 2. Provide removable protective coverings (pads), barriers, devices, signs, or other procedures to protect elevator car (wall and ceilings) and entrance doors and frame.
    - a. All materials shall be class A and have a label permanently affixed to the pad. Labels shall be visible when materials are installed.
    - b. Submit weight of materials to Owner's Representative.
  - 3. Maintain access to the emergency phone, main car operating panel, and emergency escape hatch inside the elevator.

D. Substantial completion

1. At Substantial Completion, restore elevator to condition existing before initial use
2. If, elevators were damaged during work, engage certified Elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
  - a. Correct any damage to car interior, controls, sills, and entrance doors and frame, and restore elevator to condition existing before initial use.

PART 3 - EXECUTION

3.1 PERFORMANCE

- A. Barriers: In general, provide barriers between active construction operations and completed areas of work, and between construction activity and Owner occupied areas. Provide barriers in locations indicated on drawings, or if not indicated, as required by Owner's Representative.
1. Provide dust covers over Owner's equipment and furnishings. Use 6 mil thick clear plastic sheet and thoroughly tape seams to provide dust-proof cover.

3.2 PROTECTIONS

- A. Openings Between Floors: Shaft and chase spaces may terminate above occupied areas within building. Existing barriers between floors are not designed to prevent debris from falling through to bottom level. Provide appropriate barriers at all unprotected openings between floors during construction operations.
1. Protect openings between floors with appropriate materials, providing full coverage of opening in a manner which will prevent personnel, equipment, construction materials and debris, from falling through; capable of withstanding loads imposed during construction operations; and secured to prevent unintentional removal.

END OF SECTION 01 5000



## SECTION 01 5719 – CONSTRUCTION AIR QUALITY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Standard General Conditions, Supplemental General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- 1. This Section includes requirements for construction air quality including diesel exhaust mitigation.

#### 1.3 QUALITY ASSURANCE

- A. Indoor Air Quality Reports: Review periodic Indoor Air Quality Reports provided by others and promptly comply with report recommendations.
- B. Inspection and Maintenance: Periodically inspect project conditions to assure that indoor air quality measures are being implemented. Maintain indoor air quality measures to assure operational effectiveness.

### PART 2 - PRODUCTS

#### 2.1 AIR FILTRATION

- A. Provide air filters or filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 or as specified, whichever is greater.

### PART 3 - EXECUTION

#### 3.1 SOURCE/POLLUTION CONTROL

- A. Smoking is prohibited in all University of Michigan buildings and grounds.

#### 3.2 PATHWAY INTERRUPTION

- A. Construction partitions: Provide air tight temporary construction partitions to separate occupied or completed areas from active construction areas.
- B. Provide construction entry mats at each entry to limit dirt and debris from entering the building.

3.3 HOUSEKEEPING

- A. Perform daily housekeeping to prevent the accumulation and tracking of debris, dirt, dust, and moisture within the construction area. Coordinate activities of the various trades to organize work areas to assure that routine cleaning is effective.
- B. Provide thorough cleaning of all building interior surfaces prior to HVAC filter replacement, testing and balancing, and commissioning activities.

3.4 SCHEDULING

- A. Schedule high pollution activities that utilize high VOC level products such as paints, sealants, adhesives, caulking and cleaners to take place prior to installing highly absorbent materials such as ceiling tiles, carpet, fabric furniture, acoustic panels, insulation, and gypsum board.
- B. Where practical, perform high VOC work during off-hours to minimize personnel exposure.
- C. Coordinate schedule for installation of low-VOC products with temperature requirements.
- D. Schedule delivery to minimize storage requirements of materials on the project site.
  - 1. Where air testing or building flush-out procedures are required, provide adequate time to conduct these activities prior to building occupancy.

3.5 DIESEL EXHAUST MITIGATION

- A. All diesel equipment utilized on the project site except delivery trucks shall be fueled with biodiesel B-20. In case of extreme cold weather, biodiesel B-5 is acceptable. Provide records of refueling receipts when requested by the owner.
- B. All diesel equipment utilized on the project for more than ten workdays shall utilize exhaust after-treatment devices to reduce emission from diesel engines. Exhaust after treatment devices shall be either diesel oxidation catalyst type or diesel particulate filters. The required minimum percent reduction in emissions for either device shall be, PM: 20%, HC: 40%, CO: 10%.

END OF SECTION 01 5719

## SECTION 01 6000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements governing the product delivery, storage and handling and Contractor's selection of products for use in the Project.

#### 1.2 QUALITY ASSURANCE

- A. Compatibility of Options: When Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

#### 1.3 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.
  - 1. Schedule delivery to minimize storage time at site and to avoid overcrowding of construction area.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
  - 3. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
  - 4. Inspect products upon delivery to ensure that products are undamaged and properly protected.
  - 5. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

### PART 2 - PRODUCTS

#### 2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that are undamaged and, unless otherwise indicated, unused at the time of installation.
  - 1. Provide products complete with accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
- B. Product Selection Procedures: No substitutions will be permitted, except those in compliance with the Contract Document provisions concerning "Owner's Options"; otherwise comply with the following:
  - 1. Proprietary Specification Requirements: Where a single product or manufacturer is named, provide only the product indicated.
  - 2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated.
    - a. Where products or manufacturers are specified by name, accompanied by the term "or equal", or "or approved equal" comply with the Contract Document provisions concerning "Owner's Options."

3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide only a product or assembly possessing the specified characteristics and that otherwise complies with Contract requirements.
4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with indicated requirements, and are recommended by the manufacturer for the application indicated.
5. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with a code, standard or regulation, select a product that complies with the indicated standards, codes and regulations.
6. Visual Matching: Where Specifications require matching an established sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 6000

## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Installation of the Work.
  - 2. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" and 01 1400 "Work Restrictions" for limits on use of Project site.
  - 2. Section 01 7329 "Cutting and Patching"
  - 3. Section 01 7700 "Closeout Procedures" for final cleaning.
  - 4. Section 07 8413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

### PART 2 - PRODUCTS (NOT APPLICABLE)

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine rough-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- B. Correct defects that would result in unacceptable performance of materials or equipment to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information

### 3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Install Work within recognized industry tolerances, if not otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates, anchors, fasteners, and other devices of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Allow for building movement, including thermal expansion and contraction.
  - 2. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Mounting Heights: Except as otherwise indicated, mount individual units of Work at industry recognized standard mounting heights for applications indicated. The Contractor shall refer questionable mounting height choices to the Architect/Engineer and the Owner for final decision. The Contractor shall comply with the Owner's and the State of Michigan's requirements for accessible mounting heights.

- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Adjust, clean, lubricate, restore marred finishes and protect installed Work to ensure that it will remain without damage or deterioration during the remainder of the construction period. Unless otherwise specified by the Contract Documents, all Work is to be thoroughly cleaned prior to its being turned over to the Owner. This includes dusting, window cleaning, floor cleaning and all other operations associated with the proper cleaning of the Work. Waxing or buffing floors shall be performed when required by the Contract Documents.

#### 3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work (completed or in progress) is without damage or deterioration at time of Substantial Completion. Comply with manufacturer's written instructions.

END OF SECTION 01 7300

## SECTION 01 7329 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Extent of cutting and patching work is generally not specifically shown on drawings. Include cutting and patching work as indicated by provisions of this Section.
  - 1. Cut holes and openings in, or remove portions of, existing construction necessary for connection of new architectural elements, mechanical and electrical utilities and services, equipment and supports.
  - 2. Patch around mechanical and electrical penetrations.
  - 3. Patch floors, walls, and ceilings damaged by demolition operations, including removal of indicated mechanical and electrical items, and indicated wall-, floor-, and ceiling-mounted items. Patch and paint openings in walls, floors and ceilings created by demolition and removal operations.
  - 4. Patch and repair blemishes and holes in existing construction surfaces left in place, and scheduled to be exposed, that have been damaged due to construction operations.
- B. Materials removed and not indicated to be turned over to Owner or indicated for reuse, as well as rubble and debris resulting from these operations, are property of Contractor.
- C. Related requirements:
  - 1. General: Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
  - 2. Division 22 sections for other requirements and limitations applicable to cutting and patching mechanical installations.

#### 1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

#### 1.3 QUALITY ASSURANCE

- A. Assignment of Cutting and Patching Responsibilities:
  - 1. Cutting shall be the work of the individual architectural, mechanical or electrical trade requiring such cutting for access, or to permit alteration to be performed, or similar purposes.
    - a. Cutting required for inspection and to obtain test samples shall be the work of the General Contractor.
  - 2. Patching shall be the work of the appropriate architectural trade.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting before proceeding. Shore, brace, and support structural elements during cutting and



- patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Materials for Patching: Unless otherwise indicated, use materials for patching identical to existing materials. If identical materials are not available, or cannot be used, use materials visually matching existing adjacent surfaces to the fullest extent possible and that result in equal-or-better performance characteristics.

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. Protect existing property, equipment, remaining surfaces, utilities and services within and adjacent to work from damage due to operations. If utilities or services are uncovered that are not indicated on drawings, advise Owner and do not work in immediate area until instructed by Owner.
  1. Shore and brace existing construction during cutting operations as required to prevent cracking, movement, or collapse of existing assemblies, surfaces and materials.
- B. Use extreme caution when cutting into shafts and chases. Shafts and chases may end above occupied areas within building. Take all necessary precautions to prevent debris from falling into shaft during cutting and patching operations. Comply with requirements of Division 01 Section "Temporary Facilities and Controls".
- C. Before cutting and patching the following building elements, obtain the Owner's Representative's approval to proceed:
  1. Structural concrete.
- D. Cutting Concrete Floors: Before core drilling, saw-cutting, or breaking up concrete floors, test for the presence of electrical conduits. Use an impulse induction type scanner, similar to Hilti Ferroskan, capable of detecting both metallic conduits and copper wires in PVC conduits. Tracers that scan for energized cables or that scan for injected high frequency signals are not acceptable. Immediately restore, at no cost to the Owner, conduits damaged during cutting operations. Comply with the following notification requirements:
  1. Notify the Owner's Representative not less than 72 hours in advance of each core drilling operation. Owner's Representative will arrange notification of building occupants of potential for power outage.
  2. Notify the Owner's Inspection Department prior to conducting each test.

- E. Patching: Match existing construction. Comply with applicable materials and workmanship requirements of individual sections of these Specifications that govern new work.
  - 1. Patch exposed-to-view surfaces with seams which are durable and as invisible as possible. Create surface finishes matching existing adjacent surfaces in color, texture, gloss and other visual characteristics.
  - 2. Patch all partition, floor, ceiling and roof assemblies to maintain original performance characteristics, including those for fire and acoustical barriers.
    - a. Patch fire-rated assemblies using safing materials between the penetrating element and fire-rated assembly. Use safing materials complying with Division 07 Section "Penetration Firestopping" and that will not reduce the fire-rating of the existing assembly.
    - b. Patch assemblies to maintain acoustical barrier performance using joint sealing materials between the penetrating element and assembly. Use latex acoustical sealants complying with Division 07 Section "Joint Sealants."
  
- F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

END OF SECTION 01 7329

## SECTION 01 7420 - CONSTRUCTION AND DEMOLITION WASTE TRACKING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

#### 1.2 SUMMARY

- A. This section defines requirements for reporting the disposition of construction and demolition waste/material quantities on all University of Michigan projects.

#### 1.3 REFERENCES

- A. Definitions
  1. Waste: Removal off-site of demolition and construction materials for deposit to a landfill or incinerator as is acceptable to authorities having jurisdiction.
  2. Recycle: Removal off-site of demolition and construction materials to a Recycling Center for processing.
  3. Salvage: Removal off-site of demolition or construction materials for subsequent sale or reuse in another application.
  4. Waste Manifest: Removal off-site of demolition and construction materials included in the UM-EHS Waste Manifest. Exclude from all calculations.
  5. Soils and Excavation: Excavated soils and land-clearing debris. Exclude from all calculations.

#### 1.4 SUBMITTALS

- A. Waste Quantities Report: Provide information documenting all types and amounts of demolition and construction materials removed from the project site using the form provided in Part 3.
- B. Receipts: Provide records from the salvage and recycling facilities, landfills and incinerators, in as much as available, documenting quantities of materials received by each.

### PART 2 - PRODUCTS (NOT APPLICABLE)

### PART 3 - EXECUTION

#### 3.1 IMPLEMENTATION

- A. Transmit completed Waste Quantities Report(s) and receipts to [c-d-waste-tracking@umich.edu](mailto:c-d-waste-tracking@umich.edu) by the time of Substantial Completion.

**Waste Quantities Report**

Project name: \_\_\_\_\_

U-M project number: \_\_\_\_\_

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

Name of person completing this report: \_\_\_\_\_

Contractor - Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone #: \_\_\_\_\_

**Waste<sup>123</sup>:**

Waste dumpsters: \_\_\_\_\_ Cubic yards \_\_\_\_\_ Tons  
(Landfilled or incinerated)

Recycled dumpsters: \_\_\_\_\_ Cubic yards \_\_\_\_\_ Tons  
(Dropped off at recycling center)

Salvaged Waste: \_\_\_\_\_ Cubic yards \_\_\_\_\_ Tons  
(Sold or reused)

Totals: \_\_\_\_\_ Cubic yards \_\_\_\_\_ Tons

<sup>1</sup> Report shall be completed in the same unit for each category of waste.

<sup>2</sup> Hazardous Waste Manifest and soils and excavation are excluded from all calculations.

<sup>3</sup> Provide receipts when available.

**SUBMIT COMPLETED FORM TO [c-d-waste-tracking@umich.edu](mailto:c-d-waste-tracking@umich.edu)**

END OF SECTION 01 7420

## SECTION 01 7700 – CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. The requirements of this Section are in addition to project closeout requirements indicated in the Standard General Conditions.

#### 1.2 SUBSTANTIAL COMPLETION

- A. Prerequisites to Substantial Completion: Complete the following:
  - 1. Submit statement showing changes to Contract Sum. Advise Owner of pending insurance change-over requirements.

#### 1.3 DEFINITIONS

- A. Discharge to Ground: Discharge to grassy and/or soil areas capable of water infiltration. Frozen ground conditions are not capable of infiltration.
- B. Wash Water: Liquid waste generated during cleaning activities, including mixtures of water and chemicals and/or detergents. It also includes water containing residues of chemicals, detergents, or the substances being removed (i.e., paint, solvents, etc.). It does not include runoff from cleaning with only potable water that has not come into contact with chemicals or detergents.

#### 1.4 FINAL CLEANING

- A. Final Cleaning: Immediately before turning project over to Owner, wash and clean all parts of the Work. Remove tools and equipment, construction debris, rubbish, and surplus materials.
- B. Disposal of Wash Water from Activities Outside Buildings:
  - 1. Protect storm drains and catch basins. Do not allow runoff from cleaning activities that is discharged to ground to leave the site.
  - 2. Utilize one of the following two procedures to handle wash water generated from detergent or chemical cleaning.
    - a. Obtain approval from the Michigan Department of Environmental Quality (MDEQ) for contractor to discharge to the ground by "authorization by notification" as a mobile power washer. Do not reference University of Michigan in application.
      - 1) Contact UM Environment, Health and Safety department (EHS) - Environmental Protection & Permitting at 734-936-1920 for information on discharge to ground.
    - b. Collect wash water and sample to determine proper disposal method.
      - 1) Contact UM EHS-HazMat at 734-763-4568.
      - 2) Allow adequate lead time for sampling, analysis and disposal coordination.

CITY OF ANN ARBOR  
Angell Hall  
Replace Domestic Water Service

PETER BASSO ASSOCIATES, INC.  
PBA Project No. 2024.0314.00  
January 31, 2025

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 7700

SECTION 04 2010 - UNIT MASONRY ASSEMBLIES (LIMITED APPLICATIONS)

PART 1 - GENERAL .....	1
1.1 SUMMARY.....	1
1.2 SUBMITTALS .....	1
1.3 QUALITY ASSURANCE .....	1
1.4 DELIVERY, STORAGE, AND HANDLING.....	1
1.5 PROJECT CONDITIONS.....	2
PART 2 - PRODUCTS .....	2
2.1 MASONRY UNITS, GENERAL.....	2
2.2 CONCRETE MASONRY UNITS.....	2
2.3 MORTAR AND GROUT MATERIALS.....	2
2.4 CONCRETE AND MASONRY LINTELS.....	3
2.5 REINFORCEMENT.....	3
2.6 MORTAR AND GROUT MIXES.....	3
PART 3 - EXECUTION .....	3
3.1 INSTALLATION .....	3
3.2 LINTELS .....	4
3.3 IDENTIFICATION .....	4
3.4 CLEANING.....	5

PART 1 - GENERAL

1.1 SUMMARY

- A. Extent of masonry work consists of modifying existing concrete masonry unit structures and is indicated on drawings and by provisions of this Section.
- B. Section Includes:
  - 1. Concrete masonry units (CMU's).

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."

1.3 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

## 1.5 PROJECT CONDITIONS

- A. Stain Prevention: Prevent grout and mortar from staining the face of masonry. Immediately remove grout and mortar that come in contact with masonry.
  - 1. Protect floor and base of walls from mortar splatter by spreading coverings on floor and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect floors and adjacent walls from mortar droppings.
  - 4. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 2.2 CONCRETE MASONRY UNITS

- A. Concrete Masonry Units: Provide new concrete masonry units, mortar, and accessories that match the existing installation in every respect, including size, texture and strength.
- B. Concrete Masonry Units: ASTM C 90
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
  - 2. Density Classification: Medium weight.
  - 3. Size: Nominal face dimension of 16 inches long x 8 inches high (15-5/8 inches x 7-5/8 inches actual) x 3/8 inch less than nominal widths indicated on Drawings.
- C. Shapes: Provide shapes indicated and for lintels, corners, jambs, control joints and other special conditions.

### 2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Cement: ASTM C 1329.
- F. Aggregate for Mortar: ASTM C 144.



G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

## 2.4 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

1. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than CMUs.
2. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout.

## 2.5 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Hot-dip galvanized, carbon steel
2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

## 2.6 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For interior non-load-bearing partitions: Type N.
2. For interior load-bearing walls: Type S.

B. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Lay masonry units with bond pattern matching existing adjacent units, with face shells fully bedded in mortar and with head joints of depth equal to bed joints and as follows:

1. Vertical Joints: Tooth into adjacent existing block walls; do not vertically align joints at interface of existing and new masonry work.
2. Horizontal Joints: Align coursing to match existing, adjacent units.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- D. Cut exposed masonry units, where necessary, with a power saw. Allow units to dry before laying. Install cut units with cut surfaces and, where possible, cut edges concealed. Avoid the use (by proper layout) of less than half-size units.
- E. Bond intersecting walls with masonry units or provide anchors spaced 24 inches on center.
- F. Reinforcing: Install entire length of longitudinal side rods in mortar with a minimum cover of 1/2 inch on interior walls. Lap reinforcement a minimum of 6 inches. Do not bridge control and expansion joints in the wall system.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- G. Build other work into the masonry work as shown, fitting masonry units around other work, and grouting for secure anchorage.

### 3.2 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 24 inches are shown without steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb.

### 3.3 IDENTIFICATION

- A. Provide permanent identification of all assemblies requiring opening protectives including fire walls, fire barriers, fire partitions, and smoke barriers.
- B. Install in accordance with the requirements of Michigan Building Code chapter 7.
- C. Location:
  - 1. Locate in accessible concealed spaces above finished ceiling. In locations without accessible concealed location, coordinate location with architect.
  - 2. Locate within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the assembly.
- D. Signage requirements:
  - 1. Lettering:
    - a. 3-inch minimum; 3/8-inch stroke width.
    - b. Color: Red on white background
  - 2. Verbiage incorporating project specific hourly rating. Refer to life safety plan for rating requirements:
    - a. FIRE RATED ASSEMBLY ( \_\_ HR) - PROTECT ALL OPENING
    - b. SMOKE BARRIER - PROTECT ALL OPENINGS

3.4 CLEANING

- A. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- B. Clean excess mortar as work progresses.
- C. Remove large mortar particles by hand using non-metallic scrapers or paddles.
- D. Final cleaning: Clean masonry with stiff non-metallic brushes, clean water, and a mild non-acidic soap or detergent, if required. Do not use acids without prior written approval.
- E. Dispose of wash water by methods described in Division 01 Section "Closeout Procedures."

END OF SECTION 04 2010

SECTION 07 8413 – PENETRATION FIRESTOPPING

PART 1 - GENERAL .....	1
1.1 SUMMARY .....	1
1.2 REFERENCES .....	1
1.3 PERFORMANCE REQUIREMENTS .....	1
1.4 SUBMITTALS .....	2
1.5 QUALITY ASSURANCE .....	2
1.6 PROJECT CONDITIONS .....	2
1.7 ENVIRONMENTAL REGULATIONS .....	2
PART 2 - PRODUCTS .....	2
2.1 MANUFACTURERS .....	2
2.2 FIRESTOPPING .....	3
PART 3 - EXECUTION .....	3
3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION .....	3
3.2 IDENTIFICATION .....	3
3.3 CLEANING AND PROTECTION.....	4

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
  - 1. Division 22 Section specifying piping penetrations.

1.2 REFERENCES

- A. ASTM E 84 Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM E 119 Test Method for Fire Test of Building Construction and Materials.
- C. ASTM E 814 Fire Tests of Through-Penetration Fire Stops.
- D. Firestop Contractors International Association (F.C.I.A.) Manual of Practice (M.O.P.).

1.3 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
  - 1. For through-penetration firestop systems in non-rated walls, a fire-resistance rating shall not be required.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.
- C. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

#### 1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  1. Firestopping tests shall be performed by Underwriters Laboratories (UL), Omega Point Laboratories or Intertek Warnock/Hersey.
  2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems bearing testing agency's classification marking.
- B. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

#### 1.7 ENVIRONMENTAL REGULATIONS

- A. All materials shall be asbestos free.
- B. Disposal of hazardous firestop materials: Contact UM Occupational Safety and Environmental Health Hazardous Materials (734-763-4568) for instructions regarding disposal.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products of one of the following manufacturers:
  1. A/D Fire Protection Systems Inc.
  2. Hilti, Inc.

3. Johns Manville.
4. Rectorseal Corporation
5. Specified Technologies Inc. (STI)
6. 3M; Fire Protection Products Division.
7. Tremco; Sealant/Weatherproofing Division.
8. USG Corporation.

## 2.2 FIRESTOPPING

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

## PART 3 - EXECUTION

### 3.1 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. Examination: Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Notify the Owner's Representative in writing if unsatisfactory conditions are present. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.
- C. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- D. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- E. Install fill materials for firestop systems by proven techniques to produce the following results:
  1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.2 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will

be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

### 3.3 CLEANING AND PROTECTION

- A. Clean off excess fill materials and sealants adjacent to opening and joints as Work progresses. Use methods approved by manufacturer of firestopping products.
- B. Protect firestopping during and after curing period from contact with contaminating substances.

END OF SECTION 07 8413

SECTION 09 9100 – PAINTING

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SUMMARY .....	1
1.3 DEFINITIONS .....	1
1.4 SUBMITTALS .....	2
1.5 QUALITY ASSURANCE .....	2
1.6 DELIVERY, STORAGE, AND HANDLING .....	2
1.7 SITE CONDITIONS .....	2
PART 2 - PRODUCTS .....	3
2.1 MANUFACTURERS .....	3
2.2 PAINT MATERIALS, GENERAL .....	3
PART 3 - EXECUTION .....	3
3.1 EXAMINATION AND PREPARATION .....	3
3.2 APPLICATION, GENERAL .....	4
3.3 APPLICATION .....	5
3.4 ADJUSTING, CLEANING, PROTECTION .....	6
3.5 INTERIOR PAINT SCHEDULE .....	6

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Standard General Conditions, Supplemental General Conditions, Division 01 Specification Sections, and other applicable Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
  - 1. Surface preparation and field painting of the following:
    - a. Exposed interior items and surfaces.

1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
  - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
  - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
  - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
  - 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
  - 5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.



- B. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

#### 1.4 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
  - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis, statement of VOC content and instructions for handling, storing, and applying each coating material proposed for use.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
  - 1. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications.
- C. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
  - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

#### 1.7 SITE CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.
- B. Manufacturers:
  - 1. Benjamin Moore & Co.
  - 2. International Protective Coatings.
  - 3. O'Leary Paint Co.
  - 4. PPG Industries, Inc.
  - 5. Pratt & Lambert Paints.
  - 6. Sherwin-Williams Co.
  - 7. Tnemec.

### 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- B. VOC Content for Interior Paints: For interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 150 g/L.
  - 3. Primers, Sealers, and Undercoaters: 200 g/L.
  - 4. Pretreatment Wash Primers: 420 g/L.
- C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- D. Do not use products containing isocyanate compounds.

## PART 3 - EXECUTION

### 3.1 EXAMINATION AND PREPARATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
  - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.
- C. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Cleaning, General: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
  1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
  2. Clean previously painted surfaces to remove dirt, masking tape, labels, adhesives, and other materials that would either be deleterious to adhesion of, or show through, new paint.
- E. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  1. Provide barrier coats over incompatible primers or remove and reprime.
  2. For coatings applied over previously painted surfaces, test application to check for lifting and other adhesion problems. Perform test in an isolated area where practicable.
  3. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
    - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
- F. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
  1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.

### 3.2 APPLICATION, GENERAL

- A. Paint exposed surfaces of all new work, except where the paint schedules or provisions of this Section indicate that a surface or material is not to be painted or is to remain natural. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
  1. Walls: Where walls are scheduled, include the following surfaces in addition, unless otherwise indicated:
    - a. Surfaces of wall mounted items previously painted in existing construction.
    - b. Access panels.

- c. Doors and door frames.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
  1. Paint colors, surface treatments, and finishes are indicated in the schedules.
  2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  3. Provide finish coats that are compatible with primers used.
  4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
  5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  6. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  7. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
  1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
  2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
  3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required. Spray apply coating to the following items:
    - a. Shelf standards and brackets.
    - b. Laboratory bench reagent shelving supports and brackets.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- F. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

- G. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

### 3.4 ADJUSTING, CLEANING, PROTECTION

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
  - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.
  - 2. Dispose wash water from latex paint to the sanitary sewer. Excess latex paint shall be salvaged for reuse or solidified for disposal with other construction materials. Dry empty latex paint cans and dispose with other construction materials. Contact UM OSEH Hazardous Materials (734-763-4568) to arrange for disposal of alkyd paints and solvents.
- B. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
  - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

### 3.5 INTERIOR PAINT SCHEDULE

- A. Interior Paint Systems, General: Products of Benjamin Moore are listed below, unless otherwise indicated. Provide indicated products or, subject to compliance with requirements, equivalent products of other approved manufacturers. Apply coatings at manufacturer's recommended spreading rate to achieve indicated dry film thicknesses.
  - 1. Where "Industrial" coating is indicated, provide Moore's "Industrial and Maintenance Coatings" products; or equivalent of other, listed approved manufacturers.
  - 2. Where "Professional" coating is indicated, provide Moore's "Professional Coatings" products; or equivalent of other, listed approved manufacturers.
- B. Concrete Masonry Units: Provide the indicated "Professional" or "Industrial" coating systems over interior concrete masonry block units:
  - 1. Semi-Gloss, Vinyl Acrylic Latex Finish: Two finish coats (over a block filler for new work).
    - a. Block Filler (new work only): High build latex block filler; total dry film thickness of not less than 8.5 mil.
      - 1) SuperSpec Masonry Hi-Build Block Filler 206.
    - b. Primer (over existing painted surfaces): Acrylic-latex primer; dry film thickness of not less than 1.2 mils.
      - 1) Fresh Start Interior/Exterior Latex Primer 023-00.

- c. Finish Coats: Semi-gloss, acrylic-latex, interior enamel; total dry film thickness of not less than 2.0 mils.
  - 1) Super Hide Latex Semi-Gloss Enamel 283.
  - 2) Color: Match existing wall color.

END OF SECTION 09 9100

SECTION 20 0500 - MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SUMMARY .....	1
1.3 INDUSTRY STANDARDS .....	2
1.4 PERFORMANCE REQUIREMENTS .....	3
1.5 QUALITY ASSURANCE .....	3
1.6 CODES, PERMITS AND FEES .....	3
1.7 DRAWINGS .....	4
1.8 MATERIAL AND EQUIPMENT MANUFACTURERS .....	4
1.9 INSPECTION OF SITE .....	4
1.10 ITEMS REQUIRING PRIOR APPROVAL .....	5
1.11 ACTION SUBMITTALS .....	5
1.12 INFORMATIONAL SUBMITTALS .....	5
1.13 CLOSEOUT SUBMITTALS .....	6
1.14 INSTRUCTION OF OWNER PERSONNEL .....	7
1.15 WARRANTY .....	7
PART 2 - PRODUCTS (NOT APPLICABLE) .....	7
PART 3 - EXECUTION .....	7
3.1 MECHANICAL DEMOLITION WORK .....	7
3.2 WORK IN EXISTING BUILDINGS .....	8
3.3 TEMPORARY SERVICES .....	8
3.4 WORK INVOLVING OTHER TRADES .....	9
3.5 ACCEPTANCE PROCEDURE .....	9
3.6 PROJECT COMMISSIONING .....	9

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this Section.

1.2 SUMMARY

- A. This Section includes mechanical general administrative and procedural requirements. The following requirements are included in this Section to supplement the requirements specified in Division 01 Specification Sections.
- B. Mechanical and Electrical Specifications have been developed utilizing Construction Specifications Institute MasterFormat and make use of the Facilities Services Subgroup - Divisions 20-28.
- C. Division 01 Documents and Architectural Specifications in Divisions 02 through 14 have been developed in the MasterFormat 95 Edition and utilize Division 01 through Division 14.
- D. Where Division 15 Mechanical or Division 16 Electrical are referenced in Division 01 Documents, or within the Architectural Specifications in Divisions 02 through 14, they should refer to Division 20-28. For additional cross reference information refer to the Construction Specifications Institute.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  2. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  3. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  4. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
  5. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  6. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  7. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  8. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  9. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
  10. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
  11. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
  12. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
  13. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
  14. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
  15. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
  16. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
  17. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
  18. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csa-international.org](http://www.csa-international.org).
  19. CSI - Construction Specifications Institute (The); [www.csiresources.org](http://www.csiresources.org).
  20. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
  21. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
  22. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
  23. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  24. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
  25. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
  26. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
  27. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
  28. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
  29. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
  30. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
  31. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
  32. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
  33. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
  34. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
  35. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
  36. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
  37. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
  38. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
  39. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
  40. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
  41. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.



1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Systems Components Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

#### 1.5 QUALITY ASSURANCE

- A. Scope of Work: Furnish all labor, material, equipment, technical supervision, and incidental services required to complete, test and leave ready for operation the mechanical systems as specified and as indicated on Drawings.

1. Contract Documents are complimentary, and what is required by one shall be as binding as if required by all. In the event of inconsistencies or disagreements within the Construction Documents bids shall be based on the most expensive combination of quality and quantity of the work indicated.

- B. Ordinances and Codes: Perform all Work in accordance with applicable Federal, State and local ordinances and regulations, the Rules and Regulations of ASHRAE, NFPA, SMACNA and UL, unless otherwise indicated.

1. Notify the Architect/Engineer in writing before submitting a proposal should any changes in Drawings or Specifications be required to conform to the above codes, rules or regulations.
2. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules and regulations, and without notice to A/E, the Contractor shall bear all costs arising from corrective measures.

- C. Source Limitations: Obtain equipment and other components of the same or similar systems through one source from a single manufacturer.

- D. Tests and Inspections: Perform all tests required by state, city, county and/or other agencies having jurisdiction. Provide all materials, equipment, etc., and labor required for tests.

- E. Performance Requirements: Perform all work in a first class and workmanlike manner, in accordance with the latest accepted standards and practices for the trades involved.

- F. Sequence and Schedule: Perform work to avoid interference with the work of other trades. Remove and relocate work which in the opinion of the Owner's Representatives causes interference.

- G. Labeling Requirement for Packaged Equipment: Electrical panels on packaged mechanical equipment shall bear UL label or label of other Nationally Recognized Testing Laboratory (NRTL) (Intertek, CSA, etc.)

#### 1.6 CODES, PERMITS AND FEES

- A. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for Mechanical Work shall be secured and paid for by the Contractor. All Work shall conform to all applicable codes, rules and regulations.

- B. Rules of local utility companies shall be complied with. Check with each utility company supplying service to the installation and determine all devices including, but not limited to, all valves, meter boxes, and meters which will be required and include the cost of all such items in proposal.

- C. All work shall be executed in accordance with the rules and regulations set forth in local and state codes. Prepare any detailed drawings or diagrams which may be required by the governing authorities. Where the

drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.

- D. The purchase of potable water meters and the cost of the associated assessment fees shall be the responsibility of the University of Michigan; however, installation of the meter shall be by the City of Ann Arbor. The Contractor shall be responsible for obtaining all necessary permits.

#### 1.7 DRAWINGS

- A. The drawings show the location and general arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit.
- B. Examine the drawings of other trades and verify the conditions governing the work on the job site. Arrange work accordingly. Provide fittings, valves, and accessories as required to meet actual conditions.
- C. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect/Engineer.
- D. The Architectural and Structural Drawings take precedence in all matters pertaining to the building structure, Mechanical Drawings in all matters pertaining to Mechanical Trades and Electrical Drawings in all matters pertaining to Electrical Trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect/Engineer for resolution.
- E. Drawings are not intended to be scaled for rough-in or to serve as shop drawings. Take all field measurements required to complete the Work.

#### 1.8 MATERIAL AND EQUIPMENT MANUFACTURERS

- A. Equipment: All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment or product provided shall be equal in size, quality, durability, appearance, capacity, and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Items Requiring Prior Approval specified in this section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, piping, sheet metal, electrical work, and building alterations shall be included in the original Bid.

#### 1.9 INSPECTION OF SITE

- A. Visit the site, examine and verify the conditions under which the Work must be conducted before submitting Proposal. The submitting of a Proposal implies that the Contractor has visited the site and understands the conditions under which the Work must be conducted. No additional charges will be allowed because of failure to make this examination or to include all materials and labor to complete the Work.
- B. No contract sum adjustments or contract time extensions will be made for Contractor claims arising from conditions which were or could have been observable, ascertainable or reasonably foreseeable from a site visit or inquiry into local conditions affecting the execution of the work.

1.10 ITEMS REQUIRING PRIOR APPROVAL

- A. Bids shall be based upon manufactured equipment specified. All items that the Contractor proposes to use in the Work that are not specifically named in the Contract Documents must be submitted for review prior to bids. Such items must be submitted in compliance with Division 01 specifications. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
1. Equipment to be considered for prior approval shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall fulfill the requirements of equipment arrangement and space limitations of the equipment shown on the plans and/or specified and shall be compatible with the other components of the system.
  2. All costs incurred to make equipment comply with other requirements, including providing maintenance, clearance, piping, sheet metal, electrical, replacement of other components, and building alterations shall be included in the original bid.
- B. Voluntary alternates may be submitted for consideration, with listed addition or deduction to the bid, but will not affect the awarding of the contract.

1.11 ACTION SUBMITTALS

- A. Submit for review in compliance with Division 01.
- B. Equipment and material submittals required are indicated in the Mechanical; Fire Suppression; Plumbing; and Heating, Ventilating and Air Conditioning Sections. Refer to Division 01 for submittal quantities.
- C. Submittals shall be in groupings of similar or related items. Plumbing fixture submittals shall be in one package including all fixtures intended to be used for this project. Incomplete submittal groupings will be returned "Rejected". Submit product data with identification mark number or symbol numbers as specified or scheduled on the Mechanical Drawings.
- D. Submittals shall be project specific. Standard detail drawings and schedule not clearly indicating which data is associated with this Project will be returned "Rejected".
- E. If deviations (not substitutions) from Contract Documents are deemed necessary by the Contractor, details of such deviations, including changes in related portions of the project and the reasons therefore, shall be included with the submittal for approval.

1.12 INFORMATIONAL SUBMITTALS

- A. Shop Drawings:
1. Prepare shop drawings to scale for the Architect/Engineer for review.
  2. Shop drawings shall be reviewed by the Mechanical Contractor for completeness and accuracy prior to submitting to the Architect/Engineer for review. The shop drawings shall be dated and signed by the Mechanical Contractor prior to submission.
  3. No equipment shall be shipped from stock or fabricated until shop drawings for them have been reviewed by the Architect/Engineer. Review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action indicated is subject to the requirement of the plans and specifications.
    - a. By the review of shop drawings, the Architect/Engineer does not assume responsibility for actual dimensions or for the fit of completed work in position, nor does such review relieve Mechanical Trades of full responsibility for the proper and correct execution of the work required.

- b. Contractor is responsible for:
  - 1) Dimensions, which shall be confirmed and correlated at the job site.
  - 2) Fabrication processes and techniques of construction.
  - 3) Quantities.
  - 4) Coordination of Contractor's work with all other trades.
  - 5) Satisfactory performance of Contractor's work.
  - 6) Temporary aspects of the construction process.
- 4. Submit detailed shop drawings of piping systems showing pipe routing and types and locations of all pipe hangers.

#### 1.13 CLOSEOUT SUBMITTALS

##### A. Operation and Maintenance Instructional Manuals:

- 1. Submit project specific Operation and Maintenance Instructional Manuals for review in compliance with Division 01 Specification Sections.
- 2. Provide complete operation and maintenance instructional manuals covering all mechanical equipment herein specified, together with parts lists. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. One copy of all manuals shall be furnished for Owner. Maintenance and operating instructional manuals shall be provided when construction is approximately 75 percent complete.
- 3. For Commissioned Projects: Operation and maintenance instructional manuals shall be submitted a minimum of four weeks prior to functional testing.
- 4. Format: Submit operation and maintenance manuals in the following format:
  - a. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - 1) Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - 2) Enable inserted reviewer comments on draft submittals.
- 5. The operating and maintenance instructions shall include a brief, general description for all mechanical systems including, but not limited to:
  - a. Routine maintenance procedures.
  - b. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.
  - c. Trouble-shooting procedures.
  - d. Contractor's telephone numbers for warranty repair service.
  - e. Submittals.
  - f. Recommended spare parts list.
  - g. Names and telephone numbers of major material suppliers and subcontractors.
  - h. System schematic drawings.

##### B. Record Drawings:

- 1. Submit record drawings in compliance with Division 01.
- 2. Contractor shall submit to the Architect/Engineer, record drawings on electronic media or vellum which have been neatly marked to represent as-built conditions for all new mechanical work.
- 3. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect, Engineer and Owner at their request.

##### C. Warranties:

1. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the mechanical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this mechanical installation which becomes defective within a period of one year (unless specified otherwise in other Mechanical; Fire Suppression; Plumbing; or Heating, Ventilating and Air Conditioning Sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.
2. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### 1.14 INSTRUCTION OF OWNER PERSONNEL

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of mechanical equipment and systems at agreed upon times. A minimum of 24 hours of formal instruction to Owner's personnel shall be provided for each building. Additional hours are specified in individual specification sections.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. In addition to individual equipment training provide overview of each mechanical system. Utilize the as-built documents for this overview.
- E. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction.

#### 1.15 WARRANTY

- A. Warranty: Comply with the requirements in Division 01 Specification Sections. Contractor shall warranty that the mechanical installation is free from defects and agrees to replace or repair, to the Owner's satisfaction, any part of this mechanical installation which becomes defective within a period of one year (unless specified otherwise in other Mechanical; Fire Suppression; Plumbing; or Heating, Ventilating and Air Conditioning Sections) from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material, workmanship or failure to follow the contract documents.
- B. File with the Owner any and all warranties from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### PART 2 - PRODUCTS (NOT APPLICABLE)

#### PART 3 - EXECUTION

##### 3.1 MECHANICAL DEMOLITION WORK

- A. Demolition of existing mechanical equipment and materials shall be done by the Contractor unless otherwise indicated. Include items such as, but not limited to, existing piping, pumps, ductwork, supports, and equipment where such items are not required for the proper operation of the modified system.
- B. Include draining of piping systems where required for demolition, modification of, or connection to existing systems.

- C. In general, demolition work is indicated on the Drawings. However, the Contractor shall visit the job site to determine the full extent and character of this Work.
- D. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse.
  - 1. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived.
  - 2. Remove items from the systems and turn over to the Owner in their condition prior to removal. The Owner will move and store these materials.
  - 3. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises.
- E. Work that has been cut or partially removed shall be protected against damage until covered by permanent construction.
- F. Clean and flush the interior and exterior of existing relocated equipment and its related piping, valves, and accessories that are to be reused of mud, debris, pipe dope, oils, welding slag, loose mill scale, rust, and other extraneous material so that the existing equipment and accessories can be repainted and repaired as required for the proper operation and performance of the relocated equipment.
- G. Where existing equipment is to be removed, cap piping under floor, behind face of wall, above ceiling, or at mains.
- H. Cap piping immediately adjacent to demolition as soon as demolition commences in order to allow existing systems to remain in operation.
  - 1. Cap or plug piping with same or compatible piping material.
  - 2. Cap or plug ducts with same or compatible ductwork material.

### 3.2 WORK IN EXISTING BUILDINGS

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once Work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed Work. Promptly repair any damage to same at Contractor's expense.
- C. Consult with the Owner's Representative as to the methods of carrying on the Work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Owner's Representative.
- D. Prior to starting work in any area, obtain approval for doing so from a qualified representative of the Owner who is designated and authorized by the Owner to perform testing and abatement, if necessary, of all hazardous materials including but not limited to, asbestos. The Contractor shall not perform any inspection, testing, containment, removal or other work that is related in any way whatsoever to hazardous materials under the Contract.

### 3.3 TEMPORARY SERVICES

- A. Provide temporary service as described in Division 01.
- B. The existing building will be occupied during construction. Maintain mechanical services and provide necessary temporary connections and their removal at no additional cost to the Owner.

3.4 WORK INVOLVING OTHER TRADES

- A. Certain items of equipment or materials specified in the Mechanical Division may have to be installed by other trades due to code requirements or union jurisdictional requirements. In such instances, the Contractor shall complete the work through an approved, qualified subcontractor and shall include the full cost for same in proposal.

3.5 ACCEPTANCE PROCEDURE

- A. Upon successful completion of start-up and recalibration, but prior to building acceptance, substantial completion and commencement of warranties, the Architect/Engineer shall be requested in writing to observe the satisfactory operation of all mechanical control systems.
- B. The Contractor shall demonstrate operation of equipment and control systems, including each individual component, to the Owner and Architect/Engineer.
- C. After correcting all items appearing on the punch list, make a second written request to the Owner and Architect/Engineer for observation and approval.
- D. After all items on the punch list are corrected and formal approval of the mechanical systems is provided by the Architect/Engineer, the Contractor shall indicate to the Owner in writing the commencement of the warranty period.
- E. For systems requiring seasonal operation, demonstrate system performance within six months when weather conditions are suitable.

3.6 PROJECT COMMISSIONING

- A. Refer to Division 01 "Project Commissioning" and the Commissioning Manual.
- B. Purpose: Training, documentation and verification of the operation and functional performance of mechanical systems for compliance with the "design intent."

END OF SECTION 20 0500

SECTION 20 0510 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SUMMARY .....	1
1.3 DEFINITIONS .....	2
1.4 ACTION SUBMITTALS .....	2
1.5 INFORMATIONAL SUBMITTALS .....	2
1.6 QUALITY ASSURANCE .....	2
1.7 DELIVERY, STORAGE, AND HANDLING .....	3
1.8 COORDINATION .....	4
PART 2 - PRODUCTS .....	4
2.1 MANUFACTURERS .....	4
2.2 PIPE, TUBE, AND FITTINGS .....	4
2.3 JOINING MATERIALS .....	4
2.4 PIPE THREAD COMPOUNDS .....	5
2.5 TRANSITION FITTINGS .....	5
2.6 SLEEVES .....	5
2.7 ESCUTCHEONS .....	6
2.8 GROUT .....	6
2.9 EPOXY BONDING COMPOUND .....	6
PART 3 - EXECUTION .....	7
3.1 PIPING SYSTEMS - COMMON REQUIREMENTS .....	7
3.2 PIPING JOINT CONSTRUCTION .....	9
3.3 EQUIPMENT CONNECTIONS .....	10
3.4 PIPING CONNECTIONS .....	10
3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS .....	10
3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES .....	11
3.7 EPOXY BONDING TO EXISTING MATERIALS .....	11
3.8 JACKING OF PIPE .....	11
3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES .....	11
3.10 GROUTING .....	11
3.11 CUTTING, CORING AND PATCHING .....	12
3.12 EXCAVATION AND BACKFILLING .....	12
3.13 FLASHING .....	12
3.14 LUBRICATION .....	12
3.15 CLEANING .....	12

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 22 Section "Domestic Water Piping" for flushing and cleaning of potable water piping.

1.2 SUMMARY

- A. This section includes mechanical materials and installation methods common to mechanical piping systems, sheet metal systems and equipment. This section supplements all other Division 20, 21, 22, and 23 Mechanical Sections, and Division 01 Specification Sections.



1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
  - 1. ABS: Acrylonitrile-butadiene-styrene plastic.
  - 2. CPVC: Chlorinated polyvinyl chloride plastic.
  - 3. PE: Polyethylene plastic.
  - 4. PVC: Polyvinyl chloride plastic.
  - 5. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
  - 6. RTRP: Reinforced thermosetting resin (fiberglass) pipe.
- G. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Transition fittings.
  - 2. Dielectric fittings.
  - 3. Mechanical sleeve seals.
  - 4. Escutcheons.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Brazing Certificates: As required by ASME Boiler and Pressure Vessel Code, Section IX, or AWS B2.2.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with requirements in Public Law 111-380, "Reduction of Lead in Drinking Water Act," about lead content in materials that will be in contact with potable water for human consumption.

- B. Comply with NSF 14, "Plastics Piping System Components and Related Materials," for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.
  - C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.
  - D. Comply with NSF 372, "Drinking Water System Components – Lead Content" for potable domestic water piping and components.
  - E. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
    - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
    - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
  - F. Duct Joint and Seam Welding: Qualify procedures and personnel according to the following:
    - 1. AWS D9.1, "Sheet Metal Welding Code."
  - G. Structural Welding: Qualify procedures and personnel according to the following:
    - 1. AWS D1.1, "Structural Welding Code--Steel."
    - 2. AWS D1.2, "Structural Welding Code--Aluminum."
    - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
    - 4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
    - 5. AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
  - H. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
  - I. Soldering: Qualify processes and operators according to AWS B2.3/2.3M, "Specification for Soldering Procedure and Performance Qualification."
  - J. Installer Qualifications:
    - 1. Installers of Grooved Components: Installers shall be certified by the grooved component manufacturer as having been trained and qualified to join piping with grooved couplings, fittings, and specialties.
    - 2. Installers of Pressure-Sealed Joints: Installers shall be certified by the pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
    - 3. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by the manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Storage and Protection: Provide adequate weather protected storage space for all mechanical equipment and materials deliveries to the job site. Storage locations will be designated by the Owner's Representative. Equipment stored in unprotected areas must be provided with temporary protection.
    - 1. Protect equipment and materials from theft, injury or damage.
    - 2. Protect equipment outlets, pipe and duct openings with temporary plugs or caps.
    - 3. Materials with enamel or glaze surface shall be protected from damage by covering and/or coating as recommended in bulletin "Handling and Care of Enameled Cast Iron Plumbing Fixtures", issued by the Plumbing Fixtures Manufacturer Association, and as approved.

4. Electrical equipment furnished by Mechanical Trades and installed by the Electrical Trades: Turn over to Electrical Trades in good condition, receive written confirmation of same.
5. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
6. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

## 1.8 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations. Coordinate with other trades to ensure accurate locations and sizes of mechanical spaces, chases, slots, shafts, recesses and openings.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Install Work to avoid interference with work of other trades including, but not limited to, Architectural and Electrical Trades. Remove and relocate any work that causes an interference at Contractor's expense.
- D. Coordinate requirements for and provide access panels and doors for mechanical items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."
- E. The mechanical trades shall be responsible for all damage to other work caused by their work or through the neglect of their workers.
  1. All patching and repair of any such damaged work shall be performed by the trades which installed the work. The cost shall be paid by the Mechanical Trades.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 21, 22, and 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 2.3 JOINING MATERIALS

- A. Refer to individual Division 21, 22, and 23 piping Sections for special joining materials not listed below.
- B. Flanges: Pipe Sizes 2-1/2 Inch and Larger:
  1. Ferrous pipe: Standard weight, forged steel weld neck flanges.
  2. Copper tube and pipe: Slip-on bronze flanges.

- C. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
  - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- D. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated. Square head bolts and nuts are not acceptable.
- E. Solder Filler Metals: ASTM B 32, lead-free, antimony-free, silver-bearing alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: Alloys meeting AWS A5.8.
  - 1. Use Type BcuP Series, silver-bearing, copper-phosphorus alloys for joining copper or bronze socket fittings with copper pipe. Flux is prohibited unless used with bronze fittings.
  - 2. Use Type Bag Series, cadmium-free silver alloys for joining copper with steel, stainless steel, or other ferrous alloys.

## 2.4 PIPE THREAD COMPOUNDS

- A. General: Pipe thread compounds for the fluid service compatible with piping materials provided.
- B. Potable Water Service and Similar Applications: Compounds acceptable to U.S. Department of Agriculture (USDA) or Food and Drug Administration (FDA). Compounds containing lead are prohibited.

## 2.5 TRANSITION FITTINGS

- A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
  - 1. Manufacturers:
    - a. Cascade Waterworks Mfg. Co.
    - b. Dresser Industries, Inc.; DMD Div.
    - c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
    - d. JCM Industries.
    - e. Smith-Blair, Inc.
    - f. Viking Johnson.
  - 2. Aboveground Pressure Piping: Pipe fitting.

## 2.6 SLEEVES

- A. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, and 0.375 inch wall black.
- B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, and 0.375 inch wall galvanized, plain ends.
- C. Water Stop: Cast or ductile-iron; fabricated steel; PVC; or rotationally molded HDPE pipe; with plain ends and integral water stop, unless otherwise indicated.

1. Manufacturers:
  - a. Advance Products & Systems, Inc.; Infinity and Gal-Vo-Plast Sleeves.
  - b. Calpico, Inc.
  - c. Metraflex Co.
  - d. Pipeline Seal and Insulator, Inc.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

## 2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

1. New Piping:
  - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
  - b. Chrome-Plated Piping or Piping in High Humidity Areas: One-piece, cast-brass type with polished chrome-plated finish.
  - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
  - d. Bare Piping in Finished Spaces: One-piece, stamped-steel type.
  - e. Bare Piping in Unfinished Service Spaces or Equipment Rooms: Split-plate, stamped-steel type with concealed hinge and set screw.
2. Existing Piping: Use the following:
  - a. Chrome-Plated Piping or Piping in High Humidity Areas: Split-casting, cast-brass type with chrome-plated finish.
  - b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
  - c. Bare Piping: Split-plate, stamped-steel type with set screw or spring clips.

## 2.8 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

## 2.9 EPOXY BONDING COMPOUND

A. Two-component system suitable for bonding wet or dry concrete to each other and to other materials.

B. Manufacturers:

1. Euco 452 #450; Euclid Chemical Co.
2. Epobond; L & M Construction Chemicals.
3. Sikadur 87; Sika Corp.

### PART 3 - EXECUTION

#### 3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Refer to piping application schedules on the Drawings.
- B. Install piping according to the following requirements and Division 21, 22, and 23 Sections specifying piping systems, and in accordance with manufacturer's instructions.
- C. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. The Drawings shall be followed as closely as elements of construction will permit.
- D. During the progress of construction, protect open ends of pipe, fittings, and valves to prevent the admission of foreign matter. Place plugs or flanges in the ends of all installed work whenever work stops. Plugs shall be commercially manufactured products.
- E. Prior to and during laying of pipe, maintain excavations dry and clear of water and extraneous materials. Provide minimum 4 inches of clearance in all directions for pipe passing under or through building grade beams.
- F. Weld-o-lets and thread-o-lets can be used for annular flow measuring devices, temperature control components, and thermal wells in steel pipe. Pipe taps shall be drilled and deburred. Torch cutting is not acceptable.
- G. Brazolets can be used for annular flow measuring devices, temperature control components, and thermal wells in copper tube. Pipe taps shall be drilled and deburred. Torch cutting is not acceptable.
- H. Clean and lubricate elastomer joints prior to assembly.
- I. Install piping to conserve building space and not interfere with use of space.
- J. Group piping whenever practical at common elevations.
- K. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
  - 1. Install piping to allow for expansion and contraction at locations where piping crosses building or structure expansion joints.
- L. Slope piping and arrange systems to drain at low points.
- M. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- N. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- O. In concealed locations where piping, other than black steel, cast-iron, or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches from the nearest edge of the member, the pipe shall be protected by shield plates. Protective shield plates shall be a minimum of 1/16 inch thick steel, shall cover the area of the pipe where the member is notched or bored, and shall extend a minimum of 2 inches above sole plates and below top plates.
- P. Do not penetrate building structural members unless specifically indicated on drawings.
- Q. Install piping above accessible ceilings to allow sufficient space for ceiling panel and light fixture removal.

- R. Install valves with stems upright or horizontal, not inverted.
- S. Provide clearance for installation of insulation and access to valves and fittings.
- T. Install piping to permit valve and equipment servicing. Do not install piping below valves and/or terminal equipment. Do not install piping above electrical equipment.
- U. Install piping at indicated slopes. Provide drain valves with hose end connections and caps at all piping low points, where piping is trapped and at all equipment.
- V. Install piping free of sags and bends.
- W. Install fittings for changes in direction and branch connections.
- X. Unless otherwise indicated or specified, install branch connections to mains using tee fittings in main pipe:
  - 1. Branch connected to bottom of main pipe for HVAC systems. Side connection is acceptable. Connection above centerline of main is unacceptable. For up-feed risers, connect branch to top of main pipe.
  - 2. Branch connected to top of main for steam and condensate, plumbing systems, compressible gasses, and vacuum.
- Y. Install piping to allow application of insulation.
- Z. Select system components with pressure rating equal to or greater than system operating pressure.
- AA. After completion, fill, clean, and treat systems. Refer to Division 23 Sections "Hydronic Piping," "Piping Systems Flushing and Chemical Cleaning," and "HVAC Water Treatment."
- BB. Install escutcheons for penetrations of walls below ceiling, and ceilings.
- CC. Sleeves are not required for core-drilled holes in poured concrete walls.
- DD. Permanent sleeves are not required for holes formed by removable PE sleeves in poured concrete walls.
- EE. Install sleeves for pipes passing through footings and foundation walls, masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
  - 1. Cut sleeves to length for mounting flush with both surfaces of walls.
    - a. Exception: Extend sleeves installed in floors 2 inches above finished floor level.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Schedule 40 Black Steel Sleeves: For pipes smaller than NPS 12 penetrating interior walls.
    - b. 0.375 Inch Wall Black Steel Sleeves: For pipes NPS 12 and larger penetrating interior walls.
    - c. Schedule 40 Galvanized Steel Sleeves: For pipes smaller than NPS 12 penetrating floors, and roof slabs.
    - d. 0.375 Inch Wall Galvanized Steel Sleeves: For pipes NPS 12 and larger penetrating floors and roof slabs.
    - e. For pipes penetrating floors with membrane water proofing provide cast iron sleeve with clamping flanges. Secure/seal membrane to sleeves with clamping flanges.
  - 4. Seal sleeves in concrete floors roof slabs and masonry walls with grout.
  - 5. Seal sleeves in plaster/gypsum-board partitions with plaster or dry wall compound and caulk with non-hardening silicone sealant to provide airtight installation.

6. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- FF. Existing Underground, Exterior-Wall and Slab on Grade Pipe Penetrations: Seal core drilled pipe penetrations using modular mechanical seals. Allow for 1-inch annular clear space between pipe and cored opening for installing modular mechanical seals.
1. Modular Mechanical Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of cored hole. Assemble modular mechanical seals and install in annular space between pipe and cored opening. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- GG. Verify final equipment locations for roughing-in.
- HH. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 21, 22, and 23 Sections specifying piping systems.
- B. Cut piping square.
- C. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- D. Remove scale, slag, dirt, oil, and debris from inside and outside of pipe and fittings before assembly.
- E. Clean damaged galvanized surfaces and touch-up with a zinc rich coating.
- F. Use standard long sweep pipe fittings for changes in direction. No mitered joints or field fabricated pipe bends will be permitted. Short radius elbows may be used where specified or specifically authorized by the Architect.
- G. Make tee connections with screwed tee fittings, soldered fittings or specified welded connections. Make welded branch connections with either welding tees or forged branch outlet fittings in accordance with ASTM A234, ANSI B16.9 and ANSI B16.11. For forged branch outlets, furnish forged fittings flared for improved flow where attached to the run, reinforced against external strains and to full pipe-bursting strength requirements. "Fishmouth" connections are not acceptable.
- H. Use eccentric reducers for drainage and venting of pipe lines; bushings are not permitted.
- I. Provide pipe openings using fittings for all systems control devices, thermometers, gauges, etc. Drilling and tapping of pipe wall for connections is prohibited.
- J. Provide temperature sensing device thermal wells and similar piping specialty connections.
- K. Provide instrument connections except thermal wells with specified isolating valves at point of connection to system.
- L. Locate instrument connections in accordance with manufacturer's instructions for accurate read-out of function sensed. Locate instrument connections for easy reading and service of devices.
- M. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- N. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.



- O. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on gaskets and bolt threads.
  - 1. Assemble flanged joints with fresh-stock gasket and hex head nuts, bolts or studs. Make clearance between flange faces such that the connections can be gasketed and bolted tight without strain on the piping system. Align flange faces parallel and bores concentric; center gaskets on the flange faces without projection into the bore.
  - 2. Lubricate bolts before assembly to insure uniform bolt stressing. Draw up and tighten bolts in staggered sequence to prevent unequal gasket compression and deformation of the flanges. Do not mate a flange with a raised face to a companion flange with a flat face; machine the raised face down to a smooth matching surface and use a full face gasket. After the piping system has been tested and is in service at its maximum temperature, check bolting torque to provide required gasket stress.
- P. Remake joints which fail pressure tests with new materials including pipe, fittings, gaskets and/or a filler.

### 3.3 EQUIPMENT CONNECTIONS

- A. Make connections to equipment, fixtures, and other items included in the work in accordance with the submittals and rough-in measurements furnished by the manufacturers of the particular equipment furnished.
  - 1. Any and all additional connections not shown on the drawings but shown on the equipment manufacturer's submittal or required for the successful operation of the equipment shall be installed as part of this Contract at no additional charge to the Owner.
- B. All piping connections to pumps, coils, and other equipment shall be installed without strain at the pipe connection of this equipment. When directed, remove the bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install flanges, in piping NPS 2-1/2 and larger, where indicated on Drawings, at final connection to each piece of equipment and at all control valves.

### 3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are indicated. Housekeeping pad locations and sizes shall be coordinated by mechanical contractor prior to the placement of concrete slabs.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.
- E. For suspended equipment, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of Architect for same including loads, locations and methods of attachment.

- F. Equipment Rigging Over Roof Areas: Protect building structure against damage during equipment rigging. Make provisions to distribute load of equipment to main roof structure, and to prevent damage to roof decking, roofing, or purlins.
- G. The Contract Documents indicate items to be purchased and installed. The items are noted by a manufacturer's name, catalog number and/or brief description. The catalog number may not designate all the accessory parts for a particular application. Arrange with the manufacturer for the purchase of all items required for a complete installation.

### 3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Where pipe and/or equipment support members must be welded to structural building framing, Contractor shall seek prior approval from Architect and structural engineer. Scrape, brush clean, and apply one coat of zinc rich primer after welding.
- D. Field Welding: Comply with AWS D1.1.

### 3.7 EPOXY BONDING TO EXISTING MATERIALS

- A. Use epoxy bonding compound to set sleeves or pipes in existing concrete to bond new concrete and/or grout to existing materials or to bond dissimilar materials.
- B. The compound, when applied in accordance with the manufacturer's instructions, shall be capable of initial curing within 48 hours at temperatures as low as 40 deg F and shall be capable of bonding any combination of the following properly prepared materials: Wet or dry, cured or uncured concrete or mortar; vitrified clay; cast iron and carbon steel.

### 3.8 JACKING OF PIPE

- A. Do not jack pipe in place except upon prior approval of proposed materials and complete details of methods.

### 3.9 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

### 3.10 GROUTING

- A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.

- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

### 3.11 CUTTING, CORING AND PATCHING

- A. Refer to Division 01 Specification Sections for requirements for cutting, coring, patching and refinishing work necessary for the installation of mechanical work.
- B. All cutting, coring, patching and repair work shall be performed by the Contractor through approved, qualified subcontractors. Contractor shall include full cost of same in bid.

### 3.12 EXCAVATION AND BACKFILLING

- A. Refer to Division 31 Specification Sections.
- B. Provide all excavation, trenching, tunneling and backfilling required for the mechanical work.
- C. Provide all pumping and/or well pointing required for the mechanical work.
- D. Provide foundations if required to support underground piping.
- E. Backfill all excavations with well-tamped granular material. Backfill all excavations under wall footings with lean mix concrete up to underside of footings and extend concrete within excavation a minimum of four (4) feet each side of footing. Granular backfill shall be placed in layers not more than 8 inches in thickness, 95 percent compaction throughout with approved compaction equipment. Tamp, roll as required. Excavated material shall not be used.

### 3.13 FLASHING

- A. Provide all flashing required for mechanical work. Refer to Division 07 Specification Sections.

### 3.14 LUBRICATION

- A. Provide all lubrication for the operation of the equipment until acceptance by the Owner. Contractor is responsible for all damage to bearings up to the date of acceptance of the equipment. Protect all bearings and shafts during installation. Thoroughly grease steel shafts to prevent corrosion. Provide covers as required for proper protection of all motors and other equipment during construction.

### 3.15 CLEANING

- A. Each Mechanical Trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.

- B. After equipment, steam, condensate and HVAC water piping systems have been completed and tested, each entire system shall be cleaned and flushed. Refer to Division 23 Section "Piping Systems Flushing and Chemical Cleaning" for requirements. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning requirements.
- C. Prior to connection of new HVAC piping to existing HVAC piping systems, all new piping shall be subject to initial flushing, cleaning and final flushing. Refer to Division 23 Section "Piping Systems Flushing and Chemical Cleaning" for requirements. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning requirements.
- D. Flushing, cleaning, and disinfection of domestic water piping is specified in Division 22 Section "Domestic Water Piping."
- E. Exterior surfaces of all piping, ductwork and equipment shall be wiped down to remove excess dirt and debris prior to concealment by Architectural Trades work.
- F. Upon completion of work in each respective area, clean and protect work. Just prior to final acceptance, perform additional cleaning as necessary to provide clean equipment and areas to the Owner.

END OF SECTION 20 0510

SECTION 20 0529 - HANGERS AND SUPPORTS

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 DEFINITIONS .....	1
1.3 PERFORMANCE REQUIREMENTS .....	1
1.4 ACTION SUBMITTALS .....	2
1.5 INFORMATIONAL SUBMITTALS .....	2
1.6 QUALITY ASSURANCE .....	2
PART 2 - PRODUCTS .....	2
2.1 MANUFACTURERS .....	2
2.2 HANGER ROD MATERIAL .....	2
2.3 STEEL PIPE HANGERS AND SUPPORTS .....	2
2.4 TRAPEZE PIPE HANGERS .....	3
2.5 METAL FRAMING SYSTEMS .....	3
2.6 METAL INSULATION SHIELDS .....	3
2.7 PIPE COVERING PROTECTION SADDLES .....	4
2.8 THERMAL-HANGER SHIELDS .....	4
2.9 FASTENER SYSTEMS .....	5
2.10 EQUIPMENT SUPPORTS .....	5
2.11 MISCELLANEOUS MATERIALS .....	6
PART 3 - EXECUTION .....	6
3.1 HANGER AND SUPPORT APPLICATIONS .....	6
3.2 HANGER AND SUPPORT INSTALLATION .....	7
3.3 EQUIPMENT SUPPORTS .....	10
3.4 METAL FABRICATIONS .....	10
3.5 ADJUSTING .....	10
3.6 PAINTING .....	11

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Basic Mechanical Materials and Methods."

1.2 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.
- B. MFMA: Metal Framing Manufacturers Association.

1.3 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Steel pipe hangers and supports.
  - 2. Thermal-hanger shield inserts.
  - 3. Fiberglass pipe hangers.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details and include calculations for the following:
  - 1. Trapeze pipe hangers. Include Product Data for components.
  - 2. Metal framing systems. Include Product Data for components.
  - 3. Pipe stands. Include Product Data for components.
  - 4. Equipment supports.
  - 5. Fiberglass strut systems. Include Product Data for components.

#### 1.6 QUALITY ASSURANCE

- A. MSS Standards: Pipe hangers, supports, and accessories shall comply with the following:
  - 1. MSS SP-58, Pipe Hangers and Supports – Materials, Design and Manufacture, Selection, Application, and Installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

#### 2.2 HANGER ROD MATERIAL

- A. Threaded, hot rolled, steel rod conforming to ASTM A 36 or A575.
  - 1. Rod continuously threaded.
  - 2. Use of rod couplings is prohibited.

#### 2.3 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article, and schedules and details on the Drawings for where to use specific hanger and support types.

1. Hangers and Supports for Fire Protection Piping: UL listed or FMG approved.
2. Hangers and Supports for Fire Protection Piping: UL listed and FMG approved.

B. Manufacturers:

1. Anvil; ASC Engineered Solutions.
2. B-Line by Eaton.
3. Carpenter & Paterson, Inc.
4. Hilti USA.
5. nVent Electric plc; CADDY.
6. PHD Manufacturing, Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

## 2.4 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

## 2.5 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. Anvil; Anvil-Strut; ASC Engineered Solutions.
2. B-Line by Eaton.
3. nVent Electrical plc; ERISTRUT Div.
4. Power-Strut; a part of Atkore International.
5. Unistrut; a part of Atkore International.
6. Hilti USA.

C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

D. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

E. Nonmetallic Coatings: Plastic coating, jacket, or liner.

## 2.6 METAL INSULATION SHIELDS

A. Manufacturers:

1. Anvil; ASC Engineered Solutions.
2. B-Line by Eaton.
3. Carpenter & Paterson, Inc.
4. nVent Electric plc; CADDY.
5. PHD Manufacturing, Inc.

B. Description: MSS SP-58, Type 40, protective shields. Shields shall span an arc of 180 degrees.

- C. Shield Dimensions for Pipe: Not less than the following:
  - 1. NPS 1/4 to NPS 2: 12 inches long and 0.048 inch thick.

## 2.7 PIPE COVERING PROTECTION SADDLES

- A. Manufacturers:
  - 1. Anvil; ASC Engineered Solutions.
  - 2. B-Line by Eaton.
  - 3. Carpenter & Paterson, Inc.
  - 4. nVent Electric plc; CADDY.
  - 5. PHD Manufacturing, Inc.
- B. Description: MSS SP-58, Type 39A and Type 39B, for suspension of insulated hot pipe where heat losses are to be kept to a minimum.
  - 1. Saddles shall match insulation thickness.
  - 2. Saddle length: 12 inches.
  - 3. Furnish with center rib for pipe sized NPS 12 and larger.

## 2.8 THERMAL-HANGER SHIELDS

- A. Manufacturers:
  - 1. American Mechanical Insulation Sales Inc. (AMIS).
  - 2. B-Line by Eaton.
  - 3. nVent Electric plc; CADDY.
  - 4. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.
  - 5. Rilco Manufacturing Company, Inc.
  - 6. Value Engineered Products, Inc.
- B. Description: Manufactured assembly consisting of insulation insert encased in 360 degree sheet metal shield.
  - 1. Minimum Compressive Strength of Insert Material:
    - a. 100-psig- for sizes smaller than NPS 6.
    - b. 600-psig- for sizes NPS 6 and larger.
- C. Insulation-Insert Material for Cold Piping: Full 360 degree, water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: Full 360 degree, water-repellent treated, ASTM C 533, Type I calcium silicate.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.
- F. Include carbon steel ASTM A36 load distribution plates as required by load, pipe movement, hanger style, and hanger spacing.
- G. Thermal-Hanger Shields for Flexible Foamed Elastomeric Insulated Piping:
  - 1. Manufacturer:



- a. B-Line by Eaton/Armacell; Armafix IPH.
  - b. Aeroflex USA, Inc.; Aerofix-U.
  - c. ZSi-Foster, Inc.; Cush-A-Therm.
2. Insulation-Insert Material for Copper Piping with Flexible Foamed Elastomeric Insulation: Use the following:
- a. Flexible foamed elastomeric, ASTM 534, Type I-Tubular Grade 1 with PUR/PIP support inserts.

## 2.9 FASTENER SYSTEMS

### A. Post-Installed Anchors:

1. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  - a. Manufacturers:
    - 1) B-Line by Eaton.
    - 2) DeWalt Engineered by Powers.
    - 3) Hilti, Inc.
    - 4) ITW Ramset/Red Head.
    - 5) MKT Fastening, LLC.
2. Internally Threaded Screw Anchors: Internally threaded, self-tapping screw anchor designed for performance in cracked and uncracked concrete. Suitable base materials include normal-weight concrete, sand-lightweight concrete and concrete over steel deck.
  - a. UL Listed or FMG approved for fire sprinkler piping.
  - b. Available Sizes: For 1/4-inch, 3/8-inch, and 1/2-inch diameter rod sizes
  - c. Manufacturers:
    - 1) B-Line by Eaton; Rapid Rod Hangers.
    - 2) DeWalt Engineered by Powers; Snake+.
3. Chemical Fasteners: Insert-type-stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application. Exception: Do not use chemical fasteners to support hanger systems for fire protection piping.
  - a. Manufacturers:
    - 1) DeWalt Engineered by Powers.
    - 2) Hilti, Inc.
    - 3) ITW Ramset/Red Head.
    - 4) MKT Fastening, LLC.
  - b. Bonding Material: ASTM C 881, Type IV, Grade 3, 2-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
  - c. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
  - d. Washer and Nut: Zinc-coated steel.

## 2.10 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.11 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
  - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Refer to application schedules on the Drawings.
- B. For insulated pipe, oversize hanger elements to accommodate insulation thickness.
- C. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- D. Comply with MSS SP-58 for pipe hanger selections and applications that are not specified in piping system Sections.
- E. Use hangers and supports with galvanized, metallic coatings for outdoor applications or where exposed to outdoor conditions.
- F. Use hangers and supports with plastic coating, or galvanized metallic coatings for applications in corrosive atmospheres.
- G. Use metal framing, with plastic coating, or galvanized metallic coatings for metal framing in corrosive atmospheres.
- H. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- I. Use padded hangers for piping that is subject to scratching.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. MSS Type 8 or spring type to meet system requirements.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
  - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
  - 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Concrete Structure Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Anchor Devices, Concrete and Masonry: in accordance with Group I, Group II, Type 2, Class 2, Style 1 and Style 2, Group III and Group VIII or FS FF-S-325A. Furnish cast-in floor type equipment anchor devices with adjustable positions. Furnish built in anchor devices for masonry, unless otherwise approved by the Architect. Powder actuated anchoring devices shall not be used to support any mechanical systems components.
  2. Inserts, Concrete: TYPE 18 or 19. When applied to loads equivalent to piping in sizes NPS 2 and larger, and where otherwise required by imposed loads, a one foot length of 1/2 inch reinforcing rod shall be inserted and wired through wing slots. Proprietary type continuous inserts may be proposed and shall be submitted for approval.
  3. Use mechanical-expansion anchors where required in concrete construction.
  4. Use chemical fasteners where required in concrete construction.
- M. Steel Frame Structure Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Beam Clamps:
    - a. Center Loading: TYPE 21, 28, 29 and 30, unless otherwise indicated. Type 27 shall be allowed to support single pipes NPS 6 size or smaller only.
    - b. "C" Clamps: Type 19, 20 or 23, for supporting single pipes NPS 2-1/2 size or smaller only. Use of "C" clamps, or beam clamps of "C" pattern, or any modification thereof, is prohibited for supporting multiple pipes or pipes larger than NPS 2-1/2.
- N. Hanger-Rod Attachments for Wood Construction: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. All Steel Ceiling Plates: UL listed and suitable for attachment to wood beams. For pipe sizes NPS 1/2 to NPS 2. Install in accordance with manufacturer's instructions to maintain listing.
  2. Threaded Side Beam Brackets: UL listed and FMG approved, suitable for attachment to wood beams. For pipe sizes NPS 2 to NPS 4. Install in accordance with manufacturer's instructions to maintain listing.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Use spring supports and sway braces TYPES 48, 49, 50, 51, 52, 53, 54, 55 or 56. For specific points:
    - a. Provide spring supports at point of support where vertical movement will occur.
    - b. For light loads and vertical movement less than 1/4 inch, TYPES 48 or 49 spring cushion supports.
    - c. For vertical movements in excess of 1/4 inch but less than 1/2 inch, TYPES 51, 52 or 53 variable spring supports shall be used, loaded to not more than 75 percent of published load rating.
    - d. For vertical movements of 1/2 inch and more, TYPES 54, 55 and 56 constant support spring hangers.
    - e. Sway braces; TYPE 50.
    - f. Variable spring hangers in accordance with referenced MSS Standards with "medium" allowable load change.
- P. Comply with MSS SP-58 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- Q. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- 3.2 HANGER AND SUPPORT INSTALLATION
- A. Steel Pipe Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from building structural frame.

- B. Provide necessary piping and equipment supporting elements including: building structure attachments, supplementary steel, hanger rods, stanchions and fixtures, vertical pipe attachments, horizontal pipe attachments, anchors, guides, spring supports in accordance with the referenced codes, standards, and requirements specified. Support piping and equipment from building structure, not from roof deck, floor slab, other pipe, duct or equipment.
- C. At connections between piping systems, hangers and equipment of dissimilar metals, insulate, using dielectric insulating material, nonferrous piping against direct contact with the building steel by insulating the contact point of the hanger and pipe or the hanger and building steel. Test each point of dielectric insulation with an ohm meter to ensure proper isolation of dissimilar materials. Test shall be observed by the Owner's Representative and/or Architect.
- D. Use copper plated or plastic coated supporting element in contact with copper tubing or glass piping.
- E. File and paint cut ends and shop or field prime paint supporting element components.
- F. Secure Type 40 shields to support elements in a manner that prevents movement and damage to insulation and jacket materials.
- G. Hang piping parallel with the lines of the building, unless otherwise indicated. Route piping in an orderly manner and maintain gradient. Space piping and components so a threaded pipe fitting may be removed between adjacent pipes and so there will be not less than 1/2 inch of clear space between finished surfaces and piping. Arrange hangers on adjacent parallel service lines in line with each other.
- H. Flange loads on connected equipment shall not exceed 75 percent of maximum allowed by equipment manufacturer. Flange loads in liquid containing systems shall be checked in the presence of the Architect when piping is full of liquid. No flange load is allowed on pumps, vibration isolated equipment or flexible connectors.
- I. Spring supports, within specified limitations: Constant support type, where necessary to avoid transfer of load from support to support or onto connected equipment; otherwise, variable support type located at points subject to vertical movement.
- J. Incorporate pipe anchors into piping systems to maintain permanent pipe positions. Install alignment guides for the piping adjacent to and on each side of pipe expansion loops and expansion joints to maintain alignment.
- K. Where necessary, brace piping and supports against reaction, sway and vibration.
- L. Do not hang piping from joist pans, floor decks, roof decks, equipment, ductwork, or other piping.
- M. Install turnbuckles, swing eyes and clevises to accommodate temperature changes, pipe accessibility, and adjustment for load pitch. Rod couplings are not acceptable.
- N. Install hangers and supports for piping at intervals specified, at locations not more than 3 feet from the ends of each runout, not more than 3 feet from connections to equipment, and not over 25 percent of specified interval from each change in direction of piping and for concentrated loads such as valves, etc.
- O. Base the load rating for pipe support elements on loads imposed by insulated weight of pipe filled with water. The span deflection shall not exceed slope gradient of pipe.
- P. If structural steel, roofs, or tunnels will allow support spacing greater than that shown above, Contractor shall submit proposed support system along with structural calculations documenting the allowance of such spacing, in accordance with ANSI, B31.1, and MSS Guidelines.
- Q. Support vertical risers independently of connected horizontal piping whenever practical, with supports at the base and at intervals to accommodate system range of load with thermal conditions. Support vertical risers at each floor penetration for piping in shafts or chases. Guide for lateral stability. Fit horizontal piping

connected to moving risers with two spring supports connected adjacent to riser, spaced according to required hanger spacing.

- R. For risers at temperatures of 100 deg F or less place riser clamps under fittings. Support carbon steel pipe at each operating level or floor and at not more than 15-foot intervals for pipe 2 inches and smaller, and at not more than 20 foot intervals for pipe 2-1/2 inches and larger.
- S. After the piping systems have been installed, tested and placed in satisfactory operation, firmly tighten hanger rod nut and jam nut and upset threads to prevent movement of fasteners.
- T. Attach pipe anchors and pipe alignment guides to the building structure where indicated. If not indicated, the method used is optional to the Contractor, subject to approval by the Architect. In the case of structural steel, make attachment by clamping in accordance with the American Institute of Steel Construction Specification for the Design, Fabrication and Erection of Structural Steel for Building.
- U. Attach supporting elements connected to structural steel columns to preclude vertical slippage and cascading failure.
- V. Attach pipe hangers and other supporting elements to roof purlins and trusses at panel points.
- W. Where eccentric loading beam clamps are approved and where other work is supported by similar eccentric loading support element from the same structural member, locate eccentric loading support elements to minimize structural member torsion load.
- X. Limit the location of supporting elements for piping and equipment, when supported from roof, to panel points of the bar joists.
- Y. Building structure shall not be reinforced except as approved by the Architect in writing.
- Z. Support piping and equipment from concrete building frame, not from roof or floor slabs unless otherwise indicated.
- AA. Attach piping supports to the side of concrete beams and concrete joist. Provide supplementary support steel as required. Cast-in-place or drilled anchors will not be permitted in the bottom of concrete beams and concrete joist.
- BB. Attach piping supports to the side of concrete beams or concrete joist. Where intermediate hangers are required to meet the hanger spacing schedule, the Contractor may propose attachment of intermediate pipe supports to the bottom of the concrete slab pending submittal of a satisfactory pull out test. The Contractor shall submit pull out test criteria, pull out test results, proposed hanger detail and hanger point loads to the Architect for written approval.
- CC. Trapeze Pipe Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- DD. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- EE. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- FF. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

- GG. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- HH. Install lateral bracing with pipe hangers and supports to prevent swaying.
- II. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- JJ. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- KK. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- LL. Refer to individual piping sections for hanger spacing and hanger rod sizes.

### 3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

### 3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
  - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Equipment Supports: Painting is specified in Division 09 painting Sections.
- C. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- D. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 20 0529

SECTION 22 0500 - COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 INTERPRETATION OF DRAWINGS:.....	1
1.3 PROJECT RECORD DOCUMENTS:.....	1
1.4 DELIVERY, STORAGE AND HANDLING:.....	1
1.5 QUALITY ASSURANCE: .....	2
PART 2 - PRODUCTS .....	2
2.1 FIRE STOPPING: .....	2
2.2 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS:.....	2
PART 3 - EXECUTION .....	3
3.1 GENERAL REQUIREMENTS .....	3

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.
- B. Related Sections:
  - 1. Section 07 8400 - Penetration Firestopping

1.2 INTERPRETATION OF DRAWINGS:

- A. The Drawings show the location and general arrangement of equipment, piping, and related items. They shall be followed as closely as elements of the construction will permit. Examine the drawings of other trades and verify the conditions governing the work on the job site. Drawings are schematic in nature, and installation may require additional offsets and modifications, including fittings, traps, valves and accessories.
- B. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Report conflicts or differences to the architect/ engineer for resolution.

1.3 PROJECT RECORD DOCUMENTS:

- A. For underground piping, record dimensions and invert elevations of all piping, including all offsets, fittings, cathodic protection and accessories. Locate dimensions from benchmarks that will be preserved after construction is complete.
- B. For fire protection systems, record actual locations of sprinkler heads, and valves and deviations of piping from drawings. Indicate drain and test locations.

1.4 DELIVERY, STORAGE AND HANDLING:

- A. Deliver, store and handle all materials to keep clean and protected from damage.



- B. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.
- C. Protect equipment and other materials from damage after installed from construction debris and other damage.

1.5 QUALITY ASSURANCE:

- A. Regulatory Requirements: Comply with the following:
  - 1. Michigan Mechanical Code.
  - 2. Michigan Plumbing Code.
  - 3. Applicable City of Ann Arbor rules and regulations.
- B. Labeling requirement for packaged equipment:
  - 1. Electrical panels on packaged mechanical equipment shall bear UL label or label of other approved testing agency (ETL, CSA).
- C. Other referenced standards:
  - 1. Comply with codes and regulatory agency requirements as detailed in University of Michigan Design Guideline 1.0 Codes and Regulatory Agencies (<http://www.umaec.umich.edu/vendors/design-guidelines/1-0-codes-and-regulatory-agencies/>)

PART 2 - PRODUCTS

2.1 FIRE STOPPING:

- A. Provide UL classified firestopping system for mechanical penetrations through fire rated construction to maintain the fire rating. See Related Section for additional firestopping requirements, including approved manufacturers.

2.2 BUILDING ATTACHMENTS FOR MECHANICAL WORK SUPPORTS:

- A. General Requirements:
  - 1. Provide building attachments required for supporting mechanical work, suitably selected and installed for the loads applied with a minimum additional safety factor of 3.
  - 2. Where specified attachments are not suitable for conditions, submit to Engineer for approval, proposal for alternate building attachments.
  - 3. Approved Manufacturers: Anvil, or equivalent products by Michigan Hanger and B-Line.
  - 4. Provide supplemental trapeze supports where necessary. Design trapeze to support all trades. Coordinate loads, and supports with all trades. Size trapeze for maximum deflection of 1/64 of the span.
- B. Attachments to Structural Steel:
  - 1. Support mechanical work from building structural steel where possible and approved. No welding or bolting to structural steel is permitted unless authorized by Architect. C-clamps are not permitted.
    - a. Center beam clamp - for loads over 120 lb.: Malleable center hung Anvil Fig. 228.
    - b. Side beam clamp with retaining clips - for loads up to 120 lb.

C. Cast in Place Concrete Inserts:

1. Provide inserts selected for applied load of present load plus 100% for future, and coordinated with concrete work. Except as detailed on drawings, inserts shall be Unistrut or Grinnell. Plan, lay out and coordinate setting of inserts prior to concrete pour. Use Anvil Fig. 285 lightweight concrete insert for loads up to 400# or Anvil Fig. 281 Wedge Type concrete insert for loads up to 1200#

D. Drilled Insert Anchors:

1. Where mechanical work cannot be supported from structural steel, or cast in place concrete inserts, provide drilled concrete insert anchors. Submit for approval, project specific installation drawings for all loads over 100 lbs. Install inserts in web of beam if possible and approved. Insert depth shall not exceed two thirds the thickness of the concrete. Where existing concrete appears to be deteriorating, or where applied load at insert exceeds 1000 lbs., conduct test of concrete to determine derated capacity of insert. Anchors may be adhesive or expansion type up to 1000 lbs., and shall be adhesive type for loads over 1000 lbs.
2. Manufacturers: Hilti, Powers Fasteners

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Install equipment and materials in accordance with manufacturer's written and illustrated instructions, as detailed on drawings and as described in these specifications. Bring discrepancies in installation methods to the attention of the owner and A/E.
- B. Install hanger rod straight, without bending.

END OF SECTION 22 0500

SECTION 22 0519 - THERMOMETERS, PRESSURE GAUGES, AND ACCESSORIES

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SCOPE OF WORK: .....	1
1.3 QUALITY ASSURANCE .....	1
PART 2 - PRODUCTS .....	1
2.1 PRESSURE GAUGES .....	1
PART 3 - EXECUTION .....	2
3.1 INSTALLATION OF PRESSURE GAUGES .....	2
3.2 ADJUSTING AND CLEANING .....	2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

- A. Thermometers, pressure gauges, and accessories.

1.3 QUALITY ASSURANCE

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
  - 1. UL Compliance: Comply with applicable UL standards pertaining to meters and gauges.
  - 2. ASME and ISA Compliance: Comply with applicable portions of ASME and Instrument Society of America (ISA) standards pertaining to construction and installation of meters and gauges.
  - 3. ASME/ANSI B40.1, Pressure Gauge Standard.
  - 4. National Sanitation Foundation NSF/ANSI-61 (potable drinking water) and NSF-61 Annex G (listed as ≤ 0.25% weighted average lead content) (and/or NSF/ANSI-372) and Annex F. Applies to any item in contact with domestic (potable) water.
  - 5. U.S Safe Drinking Water Act (any item in contact with domestic (potable) water).

PART 2 - PRODUCTS

2.1 PRESSURE GAUGES

- A. Unless otherwise noted, provide all pressure gauges with clear glass window, cast aluminum, stainless steel or polypropylene case, black on white face, stainless steel wetted parts, brass 1/2" MPT socket, 1% full scale accuracy complying with ASME/ANSI B40-1 Grade 1A. Lead free when used for domestic water applications.

- B. Water and Compressed Air Services over 2" piping: 4 1/2" diameter face, 6" diameter face for location more than 8 feet above floor, sealed glass window, glycerin filled for connections within 10 feet of pumps. For applications exceeding 145 deg. F, provide 316 stainless steel needle valves rated minimum 500 psi, in lieu of glycerin filled.
- C. Except where noted otherwise, select range for twice normal operating pressure:  

Service	Range	
Water (CW)	0-100 psig	
- D. Manufacturers: Ashcroft, H. O. Terice, Marsh, Weksler, Weiss, Miljoco Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRESSURE GAUGES

- A. Install pressure gauges with 1/2" isolation ball valve. Where needle valves are specified as a substitute for glycerin filled in Part 2, install the needle valve between the ball valve and the gauge. Locate gauges to be readable from the floor preferably at eye level. Mount gauges securely to prevent excessive vibration, adjust needle valve to dampen pulsations. Install syphon tubes for steam pressure gauges, connected after the isolation ball valve. Do not install pressure gauges on bottom of piping.
- B. Install in the following locations, and elsewhere as indicated on drawings:
  - 1. At building water service entrance.
  - 2. Across strainers 2-1/2" pipe size and larger. Unless indicated otherwise, provide one pressure gauge connected to a ball valve at the inlet and a ball valve at the outlet of the strainer.

3.2 ADJUSTING AND CLEANING

- A. Adjusting: Adjust faces of meters and gauges to proper angle for best visibility.
- B. Cleaning: Clean meters and gauges. Replace cracked and broken windows. Touch up scratches.

END OF SECTION 22 0519

SECTION 22 0523 – VALVES

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SCOPE OF WORK: .....	1
1.3 QUALITY ASSURANCE: .....	1
PART 2 - PRODUCTS .....	1
2.1 VALVE APPLICATION SCHEDULE: .....	1
2.2 GENERAL VALVE REQUIREMENTS: .....	2
2.3 HIGH PERFORMANCE BUTTERFLY VALVE: .....	2
PART 3 - EXECUTION .....	2
3.1 GENERAL VALVE INSTALLATION REQUIREMENTS: .....	2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

- A. Provide valves as scheduled and specified for the following systems:
  - 1. Cold Water, Hot Water, Hot Water Return

1.3 QUALITY ASSURANCE:

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
  - 1. National Sanitation Foundation NSF/ANSI-61, including Annex G (listed as  $\leq 0.25\%$  weighted average lead content) (and/or NSF/ANSI-372) and Annex F. Applies to any item in contact with domestic (potable) water.
  - 2. U.S Safe Drinking Water Act (any item in contact with domestic (potable) water).

PART 2 - PRODUCTS

2.1 VALVE APPLICATION SCHEDULE:

- A. Cold Water:
  - 1. Isolation 2 1/2" and larger: High Performance Butterfly Valve, All stainless steel.
  - 2. Specialty Valves

2.2 GENERAL VALVE REQUIREMENTS:

- A. All valves shall have seats, stem seals and disc materials compatible with intended fluid, temperature, pressure and service.
- B. All EPDM shall be peroxide cured. All wetted seals shall be made from materials that are immune from chloramine degradation.
- C. Valves in contact with domestic (potable) water shall be "lead free" NSF/ANSI-61 Annex G (and/or NSF/ANSI-372) labeled. Soldered lead free valves (all types) are restricted to use on domestic potable water systems only.
- D. Unless noted otherwise, valves shall be rated for a minimum of 125# WSP (working steam pressure)/ 250# WOG (cold water, oil, gas).
- E. Unless noted otherwise, all butterfly valves shall be full lug construction, suitable for bi-directional dead end service, and have open position memory stop. Manually operated butterfly valves 4" and larger shall have enclosed worm gear operators with position indicators.
- F. Provide extended valve stems for insulated piping.
- G. Unless noted otherwise, valves 2-1/2" and larger shall be flanged. Grooved connections are permitted where specified.
- H. Unless noted otherwise, valves shall be same size as piping.

2.3 HIGH PERFORMANCE BUTTERFLY VALVE:

- A. Full lug, high performance type, carbon steel body, 316 stainless steel disc, stainless steel shaft and bearing, PTFE seat, Teflon stem packing. Rated for 150 psi, 450 degrees F.
- B. Manufacturers: Bray – Braylok Series 41, Dezurik - BHP, Jamesbury - 815L, Milwaukee - HP Series, Tri-Seal Valve-Contromatics (formerly Watts/KF Contromatics), Xomox Pliaseal, ABZ ABZolute Seal Series 400.
- C. For domestic water systems, full lug, high performance type, 316 stainless steel body, 316 stainless steel disc, stainless steel shaft and bearing, (all wetted parts stainless steel) PTFE seat, Teflon stem packing. Rated for 150 psi, 250 degrees F.

PART 3 - EXECUTION

3.1 GENERAL VALVE INSTALLATION REQUIREMENTS:

- A. Install valves such that operator is completely operable, and the valve position indicator is discernible from the floor.

END OF SECTION 22 0523

SECTION 22 0553 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL ..... 1  
1.1 RELATED DOCUMENTS ..... 1  
1.2 SCOPE OF WORK: ..... 1  
1.3 QUALITY ASSURANCE ..... 1  
1.4 ACCEPTABLE MANUFACTURERS: ..... 1  
PART 2 - PRODUCTS ..... 1  
2.1 PIPE MARKERS: ..... 1  
2.2 IDENTIFICATION ACCESSORIES: ..... 2  
PART 3 - EXECUTION ..... 2  
3.1 GENERAL INSTALLATION REQUIREMENTS: ..... 2  
3.2 PIPING SYSTEM IDENTIFICATION: ..... 2  
3.3 VALVE IDENTIFICATION: ..... 3

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

- A. Mechanical identification on piping, ductwork and equipment, identification of underground pipe, valve tags, and architectural access panels.

1.3 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 for lettering, size, colors, and viewing angles of mechanical identification.

1.4 ACCEPTABLE MANUFACTURERS:

- A. Provide mechanical identification materials from one of the following:
  - 1. Brady Co.
  - 2. Brimer
  - 3. Craftmark
  - 4. Seton
  - 5. Marking Services Incorporated

PART 2 - PRODUCTS

2.1 PIPE MARKERS:

- A. Manufacturer's standard, pre-printed, color-coded, plastic pipe markers, complying with ANSI A13.1, and requirements below. Self-adhesive markers are not acceptable.

- B. For pipe diameter (with insulation) less than 6": full-band, semi-rigid, snap-on pipe markers, extending 360 degrees around pipe.
- C. For pipe diameter (with insulation) of 6" and larger: full-band or strip-type pipe markers, but not narrower than 3 times letter height. Fasten with nylon or stainless steel bands for pipe 6" through 12". Fastened with stainless steel bands for piping over 12".
- D. Lettering: Standard nomenclature which best describes piping system, as selected by Engineer (in cases of variance from table below).
- E. Arrows: Pipe marker arrows indicating direction of flow, either integrally with piping system lettering, or as a separate marker.
- F. Identify contents of piping by both fluid contained and unique temperature and /or pressure (if necessary to distinguish between other systems with same fluid at different conditions); e.g. Potable Hot Water - 110F vs Potable Hot Water - 140F.
- G. Use the following color coding and nomenclature for pipe markers:

Plumbing and Waste Pipe System Labels Cold Water, Potable	Drawing I.D. For Reference Only CW	Letter and Label Color White on Green
---	--	---

## 2.2 IDENTIFICATION ACCESSORIES:

- A. Valve Tags: 1-1/2" diameter brass valve tags with 1/4" stamp-engraved designations with piping system abbreviation and sequenced valve numbers. Provide solid brass chain, or solid brass S-hooks of the size and type required for proper attachment of tags to valves.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS:

- A. Coordination: Install identification after insulation is applied. Protect identification from paint, or apply after painting is complete. Install above ceiling identification prior to acoustical ceilings.
- B. Attachment: Securely attach all mechanical identification to associated pipe, duct, panels and equipment. Locate identification to be readily visible.

### 3.2 PIPING SYSTEM IDENTIFICATION:

- A. Install pipe markers on all piping systems in all locations where piping, whether concealed or non-concealed, and where accessible at manholes and access panels. Installed at all access panels or doors, adjacent to valves and branch connections, both sides of floors, ceilings and walls, and all major changes in direction,
- B. Locate pipe markers near points where piping continues into shafts, underground, floor or wall; at 25' spacing along exposed runs (15' in congested areas), at valves, equipment and control devices, and where there could be question of flow pattern.
- C. Install marker over pipe insulation segment on hot non-insulated pipes.



3.3 VALVE IDENTIFICATION:

- A. Install valve tags on all new valves and regulators for the following piping systems, except for valves within factory-fabricated equipment, at plumbing fixture faucets, hose bibs, and valves located directly at the equipment served. Number valves in a logical sequence relative to location installed.
- B. List each tagged valve in valve schedule for each piping system. Include a copy of the valve tag schedule in the Operation and Maintenance manuals, and mount a laminated copy on a wall as directed by the University.
- C. Where building has previously tagged valves, coordinate numbering with old schedule, and note changes made to previously tagged valves on new schedule.

END OF SECTION 22 0553

SECTION 22 0719 - MECHANICAL SYSTEMS INSULATION

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SUMMARY:.....	1
1.3 REFERENCES .....	1
1.4 SUBMITTALS .....	2
1.5 ASBESTOS ABATEMENT:.....	2
1.6 QUALITY ASSURANCE .....	2
1.7 DELIVERY, STORAGE, AND HANDLING.....	3
1.8 WARRANTY .....	3
PART 2 - PRODUCTS .....	3
2.1 GENERAL.....	3
2.2 PIPING INSULATION THICKNESS TABLE:.....	3
2.3 PIPING INSULATION: .....	3
2.4 PIPING INSULATION SPECIALTIES: .....	4
2.5 TUNNEL PIPING INSULATION .....	4
2.6 SEALING MASTICS FOR PIPE INSULATION .....	4
PART 3 - EXECUTION .....	4
3.1 INSULATION INSTALLATION .....	4

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.
- B. Related Sections:
  - 1. Section 22 0553 - Mechanical Identification
  - 2. Section 22 1113 - Piping Materials and Methods

1.2 SUMMARY:

- A. Insulate piping, ductwork and equipment unless indicated as not to be insulated.
- B. Reinsulate items from which asbestos insulation was removed.
- C. Insulate connection points between new and existing items.
- D. Repair or replace insulation damaged during construction.

1.3 REFERENCES

- A. Definitions
  - 1. Insulation thermal conductivity: No greater than value listed, in Btu-inch/hour-square foot-degrees F at 100 degrees F mean temperature.
  - 2. Water Vapor Permeance (ASTM E97 or E96, Procedure A): No more than value listed, in perms.  
Water vapor permeability (ASTM C355): No greater than value listed, in perm-inch.
  - 3. Puncture resistance (ASTM D781): No less than value listed.

4. Flame spread classification (ASTM E84, NFPA 255): No greater than value listed. Smoke density classification (ASTM E84, NFPA 255): No greater than value listed. Composite listing includes insulation, jacket, and adhesive.
5. Density no less than value listed, in pounds per cubic foot.
6. Condition area: Areas that are mechanically maintained between 65F and 80F and relative humidity less than 60% at all times. The following spaces are normally considered conditioned area: spaces above ceilings, heated penthouse, mechanical and electrical rooms.

#### 1.4 SUBMITTALS

- A. Product Data: Include manufacturer, catalog number, catalog illustrations, rated capacities, performance characteristics, weights, conductor insulation and jacket dimensions, component sizes, rough-in requirements, materials of construction, accessories, operating and maintenance clearance requirements. Additionally include:
  1. Shop Drawings
  2. Installation, Operation and Maintenance Manuals
  3. Test and Evaluation Reports
  4. Source Quality Control Submittals
  5. Site Quality Control Submittals
  6. Certificates
  7. Manufacturer Reports
  8. Special Procedure Submittals
  9. Qualification Statements
  10. Warranty Documentation
  11. Record Documentation

#### 1.5 ASBESTOS ABATEMENT:

- A. All asbestos within the contract bounds shall be removed per the requirements described in Division 02. Refer to drawings for items containing asbestos insulation. Reinsulate all piping, ductwork and equipment from which asbestos has been removed.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft-training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- C. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- D. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
  1. Reference Standards: ASHRAE 90.1-2013.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials and equipment raised off the floor on pallets and protected with coverings to prevent damage due to weather and construction activities. Store in areas that prevent damage due to freezing and extreme temperatures or sunlight. Arrange coverings to provide air circulation to avoid damage from condensation or chemical build-up. Protect from damage, dirt and debris at all times.
- B. Shipping and Handling Requirements
- C. Packaging and Protection
- D. On-site Storage & Staging
- E. Packaging Waste Management

1.8 WARRANTY

- A. Provide a complete warranty for parts and labor for a minimum of one year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Insulate pipe, duct and equipment to meet the thicknesses and conductivities indicated.

2.2 PIPING INSULATION THICKNESS TABLE:

- A. Minimum insulation thickness in inches, shall comply with the table below for the associated piping system and pipe sizes.

Piping System Fluid	Temp Range Deg. F	Conductivity BTU·in./ (h·ft <sup>2</sup> ·°F)	Thickness in Inches For Pipe Sizes Through Size Listed			
			1"	1.5"	4"	8" above
Cold Water potable	Any	0.21-0.27	0.5	0.5	1.0	1.0

2.3 PIPING INSULATION:

- A. Fiberglass insulation with factory-applied vapor barrier jacket with self-sealing laps. ASTM C547 Class 1 insulation. Vapor barrier jacket: laminated white kraft paper, aluminum foil, glass fiber reinforcement.
  - 1. Approved Manufacturers: Johns-Manville, Knauf, Owens/Corning
- B. At fittings and flanges, insulate with wrapped fiberglass insulation of same thickness as adjacent pipe, and cover with pre-molded PVC jackets. Seal edge of jacket with self-sealing vapor barrier tape.
  - 1. Approved Jacket Manufacturers: Zeston, Ceel-Co-, Proto
- C. For valves, strainers, suction diffusers and other accessories that require maintenance: In hot piping, insulate similar to fittings and flanges. In cold piping, insulate with closed cell elastomeric insulation, installed to be removable for maintenance access.

- D. Insulate piping systems outside buildings with fiberglass insulation. Apply insulation 1/2" thicker than listed in table and weatherproof the insulation with PVC insulation jacketing.
  - 1. Approved Jacket Manufacturers: Zeston, Ceel-Co, Proto
  
- E. As a Contractor's Option insulate hot water, cold water, chilled water, refrigerant, piping systems with flexible closed cell elastomeric insulation, ASTM C534, conductivity of 0.254 @90F, water vapor permeability of 0.05. In thickness 1" and less, composite flame spread/ smoke density of 25/50.
  - 1. Approved Manufacturers: Armacell - AP Armaflex; Rubatex - R-180-FS, IMCOA.
  - 2. Seal all butt joints and seams by joining cut edges with adhesive as supplied by the insulation manufacturer.
  - 3. For exterior piping, coat insulation with glass mesh and two finish coats compatible with insulation. Manufacturer: Armstrong Armacell- Armaflex WB.

#### 2.4 PIPING INSULATION SPECIALTIES:

- A. Expansion Joints Insulation: Expansion joints shall be insulated with prefabricated insulation blankets, installed in a manner to allow for the repacking of the joints without removing blanket. Hold blankets in place with permanently attached Velcro fasteners.
  
- B. Aluminum Jackets: Where indicated on drawings, provide 0.016" thick alloy 3003 aluminum jacketing with longitudinal lock seam and butt strap circumferential joints.
  - 1. Approved Manufacturers: Childers-Lock-on and Pabco-Surfeit.
  
- C. Removable Insulation Jackets: Where indicated on drawings, provide removable insulation jackets with fiberglass insulation, flexible fabric jacket and velcro fasteners.
  - 1. Approved Manufacturer: ESI, Insulation Technologies Inc.

#### 2.5 TUNNEL PIPING INSULATION

- A. Additionally provide dimpled aluminum jacketing.

#### 2.6 SEALING MASTICS FOR PIPE INSULATION

- A. Provide mastics to seal insulation joints and to provide a continuous vapor barrier. The permeance of the mastic shall be equal to or less than the permeance of the vapor barrier of the insulation it is applied to. The ASTM E84 flame spread and smoke density classification shall not exceed 25/50. Mastics shall be mercury and asbestos free, selected for the temperature range of the service, and selected for uses recommended by the manufacturer. Mastics used outdoors shall be outdoor rated, waterproof, and U.V. resistant.
  - 1. Approved Manufacturers: Subject to compliance with the above requirements, provide mastics manufactured by Childers, Foster, Vimasco, Mon-Eco Industries.

### PART 3 - EXECUTION

#### 3.1 INSULATION INSTALLATION

- A. All systems shall be tested and approved before being insulated.
  
- B. The insulation shall be applied over clean, dry surface.

- C. Insulate all valves, flanges, couplings and fittings. Valve and flange insulation shall be removable and re installable.
- D. Full lengths of insulation shall be used except at end of straight sections and as required to accommodate fittings. Insulation shall be applied with the joints tightly fitted together. Cracks or voids shall be filled with insulation. Manufacturer's recommended installation procedures shall be strictly adhered to.
- E. The edges and seams at all visible locations shall be finished in a neat and workmanlike manner.
- F. Finished installation shall provide a continuous and effective vapor barrier.

END OF SECTION 22 0719

SECTION 22 1113 - PIPING MATERIALS AND METHODS

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SUMMARY .....	1
1.3 SUBMITTALS .....	2
1.4 QUALITY ASSURANCE: .....	2
1.5 DELIVERY, STORAGE, AND HANDLING .....	2
1.6 WARRANTY .....	2
PART 2 - PRODUCTS .....	3
2.1 GENERAL PIPING REQUIREMENTS: .....	3
2.2 PLUMBING PIPING SYSTEMS: .....	3
2.3 PIPE JOINTS: .....	3
2.4 UNIONS: .....	4
2.5 PIPE HANGERS AND SUPPORTS: .....	4
2.6 THERMAL-HANGER SHIELD INSERT ASSEMBLIES .....	4
2.7 PIPE SLEEVES: .....	5
2.8 STRAINERS: .....	5
2.9 FLEXIBLE PIPING CONNECTORS: .....	6
2.10 PIPE ANCHORS: .....	6
2.11 PIPING TRANSITIONS: .....	6
2.12 SLEEVE-SEAL SYSTEMS .....	6
PART 3 - EXECUTION .....	7
3.1 GENERAL PIPING INSTALLATION REQUIREMENTS: .....	7
3.2 UNDERGROUND PIPING INSTALLATION REQUIREMENTS .....	8
3.3 WATER METER INSTALLATION .....	8
3.4 PROTECTION AGAINST FREEZING: .....	8
3.5 INSTALLATION OF PIPE HANGERS AND SUPPORTS: .....	8
3.6 INSTALLATION OF PIPE SLEEVES: .....	9
3.7 INSTALLATION OF STRAINERS: .....	9
3.8 FLUSHING AND CLEANING OF PIPING: .....	9
3.9 PIPING SYSTEMS PRESSURE TESTING .....	10
3.10 FLUSHING, DISINFECTING, AND TESTING DOMESTIC WATER .....	10

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section.
- B. Related Sections
  - 1. Section 22 0500 - Common Work Results for Mechanical

1.2 SUMMARY

- A. This Section specifies piping materials and installation methods for the piping systems listed in Part 2 and includes joining materials, piping specialties, and basic piping installation instructions.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer, catalog illustrations, model, rated capacities, performance, dimensions, component sizes, rough-in requirements, materials of construction, and operating and maintenance clearance requirements. Additionally include:
1. Provide a piping material schedule that indicates, by service, pipe material, pipe manufacturer, fitting type and manufacturer, joint type and manufacturer.
  2. Solder and brazing material data sheets.
  3. Grooved fittings, couplings, and accessories data sheets.
  4. Data sheets for all products listed in this section including flanges, gaskets, unions, hangers, di-electric protection method, thermal hanger shield inserts, di-electric fittings, flexible metal hose, flexible connectors, and seal sleeve systems.

1.4 QUALITY ASSURANCE:

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
1. All piping, (including vacuum piping), unless noted otherwise, shall comply with ANSI Standard B31.9 - Building Service Piping.
  2. All steam piping above 15 psig, and all steam condensate piping shall comply with ANSI Standard B31.1 - Power Piping.
  3. National Sanitation Foundation NSF/ANSI-61, including Annex G (listed as  $\leq 0.25\%$  weighted average lead content) (and/or NSF/ANSI-372) and Annex F. Applies to any item in contact with domestic (potable) water.
  4. U.S Safe Drinking Water Act (any item in contact with domestic (potable) water)
  5. NFPA 54 - National Fuel Gas Code
  6. AWWA C600 Standard for Installation of Ductile-Iron Water Mains and their Appurtenances
  7. AWWA C606 Grooved and Shouldered Joints.
  8. Mill certifications indicating country of origin and compliance to ASTM/ANSI/NSF and other required compliance standards verified by independent third party based in the United States, shall be promptly provided whenever requested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store piping materials and accessories raised off the floor or ground on pallets and protected with coverings to prevent damage or contamination due to weather and construction activities. Provide temporary protective caps on pipe ends. Maintain caps installed at all times until just prior to assembly, and recap open pipe ends at the conclusion of each work day. Store in areas that prevent damage due to freezing and extreme temperatures or sunlight. Arrange coverings to provide air circulation to avoid damage from condensation or chemical build-up. Protect from damage, dirt and debris at all times.

1.6 WARRANTY

- A. Provide a complete warranty for parts and labor for a minimum of one year from the date of Substantial Completion.



## PART 2 - PRODUCTS

### 2.1 GENERAL PIPING REQUIREMENTS:

- A. All piping materials shall be compatible for temperature, pressure and service.
- B. All wetted seals shall be made from materials that are immune from chloramine degradation.
- C. Provide long radius elbows and returns on welded steel pipe.
- D. Grooved Joints:
  - 1. Where grooved joints are indicated as permitted, such joints are only permitted in accessible locations. The following locations are considered inaccessible: shafts, above dry wall ceilings.

### 2.2 PLUMBING PIPING SYSTEMS:

- A. Domestic Cold Water - Above Ground (potable):
  - 1. For piping through 6":
    - a. Pipe: Type L Copper, hard drawn, ASTM B88
    - b. Fittings: Wrought Copper, ANSI B16.22
    - c. Joints: Soldered through 2"; Brazed for 2-1/2" through 6"
  - 2. Contractor Options:
    - a. For piping 2-1/2" through 6", excluding inaccessible locations, Grooved Joints - for cold water may be used (not allowed on hot or hot return).
    - b. For piping through 4", copper press to connect fittings for cold water may be used (not allowed on hot or hot return).
  - 3. For tunnel applications and piping upstream of meter assembly:
    - a. Pipe: Type L Copper, hard drawn, ASTM B88
    - b. Fittings: Grooved Joints.

### 2.3 PIPE JOINTS:

- A. Soldered Joints: ASTM B32; Alloy Sb5, (95% Tin, 5% Antimony, maximum 0.20% Lead). When recommended by the component manufacturer, use manufacturer's recommended flux. Unless noted otherwise, joints may be screwed or flanged to suit valves and equipment. Manufacturers: Engelehard "Silverbrite 100", Harris "Bridgit"
- B. Brazed Joints: ASTM B32, silver brazed joints with 1000F minimum melting point, conforming to AWS - A5.8, "Specification for brazing filler metal". Classification BAg-1. For domestic potable water applications, maintain a nitrogen purge during brazing to prevent deposit formation inside the pipe. Unless noted otherwise, joints may be screwed or flanged to suit valves and equipment. Manufacturers: Lucas-Milhaupt Inc. "Sil-Fos", J.W. Harris "Stay-Silv 15" and "Safety Silv"
- C. Flanged Joints:
  - 1. Select flange and gasket materials to suit service of piping and to comply with the respective ASME B31.1 or B31.9 piping standard.
  - 2. For steel pipe, provide raised face ANSI B16.5 compliant steel flanges.

3. Gaskets shall conform to respective ANSI Standards, A21.11, B16.20, B16.21. Gaskets in steam and condensate lines shall be "FLEXALLIC", 316 L stainless steel with "FLEXICARB" filler. Flange gaskets for domestic hot water shall be 100% PTFE. For butterfly valves on replaceable seat side with interfering set-screws, provide Garlock Style 9800.
  4. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated. Central Power Plant and Tunnels: Provide ASTM A193 B7 bolts and studs with ASTM A194 grade 2H heavy hex nuts.
- D. Grooved Joints - for Copper Piping, maximum pipe size 8": Rolled grooves, peroxide cured EPDM gaskets, ductile iron housing (ASTM A 532 or A 536), wrought copper (ASTM B 75, ANSI B16.22) or cast bronze fittings, rated for minimum 300 psi working pressure at 250°F, when used with grooves that comply with AWWA C606. Grooved system/components shall provide rigid installation. UL and UPC approved. Utilize manufacturer's recommended gasket lubricant. Brazed Class 150 ANSI B16.24 cast bronze flanges (or copper companion flange by CTS Fabrication USA) must be used at any component requiring a flanged connection. Clamp-on branch outlets are prohibited. Exact gasket material and style shall be as recommended by the coupling manufacturer for the service, and NSF/ANSI-61 Annex G and NSF/ANSI-372 listed when used for potable water. On potable water service, provide non-standard gasket styles that close off and isolate gasket cavities from the water in the pipe. The manufacturer of the couplings and the fittings shall be the same. The same grooved component manufacturer shall be provided for the entire scope of the work, for each system.
1. For copper piping in tunnels: Victaulic Style 607 only.
- 2.4 UNIONS:
- A. Unions in steel piping systems shall be malleable iron with ground joints made between two bronze inserts.
  - B. Unions in copper piping systems shall be wrought copper or brass with sweat ends.
- 2.5 PIPE HANGERS AND SUPPORTS:
- A. Provide adjustable type pipe hangers, supports and accessories for the proper support of all piping. See details on drawings for requirements. Figure and model numbers specified on drawings are for Anvil International, and Pipe Shields Inc. Equivalent products by Carpenter & Paterson, Cooper B-line and PHD Manufacturing are also acceptable. Continuous threaded rod shall be used for intermediate attachments.
  - B. Dielectric protection for hangers and supports: Where copper piping is supported with steel hangers and supports, dielectric protection must be provided. Use one of the following means as applicable:
    1. Coated hangers (copper or plastic coating)
    2. Insulation inserts
    3. Cushion clamps
    4. Other as approved by Engineer.
- 2.6 THERMAL-HANGER SHIELD INSERT ASSEMBLIES
- A. Except as noted, thermal hanger shield "insert" assemblies shall be used on all insulated pipe systems at each horizontal support, and at each clamped or guided vertical support. Manufactured units shall comply with MSS SP-58 standards and be tested per MSS SP-89 guidelines. Each assembly shall closely fit the various pipe diameters and match the outside diameter of the adjoining pipe insulation. Provide pre-grooved inserts when piping is heat traced. Compressive strength shall be adequate to prevent deformation at the project's hanger spacing requirements, with a minimum 3:1 safety factor.
  - B. Thermal hanger shield insert assembly: Water-repellent treated, ASTM C 533, Type I calcium silicate, asbestos free insert. With G-90 galvanized sheet metal shield. With attached vapor barrier, where indicated. Each component shall have an ASTM E84 flame/smoke rating maximum of 25/50.

- C. Inserts for Cold Piping (piping conveying materials less than or equal to 60F), including all chilled water and domestic cold water piping: Insert with an attached vapor barrier.
    - 1. Provide insert and sheet metal shield covering entire circumference of pipe.
  - D. Inserts for Hot Piping (piping conveying materials at more than 60F): Insert only.
    - 1. For clevis or band hangers that support pipe from bottom: Insert and sheet metal shield shall cover lower 180 degrees of pipe, or entire circumference of pipe.
    - 2. For trapeze hangers or clamped pipe: Insert and sheet metal shield shall cover entire circumference of pipe.
  - E. Inserts for piping less than 3/4-inch diameter: Not required except for piping conveying materials less than 45°F.
  - F. Minimum Compressive Strength of Insert Material:
    - 1. 100 psig for sizes smaller than NPS 6.
    - 2. 600 psig for sizes NPS 6 and larger.
  - G. Insert Length: Extend 2 inches beyond sheet metal shield.
  - H. Vapor barrier: meeting ASTM C1136, with 0.02 perms maximum water vapor permeance.
  - I. Adhesives shall comply with NFPA 90-A.
  - J. Sheet Metal Shield Dimensions for Pipe: Not less than the following:
    - 1. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    - 2. NPS 4: 12 inches long and 0.06 inch thick.
    - 3. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick
    - 4. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick
    - 5. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick
  - K. Manufacturers
    - 1. Cooper B-Line
    - 2. Pipe Shields Inc.
    - 3. Rilco Manufacturing Company
    - 4. Value Engineered Products.
    - 5. American Mechanical Insulation Sales
    - 6. ERICO International Corp
- 2.7 PIPE SLEEVES:
- A. Furnish and set pipe sleeves per details on drawings.
- 2.8 STRAINERS:
- A. Body shall be bronze for sizes 2" and less and bronze, cast steel, or cast iron for sizes over 2" unless otherwise indicated. Provide domestic water strainers with bronze, stainless steel, or epoxy lined cast iron bodies suitable for potable water.
  - B. Strainers shall be same size as piping.

1. Provide flanged connections on sizes 2-1/2" and larger. Where grooved piping is specified, grooved joint strainers may be used.
  2. Pressure rating shall be that of piping system, minimum Class 125.
  3. Provide with plugged blowdown port.
  4. Provide screen free areas that are a minimum of twice the internal cross sectional area of the piping where installed.
- C. For water service, screen material stainless steel, with openings of 1/16 (0.062) inches for pipes 2" and smaller and 1/8 (0.125) inches for pipe sizes 2-1/2" and larger.
- D. Approved Manufacturers: Armstrong, Anvil International, Keckley, Metraflex, Mueller, Spirax-Sarco, Victaulic, Watts, Yarway.
- 2.9 FLEXIBLE PIPING CONNECTORS:
- A. Refer to Related Section 22 0548 - Vibration Control.
- 2.10 PIPE ANCHORS:
- A. Provide pipe anchors where shown and as detailed on drawings.
- 2.11 PIPING TRANSITIONS:
- A. For transitions between ductile iron pipe and other pipe materials, refer to the requirements for hubless joints found elsewhere in this specification.
- B. When two different pipe materials must be joined such as cast iron, clay, steel, copper or plastic, provide transition fittings specifically designed for that purpose and that are manufactured in compliance with the standards relevant for the pipes joined. Transitions shall have equal corrosion resistance to the pipes joined.
- C. For dissimilar metal connections, see "Dielectric Fittings".
- 2.12 SLEEVE-SEAL SYSTEMS
- A. Approved Manufacturers:
1. EnPro Industries "Link Seal"
  2. Advance Products & Systems, Inc.
  3. Metraflex Company (The).
  4. Proco Products, Inc.
- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve. Shall provide a water-proof seal between the pipe and sleeve at up to 20 psig head pressure. Each link and pressure plate shall include permanent identification of size and manufacturer's name. Manufactured in an approved ISO-9001:2000 facility.
- C. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe.
- D. Pressure Plates: Molded of glass reinforced nylon.
- E. Connecting Bolts and Nuts: Mild steel with a 60,000 psi minimum tensile strength and 2-part Zinc Dichromate coating per ASTM B-633 and Organic Coating, tested in accordance with ASTM B-117 to pass a 1,500-hour salt spray test. Of length required to secure pressure plates to sealing elements.

F. Sleeves:

1. Galvanized steel, ASTM A53/A53M, Schedule 40, with plain ends and welded steel collar, zinc coated. Steel Sleeve sizes 12" and larger shall be 0.375" thick or standard pipe wall thickness. Sleeves through wall shall be cast in place and the pipe shall be installed centered in the sleeve. Provide 2" collar (water-stop) of steel to match sleeve, welded all around on both sides to the sleeve at the point on the sleeve that positions it at the mid-point of the structural wall when the sleeve is in place.
2. Molded non-metallic high density polyethylene sleeves (HDPE) with integral hollow, molded water-stop ring four inches larger than the outside diameter of the sleeve itself. End caps and reinforcing ribs, manufactured in an approved ISO-9001:2000 facility. With nailer flange.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATION REQUIREMENTS:

- A. Work shall be done in accordance with applicable ordinances and codes. Arrange for inspections.
- B. For domestic potable water applications, maintain a nitrogen purge during brazing to prevent deposit formation inside the pipe, so that the inner pipe surface remains clean. Properly ventilate the area outside the pipe to avoid unsafe levels of nitrogen.
- C. Install pipe components and joining systems in accordance with the manufacturer's installation instructions.
- D. Install piping to permit complete draining. Provide capped hose end ball type drain valves at all low points.
- E. Installed piping shall be free from sagging. Provide for expansion and contraction of piping in an approved and safe manner by means of loops or offsets, where mechanical expansion joints are not specifically called for.
- F. Branch piping shall be valved at the branch connection points.
- G. Provide fittings and specialties necessary to properly interconnect all items, whether or not shown in detail.
- H. Piping shall remain protected and capped until just prior to connection. Immediately after assembly, restore all protection and cap unprotected ends to prevent odors, dust, moisture, and other debris from entering the piping system.
- I. Clean and swab-out all piping before installation.
- J. Lay out pipe lines straight, plumb and in true alignment. Offset as required to avoid interference with other work, to conceal piping, to allow maximum headroom and to avoid interference with windows and doors. Lay out all pipes and establish their levels from bench marks, existing floors or finished grades.
- K. Piping shall be concealed unless indicated otherwise on drawings. Do not conceal piping until it has been inspected, tested, flushed and approved.
- L. Use eccentric reducing fittings to increase or decrease pipe sizes. Bushings are not acceptable. Orient reducers to prevent trapping of water.
- M. Lubricate flange bolts and install with hardened flat washers. Use a torque wrench to tighten flange bolts to the gasket manufacturer's recommended torque.
- N. Locate groups of pipe parallel to each other, spaced to permit applying insulation and servicing of valves. Install hot and cold water lines at least 6 inches apart.

- O. Install piping at least 3 inches clear of electrical conduit. Do not install pipe within the National Electrical Code (NEC) working space zone of electrical equipment. Examples:
  - 1. Above the footprint of electrical equipment in the zone extending 6' above the installed height of the equipment.
  - 2. Within the NEC working space in front of the electrical equipment. NEC working space varies depending on voltage and other factors, typically for equipment 600 volts or less it extends from the floor to the height of the equipment or 6'-6", whichever greater, 3'-6" in front of the equipment, and for the width of the equipment or 30", whichever is greater.
- P. Verify NEC clearance requirements prior to installing work. Note that variable frequency drives are considered electrical equipment.
- Q. Pitch piping as follows, but not less than required by code:
  - 1. Waste down in direction of flow at 1/8" per foot.

### 3.2 UNDERGROUND PIPING INSTALLATION REQUIREMENTS

- A. Piping below grade intersecting tunnel walls, basement walls, or penetrating floors, shall be run through a sleeve seal system.
  - 1. Size sleeves and select sleeve seal links per sleeve seal manufacturer's recommendations.
  - 2. Install sleeves and seals per manufacture's recommendations. Center sleeve water stops at midpoint of wall/floor thickness. Provide temporary support to avoid sleeve collapse during pours.
- B. Record as-built sketches and dimensions prior to backfilling.

### 3.3 WATER METER INSTALLATION

- A. The purchase of potable water meters and the cost of the associated assessment fees shall be the responsibility of the University of Michigan; however, installation of the meter shall be by the City of Ann Arbor. The Contractor shall be responsible for obtaining all necessary permits.

### 3.4 PROTECTION AGAINST FREEZING:

- A. At any time that any of the piping is full of water for testing purposes or otherwise prior to actual heated operation, the system shall be protected against freezing by the introduction of pre-mixed propylene glycol type anti-freeze which will be flushed out before acceptance. Provision for introducing anti-freeze shall be made by means of valved connections to the system in an acceptable manner.

### 3.5 INSTALLATION OF PIPE HANGERS AND SUPPORTS:

- A. Arrange pipe hangers and supports to permit proper pitch of piping, free to move with pipe expansion, installed at proper intervals to totally prevent sagging and attached to building construction through approved means. Hangers shall be located near or at changes in piping direction and concentrated loads. Valves, strainers, in line pumps and other heavy equipment shall be supported independent of the pipes. After systems have been installed and filled adjust hangers and supports to evenly distribute weight, and maintain proper pitch. Refer to drawings for pipe hanger and support details.
- B. Vertical Piping: When support locations are not indicated on the drawings, support piping at every floor level.
- C. Horizontal Piping Hanger Spacing: Space hangers in compliance with schedule on drawings and applicable codes, or per MSS SP-89, which ever results in shortest spacing.

- D. For cold piping, install hangers and supports to maintain an effective continuous thermal and vapor barrier between cold piping and hangers and supports.
- E. Plastic Piping: Hang and support in compliance with manufacturer's recommendations. At hangers and supports, including "Unistrut®" style channel supports, install to prevent plastic pipe contact with metal (exception: angle iron may be used for continuous support, provided all sharp edges are removed). Anchor piping only where required for expansion loops or to protect against pressure surges, etc. Compression style clamps/supports shall not be used. Use plastic pipe sleeves or equivalent as guides at all other locations, to allow longitudinal thermal expansion and to prevent lateral pipe movement. Compression style riser clamps shall not be used, use other support methods such as supporting at fitting shoulders. Support valves and other significant weight components independent of pipe. Space hangers no farther than manufacturer's recommendations for the application temperature but in no case farther than recommended for 100 deg. F application temperature. Continuously support all piping 1.5-inch nominal diameter or less (exception: PVC pipe connected to sump pumps). Provide thrust restraints where piping is subject to cyclic pressure surges, e.g. on/off pump applications.

### 3.6 INSTALLATION OF PIPE SLEEVES:

- A. Install pipe sleeves where piping passes through building construction including all walls, floors and ceilings.
- B. For new wall construction, promptly and accurately locate and securely set sleeves in forms before concrete is poured. For masonry construction, set the sleeves over the piping for Masonry Contractor to build around.

### 3.7 INSTALLATION OF STRAINERS:

- A. Provide Y-strainers in steam, condensate, or water piping preceding control valves, traps, pumps, pressure regulating valves and elsewhere as shown on drawings.
- B. Install strainer elements prior to flushing piping. Remove, clean and reinstall during flushing.
- C. On all strainers 2-1/2" or larger, provide a ball valve on the strainer blowdown port sized to match the blowdown port size on all strainers 1 1/2" and larger. Provide a 3/4" hose connection with cap on the ball valve.
- D. Install Y-type strainers in horizontal steam lines so the screen pocket is in the horizontal plane.
- E. Rotate screen removal flange so the blowdown port is at the lowest point.

### 3.8 FLUSHING AND CLEANING OF PIPING:

- A. Flush and clean the following piping systems:
- B. Domestic Cold Water (flush only)
- C. Develop plan for flushing and cleaning piping. Submit plan for approval prior to completion of piping. Provide all temporary and permanent piping, equipment, materials necessary to complete flushing and cleaning.
- D. Prior to flushing, swab out underground piping to remove all particulate.
- E. Prior to flushing, install fine mesh construction strainers at inlet to all equipment. Install fine mesh construction element in permanent strainers. During flushing and cleaning, remove and clean strainers periodically. At completion of final flush, clean permanent strainers, remove construction strainers.

- F. Flushing for new piping: Flush all piping with cold water (or fire protection system where approved by owner) for a minimum of one hour, until water runs clear. Water supply shall be equivalent to piping to be flushed. Use (2) 2-1/2" fire hose connections for piping 3" and larger. Drain all low points.

### 3.9 PIPING SYSTEMS PRESSURE TESTING

#### A. General

1. Test new systems only, from point of connection to the existing systems. Perform initial tests and correct deficiencies prior to requesting acceptance test.
2. Perform acceptance pressure tests in the presence of the authorities having jurisdiction. Acceptance tests must be satisfactorily completed before piping surfaces are concealed.
3. Pneumatic tests shall be conducted using dry, oil free compressed air, carbon dioxide or nitrogen. Evacuate personnel not directly involved in testing prior to performing pneumatic testing. Perform testing in two stages, initial and acceptance. Conduct initial testing at 5 PSI or less. Swab joints with a commercial leak detector. Repair deficiencies prior to testing at higher pressures. Under no circumstances shall plastic piping of any type be pneumatically tested, including pre-acceptance tests.
4. Components shall be removed or isolated during testing if damage may occur due to test pressure and/or test media.
5. Existing steam and hot water piping connected to piping to be tested shall be shutoff, drained and cooled before testing.

#### B. Acceptance Pressure Testing:

1. Perform acceptance pressure testing per table found on the drawings, or if a table is not provided, per UM website: <http://www.umaec.umich.edu/for.archs/StandardDetails.html>.
2. Remake leaking gasket joints with new flange bolting. Where welded joints fail, submit proposed method of repair for approval by the Owner's representative and authorities having jurisdiction.
3. For each system tested, provide a certificate testifying that the system was satisfactorily tested and passed, using owner furnished forms.

### 3.10 FLUSHING, DISINFECTING, AND TESTING DOMESTIC WATER

#### A. Flush, disinfect and test domestic water piping as follows:

1. Prior to disinfection, flush all domestic water piping as described under Flushing and Cleaning of Piping.
2. Purge and disinfect domestic water piping per plumbing code and City of Ann Arbor requirements. Do not use excessive amounts of disinfectant as it may damage piping seals.
3. Submit water samples in sterile bottles to the City of Ann Arbor. Repeat the procedure if the biological examination made by the City of Ann Arbor shows evidence of contamination.

#### B. Prepare reports for all purging and disinfecting activities. Furnish owner final copy of test results for acceptance.

END OF SECTION 22 1113



SECTION 22 1119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL .....	1
1.1 RELATED DOCUMENTS .....	1
1.2 SCOPE OF WORK: .....	1
1.3 QUALITY ASSURANCE .....	1
PART 2 - PRODUCTS .....	1
2.1 GENERAL .....	1
2.2 PIPING SPECIALTIES .....	2
PART 3 - EXECUTION .....	2
3.1 INSTALLATION OF PIPING SPECIALTIES .....	2
3.2 FLUSHING, DISINFECTING AND TESTING .....	2
3.3 FLUSHING AND TESTING .....	3

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

1.2 SCOPE OF WORK:

- A. Provide piping, fittings, and specialties up to point 5 feet beyond the building for the following systems:
  - 1. Domestic Cold Water System
  - 2. Domestic Hot Water System

1.3 QUALITY ASSURANCE

- A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.
- B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.
  - 1. National Sanitation Foundation NSF/ANSI-61 (potable drinking water) and NSF-61 Annex G (listed as  $\leq 0.25\%$  weighted average lead content) (and/or NSF/ANSI-372) and Annex F.
  - 2. U.S Safe Drinking Water Act.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All wetted seals shall be made from materials that are immune from chloramine degradation. EPDM seals shall be peroxide cured.

## 2.2 PIPING SPECIALTIES

### A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Apollo Valves; Conbraco Industries, Inc.
  - b. FEBCO; a Division of Watts Water Technologies, Inc.
  - c. Watts Water Technologies, Inc.; Watts Regulator Co.; Model 957
  - d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Size and Capacities: As scheduled on the drawings.
6. Body: Cast-iron or ductile-iron, with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
7. End Connections: Flanged for NPS 2-1/2 and larger.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories:
  - a. Valves: Gate-type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
  - b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PIPING SPECIALTIES

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
  2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
  3. Do not install bypass piping around backflow preventers.
  4. Install strainer and soft-seated check valve upstream of backflow preventer. Exception: Fire protection backflow preventers.

### 3.2 FLUSHING, DISINFECTING AND TESTING

- A. Flush, disinfect and test domestic water piping as follows:
1. Flush all domestic water piping per Related Section 22 1113.
  2. Purge and disinfect domestic water piping per City of Ann Arbor requirements.
  3. Submit water samples in sterile bottles to the City of Ann Arbor. Repeat the procedure if the biological examination made by the City of Ann Arbor shows evidence of contamination.
- B. Prepare reports for all purging and disinfecting activities. Furnish owner final copy of test results for acceptance.

3.3 FLUSHING AND TESTING

- A. Flush and test domestic water piping as follows:
  - 1. Flush all domestic water piping per Related Section 22 1113.
  - 2. Submit water samples in sterile bottles to the City of Ann Arbor. Repeat the procedure if the biological examination made by the City of Ann Arbor shows evidence of contamination.
  
- B. Furnish owner final copy of test results for acceptance.

END OF SECTION 22 1119

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**AGGREGATE BASE, \_ IN., 21AA, MODIFIED**

WT:AJK:MHM

1 of 2

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and place compacted aggregate base in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.** Aggregate base will be limestone 21AA in accordance with Section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.** Prior to the placement of aggregate base course, the Contractor must obtain a "Permit to Place" from the Engineer. This "Permit to Place" shall be issued once the grade of the underlying layer has been compacted and graded and approved by the Engineer.

The base course shall be shaped to the specified crown and grade and maintained in a smooth condition. If the Contractor's equipment should cause any rutting or other damage in the base, subbase or subgrade, the equipment will be immediately restricted from the grade and the Contractor shall restore the area to the satisfaction of the Engineer at the Contractor's expense.

The base course material shall be placed in uniform layers to such a depth that when compacted, the material will have the grade and cross section as shown on the Plans or as determined by the Engineer. The loose measure of any layer shall not be more than 9 inches nor less than 4 inches.

The aggregate base course shall not be placed when there are indications that the mixture may become frozen before the specified density is obtained. At no time shall the material be placed on frozen subbase or subgrade.

All materials 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 approved by the Engineer that will minimize segregation of material. Should it be necessary, 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.

The aggregate base shall be placed and rough-graded with the use of tracked equipment. Fine grading may be performed with the use of either tracked equipment or a rubber-tired blade grader. The finished aggregate base shall be constructed to the grade and cross section as shown on the Plans or determined by the Engineer. A tolerance that allows for gradual, isolated variations of the top surface of no more than ¼ inch above or ½ inch below the specified grade will be allowed. The aggregate base shall be compacted to 98%

of its maximum unit weight as determined by the AASHTO T 180 test.

Manholes, valve boxes, monument boxes, inlet structures and curbs shall be protected from damage. All utility structures of any type shall be properly covered at all times during the construction. All inlet structures shall have inlet filters installed and properly maintained. Upon completion of each days' work, any extraneous material in manholes, water valve boxes, inlets, catch basins or any other utility structure resulting from the Contractor's operations shall be removed and properly disposed of. The Contractor may be charged for cleaning and damages resulting from accumulated construction debris in the utility structures.

**a. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
--	------------------------

DS_Aggregate Base, __ In., 21AA, Modified.....	Square Yard
--	-------------

Payment for **DS\_Aggregate Base, \_ In., 21AA, Modified** will be measured by the square yard for areas installed and will include all costs labor, material and equipment required to furnish, place, and compact the aggregate base course or surface course material to the thickness designated on the plans.

CITY OF ANN ARBOR

DETAILED SPECIFICATION  
FOR  
HOT MIX ASPHALT (HMA) APPLICATION ESTIMATE

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work shall be done in accordance with the requirements of Division 5 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, the Hot Mix Asphalt (HMA) Paving Special Provision, and as specified herein.

**b. Materials.** The materials shall meet the requirements of the 2020 Michigan Department of Transportation Standard Specifications for Construction Sections 501, 902, and 904.

**c. Construction.** The Contractor shall construct HMA mats at thicknesses specified in the table below in accordance with the Hot Mix Asphalt Paving (HMA) Special Provision.

Course	Pay Item	HMA Mixture	Application Rate	Estimated Thickness	Performance Grade Binder	AWI (Min)
Top	HMA, 5EML	5EML	220 lb/Syd	2.0"	PG 58-28	260
Leveling	HMA, 4EML	4EML	220 lb/Syd	2.0"	PG 58-28	N/A
Base	HMA, 3EML	3EML	330 lb/Syd	3.0"	PG 58-28	N/A
Temp. Pavt	HMA, Temp Pavt (4EML)	4EML	220 lb/Syd	2.0"	PG 58-28	220 N/A N/A
All	Hand Patching	5EML (top) 4EML (leveling) 3EML (base)	110 lb/in/Syd	As Directed	PG 58-28	260 N/A N/A

**d. Measurement and Payment.** The work shall be measured and paid for in accordance with the City of Ann Arbor 2025 Standard Specifications.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**HMA, TEMP PAVT**

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install temporary hot mix asphalt pavement where shown and detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

All materials will meet the requirements of section 501.02 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

HMA mixtures, aggregates, and mineral filler will meet the requires of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction, except that aggregate containing crushed concrete and/or furnace slag may not be used.

Bond coat, anti-foaming agent, and asphalt binders will meet the requires of section 904 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will construct HMA, Temp Pavt in accordance with City of Ann Arbor 2025 Public Services Standard Specifications for HMA construction and section 501 of the Michigan Department of Transportation 2020 Standard Specifications Construction.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Unit</b></u>
DS_HMA, Temp Pavt (4EML) .....	Ton

Payment for **DS\_HMA, Temp Pavt (4EML)** will be measured by the ton for units completely installed and will include all costs for labor, material, and equipment required to complete the work, including providing contractor quality control services, furnishing and applying prime and bond coat, compacting the mixture, protection of existing improvements from damage during placement and compaction operations, and protecting installed pavement until it has cooled.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**LANE TIE, EPOXY ANCHORED**

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install lane ties where shown and detailed on the plans in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Epoxy coatings will meet the requirements of section 905.03.C of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Epoxy resin adhesive will meet the requirements of section 914.06 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Lane ties will be epoxy coated #5 deformed bars which meet the requirements of section 914.09.A of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will construct Lane Tie, Epoxy anchored in accordance with section 603 of the Michigan Department of Transportation 2020 Standard Specifications Construction.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Unit</b></u>
DS_Lane Tie, Epoxy Anchored.....	Each

Payment for **DS\_Lane Tie, Epoxy Anchored** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work, including drilling and cleaning holes, providing, mixing, and installing adhesive, and installing deformed bars.



CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**CONCRETE PAVEMENT JOINTS**

WT:AJK:MHM

1 of 1

01/31/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct concrete pavement joints where shown and as detailed on the plans in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Hot-poured joint sealant will meet the requirements of section 914.04.A of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Backer rod will meet the requirements of section 914.04.B of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Dowel bars will meet the requirements of section 914.07 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

Tie bars will be epoxy coated and meet the requirements of section 914.08 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will construct concrete pavement joints in accordance with section 602 of the Michigan Department of Transportation 2020 Standard Specifications Construction and MDOT standard plans R-39-K, R-40-I, and R-44-G.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Joint, Contraction, Cp.....	Foot
DS_Joint, Contraction, Crg.....	Foot

Payment for **DS\_Joint, Contraction, \_** will be measured by the foot for units completely installed and will include all costs for labor, material, and equipment required to complete the work, including sawcutting, drilling, furnishing and installing load transfer assemblies, dowels, tie bars, backer rod, and hot poured sealant.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**MOUNTABLE CURB AND GUTTER**

WT:AJK

1 of 1

01/13/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct mountable curb and gutter where indicated and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.** The Contractor will furnish materials in accordance with City of Ann Arbor 2025 Standard Specifications.

**c. Construction Methods.** The Contractor will construct mountable curb and gutter in accordance with City of Ann Arbor 2025 Public Services Standard Specifications for concrete curb and gutter construction.

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

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Mountable Curb and Gutter .....	Foot

Payment for **DS\_Mountable Curb and Gutter** will be measured by the foot for complete work in place and will include all costs for labor, materials, and equipment required to complete this work described herein, including furnishing, placing, and finishing concrete and curing compound.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**CONCRETE FIBERMESH SIDEWALK, SIDEWALK RAMPS, AND PLANTER CURB**

WT:AJK

1 of 6

01/13/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct fibermesh concrete sidewalk, sidewalk ramps, and sidewalk curb where indicated and detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.** The materials will meet the requirements as specified in Section 802.02 of the Michigan Department of Transportation 2020 Standard Specifications and as specified herein.

All concrete furnished will be grade 4000 with 6AA coarse aggregate. The Contractor may elect to add GGBFS to 4000 mixtures in accordance with the requirements of the contract documents. No additional payment will be made for concrete mixtures containing GGBFS.

All concrete mixtures shall contain 6AA coarse aggregates which are either natural or limestone and meet the requirements of Section 902.

It shall be the Contractor's sole responsibility to propose specific concrete mix designs which meet the requirements of this Special Provision and the contract documents.

Fibermesh reinforced concrete will have monofilament non-metallic polypropylene fibrillated fibers added at a rate of 1.5 pounds per cubic yard. The fibers shall meet the requirements of ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long. 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.

Curing compound for all concrete, except Planter Curb, will be "clear" type waterborne, membrane-forming curing compound in accordance with ASTM C309, Type 1, Class B, dissipating or waterborne, membrane-forming curing and sealing compound in accordance with ASTM C1315, Type 1, Class A.

Concrete for Planter Curb will be colored with an integral concrete colorant admixture within the concrete colored with color pigment ASTM C979, synthetic iron-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis. Subject to compliance with requirements, provide products by SIKA Corporation or Engineer approved equal. Color product will be SikaColor-120G Granular Integral Concrete Colorant (formerly Chromix G Admixture) and will be color C34 Dark Gray. Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

Curing compound for Planter Curb will be pigmented type approved by coloring admixture manufacturer. "Colorcure" concrete curing compound and sealer by SIKA Corporation or Engineer approved equal will be used on Planter Curb.

#### Concrete Mixing:

Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94 and ASTM C 1116/C1116M (for fiber reinforced concrete) and furnish batch ticket information.

When material temperature exceeds 90 deg F, material is unsuitable for installation and will be rejected.

#### **c. Construction.**

Expansion joints of the thickness shown on the details shall be placed as directed by the Engineer.

The preparation of the aggregate base course upon which the curb and gutter will be constructed shall be performed in accordance with Section 302 of the 2020 MDOT Standard Specifications.

The concrete curb and gutter and/or driveway openings shall not be constructed on a pedestal or a mound. The aggregate base course shall be constructed the full width of the stage or phase in which concrete curb and gutter or driveway opening is to be constructed.

The concrete items being placed shall not be opened to construction or vehicular traffic until such time as the concrete has reached the required flexural strength. The Contractor shall cast beams in accordance with Section 603.03.B.10, and as approved by the Engineer, and obtain concrete flexural strength in accordance with the requirements of Section 104.11, Table 104-2. Beams cast for open to traffic determinations shall be cured in the same manner and environment as the concrete items which they represent.

Flexural strength beams shall be tested (broken) with a device meeting the approval of the Engineer and be in a state of good repair and shall be calibrated by an accredited testing laboratory or engineering company within a period of two years from the date of the test being performed.

#### **Inspection**

Notify Owner's Representative 48 hours before placing concrete. Do not place concrete before Architect has approved completed reinforcement installation.

## **Formwork Installation**

Design, construct, erect, brace, and maintain formwork according to ACI 301.

Provide chamfer strips in the corners of concrete forms to produce beveled corners on walls and columns which will be exposed to view in finished construction.

## **Formwork Removal**

Forms may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

Do not remove formwork until cylinder break or beams break test indicates concrete has reached 2500 psi strength.

## **Joints**

Construct joints true to line with faces perpendicular to surface plane of concrete.

Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces. Exterior exposed concrete slab on grade pavement contraction joints shall be hand tooled/grooved, unless otherwise indicated.

Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

## **Concrete Placement**

Comply with ACI 301 for placing concrete.

Do not add water to concrete during delivery, at Project site, or during placement.

Consolidate concrete with mechanical vibrating equipment according to ACI 301.

**Application of Bonding Agent:** Clean existing surfaces free of dirt, oil, grease and cleaning agents. Apply bonding agent in accordance with manufacturer's directions. Do not allow bonding agent to puddle in low spots. Place new concrete within time limits recommended by bonding agent manufacturer.

## **Finishing Formed Surfaces**

**Related Unformed Surfaces:** At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

## **Concrete Protecting and Curing**

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 308, ACI 306.1 for cold-weather protection and with ACI 305 for hot-weather protection during curing.

Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

**Curing Methods:** Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:

1. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
2. **Curing Compound:** Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### **Concrete Surface Repairs**

Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

### **Field Quality Assurance**

Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

Tests: Perform according to ACI 301. Obtain at least one composite sample for each 100 cubic yard or fraction thereof of each concrete mixture placed each day.

### **Concrete Washout**

Do Not Discharge concrete/grout washout into storm drains, catch basins, the sanitary sewer system, ditches, or surface waters. Perform washing of concrete trucks and materials clean-up in designated areas or an approved off site location. Use as little water as necessary.

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

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Pay Unit</b></u>
DS_Conc, Sidewalk, Fibermesh, 8 In. ....	Square Foot
DS_Conc, Sidewalk Ramp, Fibermesh, 8 In.....	Square Foot
DS_Conc, Sidewalk, Fibermesh, 9 In., Raised .....	Square Foot
DS_Planter Curb .....	Foot

Payment for **DS\_Conc, Sidewalk, DS\_Fibermesh, 8 In, Conc, DS\_Sidewalk Ramp, Fibermesh, 8 In.,** and **DS\_Conc, Sidewalk, Fibermesh, 9 In., Raised** will be measured by the square foot for units in place and will include all costs for labor, materials, and equipment required to complete this work, including furnishing, installing, and finishing concrete, admixtures, and curing compound.

Payment for **DS\_Planter Curb** will be measured by the foot for work in place and will include all costs for labor, materials, and equipment required to complete this work, including furnishing, installing, and finishing concrete, admixtures, color admixture, and special curing compound.



CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**TACTILE DIRECTIONAL INDICATOR**

WT:AJK

1 of 1

11/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install Armor-Tile Detectable Directional Tiles according to the manufacturer's instructions.

**b. Materials.** Tactile Direction Indicators shall be Armor-Tile ADD-504 colored Federal Yellow, #33538 as found at <https://armor-tile.com/assets/add-504-6x48.pdf>

Embedment anchors and hardware shall be as noted on the plans.

**c. Construction.** The Contractor shall install Tactile Direction Indicators in areas indicated on the plans or at the direction of the Engineer according to the manufacturer's specifications for installation.

The installer shall be well-qualified and experienced who has successfully completed tile installations similar in material, design, and extent to what is required for this work.

**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:

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
DS_Tactile Directional Indicator.....	Foot

Payment for **DS\_Tactile Directional Indicator** will include all costs for labor, materials, and equipment costs to perform the work as described herein. The completed work will be measured by the foot, taken at the mid-point of the tile, following the arc of the tiles if placed in a radius.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**DETECTABLE WARNING SURFACE, TEMP**

WT:CGT:MHM

1 of 2

12/20/2024

**a. Description.** This work shall consist of furnishing and installing temporary detectable warning units in accordance with the Americans with Disability Act (ADA). All work shall be in accordance with Section 812 of the MDOT 2020 Standard Specifications for Construction, MDOT Standard Detail R-28 Series as indicated on the plans, and as modified herein.

**b. Related Documents.** Americans with Disabilities Act (ADA) Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces

**c. Submittals.** Submit manufacturer's literature describing products, installation procedures and maintenance instructions. Provide temporary detectable surface applications and accessories as produced by a single manufacturer.

Samples for Verification Purposes: Submit two (2) tile samples minimum 6" x 8" of the kind proposed for use. Samples shall be properly labeled and shall contain the following information: Name of Project; Submitted by; Date of Submittal; Manufacturer's Name; Catalog No.; and Date of Fabrication.

Material Test Reports: Submit current test reports from a qualified, independent, testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. The required tests listed elsewhere in this Special Provision shall be performed by a certified and qualified independent testing laboratory on a cast-in-place tactile warning system. All test reports submitted shall be certified by the testing laboratory and shall clearly state that all tests were completed within 5 years of the date of the submittal. The manufacturer shall certify in writing that the materials provided to the project are manufactured with the same materials and manufacturing procedures as those used in the materials on which the test were performed.

**c. Criteria.** The temporary detectable warning surfaces shall meet the following material properties, dimensions, and tolerances using the most current test methods:

1. Water Absorption: Not to exceed 0.35% when tested in accordance with ASTM-D570
2. Slip Resistance: 0.80 minimum combined wet/ dry static coefficient of friction on top domes and field area, when tested in accordance with ASTM C1028.
3. Compressive Strength: 18,000 psi minimum, when tested in accordance with ASTM D695.

- 4. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, urine, chewing gum, soap solution, motor oil, bleach, calcium chloride, when tested in accordance with ASTM D543 or D1308.
- 5. Wear Depth: 300 minimum, when tested in accordance with ASTM C501.
- 6. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.
- 7. Gardner Impact: 50 in.-lbs. minimum, when tested in accordance with Geometry "GE" of ASTM D5420.
- 8. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM-B117 not to show any deterioration or other defects after 100 hours of exposure

**b. Materials.** The following are acceptable products for Temporary Detectable Warning Surfaces. If at any time, the surface shows damage, it must be replaced at the Contractor's expense.

- RediMat by Detectable Warning Systems
- Self-Adhesive Truncated Domes Mats for Asphalt or Concrete by ADA Sign Depot

**d. Construction Methods.** Installer's Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for this Project.

The contractor shall follow manufacturer specifications for installation.

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

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Detectable Warning Surface, Temp .....	Square Foot

Payment for **DS\_Detectable Warning Surface, Temp** will be measured by the square foot for units installed and will include costs for all labor, materials, and equipment required to install, maintain, restore, and remove the temporary detectable warning surface and disposal of all associated materials throughout the life of the contract.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PAVT MRKG, POLYMER CEMENT SURFACE**

SG:OJK  
WT:AJK:MHM

1 of 3

10/10/2022  
REV. 12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install 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 in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

**b. Materials.** Wet Night Retroreflective Beads and/or Elements. Select WR beads and/or elements from one of the Approved Manufacturers or a Department approved alternative that meets the requirements in Table 1.

**Table 1**

Average Initial Retroreflectivity at 30-meter geometry in mcd/lux/m <sup>2</sup>		
Test Method	Color	
	White	Yellow
Dry (ASTM E 1710)	700	500
Wet Recovery (ASTM E 2177)	250	200

Approved Manufacturers:

3M Corporation  
Potter's Industries  
Swarco  
Flex-o-Lite

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 recommendation the beads and/or elements meet the requirements shown in Table 1.

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 MohsScale.

**c. Construction.** Place the binder and beads and polymer surface coatings in accordance with the Manufacturers' recommendations and sections 811 and 920 of the Michigan Department of Transportation 2020 Standard Specifications for Construction except as noted above.

Construction of bike lane pavement markings shall be in accordance with manufacturer application and installation procedures, Michigan Department of Transportation 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.

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

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
DS_Pavt Mrkg, Polymer Cement Surface, Bike Lane, Green .....	Square Foot
DS_Pavt Mrkg, Polymer Cement Surface, Bus Lane, Red.....	Square Foot
DS_Pavt Mrkg, Polymer Cement Surface, Bike Thru Arrow Sym .....	Each
DS_Pavt Mrkg, Polymer Cement Surface, Bike, Small Sym .....	Each
DS_Pavt Mrkg, Polymer Cement Surface, Bus .....	Each
DS_Pavt Mrkg, Polymer Cement Surface, Only .....	Each

Payment for **DS\_Pavt Mrkg, Polymer Cement Surface, \_ , \_** will be measured by the square foot for areas installed and will include all costs for labor, materials, and equipment costs required to perform all the work described herein.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**SCARIFICATION, FOR POLYUREA SPEC MRKG**

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to scarifying to prepare pavement surfaces for new pavement markings where shown and detailed on the plans in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

None.

**c. Construction.**

The Contractor will scarify pavement surfaces in accordance with section 811 of the Michigan Department of Transportation 2020 Standard Specifications Construction.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Scarification, for Polyurea Spec Mrkg .....	Square Foot

Payment for **DS\_Scarification, for Polyurea Spec Mrkg** will be measured by the square foot for areas completely scarified for the installation of polyurea special markings based on MDOT's Pavement Marking Standard Plans and will include all costs for labor, material, and equipment required to complete the work, including preparing the pavement surface via shot blasting or grinding with non-milling teeth and cleaning of generated debris in advance of installing pavement markings.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**CONDUIT, SCHEDULE \_ PVC, \_ IN.**

WT: MHM

1 of 2

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to install polyvinyl chloride (pvc) piping for streetlights owned by the University of Michigan in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and the University of Michigan Master Specifications, except as modified herein, and as directed by the engineer.

**b. Materials.** Conduit will be Schedule 40 or 80 PVC where specified on the plans with matching fittings. Fittings shall be the same type and from the same manufacturer as the conduit. Conduit shall be UL labeled for 90 degrees C cables. Cantex, Carlon, or National Pipe & Plastic.

**c. Construction.** Build straight conduit runs. If the contract requires sweeps, use the largest radius that will fit the work space available for each sweep. No sweep shall be less than 20 feet. Provide conduit fittings and use methods of joining conduits, including conduit cement, in accordance with current NEC methods. If the NEC does not clearly describe the method, install the conduits in accordance with the manufacturer's recommendation. Obtain the Engineer's approval of installation methods before beginning work. Attach end bells on the ends of conduits entering handholes to prevent damage to the cable. Install continuous coilable conduit between handholes.

Verify that new conduit inserted into existing manholes or handholes does not interfere with racking, training of cables, or both. Do not disturb existing cables.

Bend conduit to the radii specified in the current NEC. For conduit entering foundations or cable pole envelopes, provide conduit with factory bends.

Excavate the conduit trench to provide an earth cover of at least 30 inches over the finished conduit.

Grade the trench to provide drainage to handholes. Stake conduit grades at no greater than 50-foot intervals or as directed by the Engineer. Create a grade that slopes at least 4 inches over 100 feet to the lowest manhole or handhole or from the middle of the conduit run toward both holes.

Backfill. Tamp the bottom of the trench to produce a smooth, flat, or gently sloping surface before placing the conduit. Backfill trenches outside the roadbed with excavated material, suitable for backfill, as determined by the Engineer. If excavated material is unsuitable, backfill the trenches with Class II granular material in accordance with section 204. Backfill trenches within the limits of the roadbed with Class II granular material in accordance with section 204 of the 2020 MDOT Standard Specifications for Construction.



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

<u>Contract Item (Pay Item)</u>	<u>Pay Unit</u>
DS_Conduit, Schedule 40 PVC, 1-1/4 In.....	Foot
DS_Conduit, Schedule 80 PVC, 6 In.....	Foot

Payment for **DS\_Conduit, Schedule 40 PVC, 1-1/4 In.** and **DS\_Conduit, Schedule 80 PVC, 6 In.** will be measured by the foot for conduit installed and includes all costs for all labor, materials, and equipment required to install the conduit.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**U OF M HANDHOLE**

WT:AJK:MHM

1 of 1

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install U of M handholes where shown and as detailed on the plans in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and the University of Michigan Master Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Handhole will be Oldcastle Infrastructure 13" x 24" x 15" Polymer Concrete/FRP Enclosure, Tier 8 (S), Tier 15 (H) SKU CTA132415 or Engineer approved equal and feature a cover with logo that reads "UM OUTSIDE LIGHTING".

**c. Construction.**

The Contractor will construct U of M Handhole in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and the University of Michigan Master Specifications

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_U of M Handhole .....	Each

Payment for **DS\_U of M Handhole** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**DUCT BANK**

WT:AJK:MHM

1 of 4

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install concrete encased duct banks where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, University of Michigan Master Specifications, and the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Ducts for concrete encased duct banks shall be Type DB PVC conduits with matching fittings except where galvanized rigid steel conduits and fittings are shown.

PVC conduit and fittings for encasement in concrete shall be Type DB, UL Labeled for 90 degrees C cables. Carlon or Cantex.

Galvanized rigid steel conduit shall be hot dipped galvanized inside and outside, in 10' lengths threaded on both ends. Allied, Republic Steel, Triangle PWC, Wheatland or Western Tube.

Steel Casing pipe shall be non-spiral pipe and have a minimum yield strength of 35,000 psi. All joints shall be made leak-proof using full penetration, continuous welds. Welds shall be ground smooth outside and inside (except 22" diameter and less) to prevent conflict with the soil or pipe placement. Steel pipe shall meet the requirements of ASTM A53, Type E or S, Grade B.

The following information shall be clearly marked on each length of pipe:

- a. The pipe designation and class (e.g., A53, Type S, Grade B).
- b. The name or trademark of the manufacturer.
- c. Identification of the manufacturing plant.

All pipe furnished shall be subject to inspection on arrival at the job site. 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 University of Michigan.

Brady or Seaton marker strip shall be red plastic, 6" wide, and labeled to indicate type of service.

Concrete encased and direct buried ducts (except site lighting ducts) shall be 4" minimum.

Unless shown otherwise, ground rods shall be 3/4" diameter by 10' long, copper clad steel. Ground rods shall be capable of being extended when additional length is required.

Grounding conductors for direct burial underground, for encasement in concrete, and for grounding of unit substations shall be No. 4/0 AWG minimum, bare, stranded copper.

Ground connections shall be Burndy Hyground, Cadweld, Thermo-weld or Thomas & Betts Blackburn only.

Radial duct bank sections will have a 20-foot radius.

Concrete will be grade 3500 and meet the requirements of section 1004 of the Michigan Department of Transportation 2020 Standard Specifications for Construction and will be tested by an Owner representative.

Detectable underground warning tape – "Caution, Buried Electric Line Below", shall be obtained from Section or approved equivalent.

### **c. Construction.**

The Contractor will excavate, haul away, and dispose of spoils including a 3-inch overcut on duct bank sides to accommodate concrete encasement.

Duct banks shall be supported on undisturbed soil or on piers extending down to undisturbed soil.

Changes in duct bank direction shall be made with 20' minimum radius bends for power. Manufactured sweeps are preferred.

Duct banks shall be sloped downward toward manholes and away from buildings a minimum of 6" per 100'. Duct banks shall not contain traps where water may accumulate.

End bells shall be installed on primary duct ends where the ducts enter the manholes and buildings. End bells shall be firmly embedded in and flush with the inside surface of the wall.

Pull a solid mandrel and a stiff bristled brush through each duct to clean them and insure the absence of kinks and flat spots. A minimum 3-1/4" diameter by 5" minimum long mandrel shall be used for 4" conduit and a minimum 4" diameter by 6" minimum long mandrel shall be used for 5" diameter conduit. The mandrel pull shall be witnessed by the Owner's Representative.

A 3-inch-thick minimum concrete cover shall protect ducts over the entire length and width of the duct bank.

Duct banks shall be marked with a 6" wide red plastic marker strip placed in the backfill approximately 12" above the entire length of the duct bank.

All ducts installed by this project shall contain measuring-type pull tape, Greenlee No. 435 or similar. The tape shall be waterproof polyester or nylon, printed with length measurements every foot to indicate the length of the duct, and have a minimum breaking strength of 130 lbs. A minimum of 60" of excess is required at both ends.

Primary duct banks shall be grounded with a No. 4/0 AWG bare stranded copper ground wire that is run within the duct bank and is bonded and grounded at both ends. Conduit shall not be used as the ground conductor.

Place / bury detectable underground warning tape along the perimeter of the duct bank at a depth specified by the manufacturer.

### **Field Quality Control**

The University shall assign an agent to coordinate Quality Control associated with activities.

The Contractor shall assist with establishing the order, timing, and duration of the activities requiring Quality Control for inclusion in the Project Schedule.

The electrical equipment and construction to be observed by the Quality Control Agent include the following:

- Manholes
- Spacers
- Grounding
- Bell Ends
- Concrete Pours

Provide the Quality Control Agent with reports, lists, forms, plans and drawings.

During the Shop Drawing Submittal Process, submit one set of the Shop Drawings to the Quality Control Agent for Review.

Return to the Quality Control Agent one set of the A/E reviewed and stamped Shop Drawings.

Correct the incomplete and non-conforming items that are identified by the Quality Control Agent.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Unit</b></u>
DS_Duct Bank, 6H x 1V .....	Foot

Payment for **DS\_Duct Bank, 6H x 1V** will be measured by the foot for units in place and will include all costs for labor, material, and equipment required to complete the work as described herein, including radial duct bank sections, excavation, hauling, disposal, furnishing and installing duct banks, grounding rods, grounding and bonding cables, and concrete.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**LIGHT POLE FOUNDATION**

WT: MHM

1 of 4

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to install concrete bases for pedestrian pole lights in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and University of Michigan Master Specifications where indicated and as detailed on the plans.

Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section:

Related University of Michigan Master Specifications Sections:

1. Section 017823 - Operation and Maintenance Manual
2. Section 019100/019110 - Commissioning
3. Section 260513 - Medium, Low & Control Voltage Cables
4. Section 260526 - Grounding and Bonding for Electrical
5. Section 260533 - Electrical Materials and Methods
6. Section 260800 - Electrical Acceptance Tests

Provide all equipment and materials required for pedestrian (security), roadway, and parking lot outdoor lighting as shown on the Drawings.

Prior to construction activities, contact the Owner's Utilities Power & Lighting Shop at 734-647-2049 to coordinate project parameters.

Refer to the fixture schedule and details on the Drawings for information on the fixtures, poles, and accessories.

Contact MISS DIG at 1-800-482-7171 or 811 before performing any excavation work.

Provide barricades around open holes and trenches. Provide temporary bridges over trenches cut through major sidewalk routes. Major sidewalk routes shall not be closed to pedestrian traffic.

Contact the Owner's Electrical Inspectors at 734-764-2457 for inspections before backfilling excavations and before energizing circuits.

For maintenance or repairs to existing lighting systems, contact Utilities Power & Lighting Shop at 734-647-2049.

Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Submit marked up as-built drawings showing the actual locations of lighting poles, sleeves and junction boxes, circuit numbers for all loads, and all deviations from the design. Dimension the locations of sleeve ends, conduits, and junction boxes from a permanent building or landscape feature.

### Quality Assurance

**Manufacturers and Products:** The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

**Reference Standards:** Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.

- IEEE C2, National Electrical Safety Code.
- NFPA 70; National Electrical Code.
- MDOT Standard Specifications for Construction.
- AASHTO, American Association of State Highway and Transportation Officials
- Aluminum Association Standards.

**Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

#### **b. Materials.**

Anchor bolts for pedestrian lighting fixtures shall be 3/4-inch diameter by 20 inches long with a 3-inch "L", fully hot dip galvanized steel having a yield strength of 36,000 psi, each with two hot dip galvanized fender washers and hex nuts.

Concrete for lighting pole and emergency telephone kiosk bases shall be 6 bag minimum mix, with aggregate not exceeding 3/4 inch, 3,000 psi minimum compressive strength after 28 days, air content minimum 5 percent and maximum 7 percent.

Backfill material will be class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.



### **c. Construction**

#### Examination and Preparation

Remove existing pole bases and associated circuiting completely when demolishing existing lighting. Direct buried wiring or underground conduit may be abandoned in place, unless shown otherwise.

Where sidewalk sections must be removed for installation of outdoor lighting, remove the sidewalk sections completely from joint to joint.

Where asphalt must be removed for installation of outdoor lighting, saw cut the asphalt in two, straight, parallel lines, with clean edges.

#### Excavation and Backfill

Excavate and maintain trenches according to applicable Safety and Code requirements. Protect existing features.

Backfill excavated trenches in accordance with the drawings. Excavated materials may be used to backfill the trench only if the backfill is sand or suitable soil that conforms to Section 312000 Earth Moving backfill material requirements and that is free of rocks and debris over 3/4 inch. Dispose of unsuitable material, clay or rocky excavated material, and replace with MDOT Class II sand.

Mark sleeves and conduits for their entire length with a marking tape buried 12 inches above the top of the sleeve or conduit.

Backfill excavated trenches in 6-inch layers and mechanically compact to 98 percent compaction.

Backfill and mechanically compact holes left by demolished pole bases with MDOT Class II sand or clean dirt to a depth of 6 inches below grade. Backfill the last 6 inches with topsoil.

#### Concrete Pour

Install light pole and emergency telephone kiosk concrete bases according to details. Provide specified concrete mix.

Exposed portions of light pole and emergency telephone kiosk concrete bases shall be free of voids and honeycombs.

Provide a uniform, 1-inch, 45-degree chamfer on all light pole concrete bases.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Light Pole Foundation .....	Each

Payment for **DS\_Light Pole Foundation** will be measured by each unit installed and will include all costs for labor, materials, and equipment required for furnishing and installing the materials as shown on the plans and as specified herein.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**DTE STREET LIGHT POLE FOUNDATION**

WT: MHM

1 of 4

01/31/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to construct concrete foundations for DTE light poles where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications and University of Michigan Master Specifications, and as directed by the Engineer.

Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections, in particular the Related Sections listed below, apply to this Section:

Related University of Michigan Master Specifications Sections:

1. Section 017823 - Operation and Maintenance Manual
2. Section 019100/019110 - Commissioning
3. Section 260513 - Medium, Low & Control Voltage Cables
4. Section 260526 - Grounding and Bonding for Electrical
5. Section 260533 - Electrical Materials and Methods
6. Section 260800 - Electrical Acceptance Tests

Provide all equipment and materials required for pedestrian (security), roadway, and parking lot outdoor lighting as shown on the Drawings.

Prior to construction activities, contact the Owner's Utilities Power & Lighting Shop at 734-647-2049 to coordinate project parameters.

Provide barricades around open holes and trenches. Provide temporary bridges over trenches cut through major sidewalk routes. Major sidewalk routes shall not be closed to pedestrian traffic.

Contact the Owner's Electrical Inspectors at 734-764-2457 for inspections before backfilling excavations and before energizing circuits.

Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

Submit marked up as-built drawings showing the actual locations of lighting poles, sleeves and junction boxes, circuit numbers for all loads, and all deviations from the design. Dimension the locations of sleeve ends, conduits, and junction boxes from a permanent building or landscape feature.

### Quality Assurance

**Manufacturers and Products:** The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

**Reference Standards:** Products in this section shall be built, tested, and installed in compliance with the specified quality assurance standards; latest editions, unless noted otherwise.

- IEEE C2, National Electrical Safety Code.
- NFPA 70; National Electrical Code.
- MDOT Standard Specifications for Construction.
- AASHTO, American Association of State Highway and Transportation Officials
- Aluminum Association Standards.

**Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### **b. Materials.**

Anchor bolts will meet the DTE requirements as detailed in the plans or as directed by the Engineer.

Concrete for will be 6 bag minimum mix, with aggregate not exceeding 3/4 inch, 3,000 psi minimum compressive strength after 28 days, air content minimum 5 percent and maximum 7 percent.

Backfill material will be class II granular material which meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

### **c. Construction**

The Contractor will notify MISS DIG in advance of excavation work.

The Contractor will construct DTE light pole foundations in accordance with the details on the plans and as directed by the Engineer.

### Examination and Preparation

Remove existing pole bases and associated circuiting completely when demolishing existing lighting. Direct buried wiring or underground conduit may be abandoned in place, unless shown otherwise.

Where sidewalk sections must be removed for installation of outdoor lighting, remove the sidewalk sections completely from joint to joint.

Where asphalt must be removed for installation of outdoor lighting, saw cut the asphalt in two, straight, parallel lines, with clean edges.

### Excavation and Backfill

Excavate and maintain trenches according to applicable Safety and Code requirements. Protect existing features.

Backfill excavated trenches in accordance with the drawings. Excavated materials may be used to backfill the trench only if the backfill is sand or suitable soil that conforms to Section 312000 Earth Moving backfill material requirements and that is free of rocks and debris over 3/4 inch.

Dispose of unsuitable material, clay or rocky excavated material, and replace with MDOT Class II sand.

Mark sleeves and conduits for their entire length with a marking tape buried 12 inches above the top of the sleeve or conduit.

Backfill excavated trenches in 6-inch layers and mechanically compact to 98 percent compaction.

Backfill and mechanically compact holes left by demolished pole bases with MDOT Class II sand or clean dirt to a depth of 6 inches below grade. Backfill the last 6 inches with topsoil.

### Concrete Pour

Provide specified concrete mix.

Exposed portions of light pole and emergency telephone kiosk concrete bases shall be free of voids and honeycombs.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

**Contract Item (Pay Item)**

**Unit**

DS\_DTE Street Light Pole Foundation ..... Each

Payment for **DS\_DTE Street Light Pole Foundation** will be measured by each unit completely installed and will include all costs for labor, materials, and equipment required to complete the work, including excavation, hauling away and disposing of spoils, furnishing and installing concrete, backfill, conduit, and anchoring hardware.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PRECAST POWER MANHOLE**

WT:AJK:MHM

1 of 3

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to furnish and install a precast electrical manhole where shown and as detailed on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, University of Michigan Master Specifications, and Michigan Department of Transportation 2020 Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Manholes will be precast or cast in place reinforced concrete. Primary manholes shall have inside dimensions of 10' wide by 10' long by 7' high.

Manholes will include a cast iron frame with cover, a hot dipped galvanized steel ladder, hot dipped galvanized pulling eyes embedded in the concrete walls opposite each duct entrance and in the floor beneath the cover, and a sealed indentation for use of a portable pump, offset to one side to clear pulling iron.

Primary manholes will contain a minimum of 2 vertical stanchions on each wall. The stanchions shall be Underground Devices CR-36.

Primary manholes will contain cable racks for routing cables between the duct openings. The racks shall be Underground Devices with 20" arms.

Unless shown otherwise, ground rods shall be 3/4" diameter by 10' long, copper clad steel. Ground rods shall be capable of being extended when additional length is required.

Grounding conductors for general use shall be stranded, copper conductor, sized in accordance with the NEC unless shown otherwise on the drawings, and insulated with green NEC Type THHN insulation rated 90 degrees C, 600 volts.

Ground connections shall be Burndy Hyground, Cadweld, Thermo-weld or Thomas & Betts Blackburn only.

Bedding and backfill will be class II granular material that meets the requirements of section 902 of the Michigan Department of Transportation 2020 Standard Specifications for Construction.

**c. Construction.**

The Contractor will excavate to the required depth to allow 12 inches of bedding and haul away and dispose of all spoils. The Contractor will overcut to accommodate equipment required for compaction.

Class II bedding and backfill will be placed in maximum 12-inch layers compacted to 98% of the maximum density. Backfill to within 4 inches of the finished grade.

Protect the work utilizing temporary fence and/or other traffic control devices with daily maintenance until turf restoration operations are completed.

Manholes will be accessible by trucks, cable reel trailers and other cable pulling equipment.

Primary manholes will be grounded with four  $\frac{3}{4}$ " diameter by 10' long ground rods, one driven inside or outside of the manhole at each corner. Connect the ground rods with a No. 4/0 AWG bare, stranded copper ground wire loop. A No. 2 AWG bare stranded copper pigtail from the ground wire loop shall be used to bond together and ground the manhole cover frame, ladder support bracket, concrete inserts, metallic cable racks, duct bank ground conductors, and the shields of any primary cables that are spliced in the manhole.

Each ground rod shall have a maximum resistance to ground of 10 ohms before connection to the other ground rods. If reading is above 10-ohms, drive one extension. Further testing of that individual rod is not needed.

The total grounding system with all connections completed shall have a maximum resistance to ground of 2 ohms.

Provide exothermic weld type, or Burndy Hyground, ground connections for concealed, underground, and concrete encased ground connections, for ground connections to structural steel, connections between sections of the main ground bus and all connections to the substation room ground bus bars.

Exposed ground connections (except connections to structural steel and substation room ground bus bars) may be made with copper or bronze compression ground fittings or bolted compression ring lugs.

Provide exothermic weld type, or Burndy Hyground ground connections for splices and taps of grounding conductors No. 8 AWG and larger. Exposed splices and taps shall be taped.

Adjust the structure to final grade.

Clean the structure after all work is completed.



**Field Quality Control**

The University shall assign an agent to coordinate Quality Control associated with activities.

The Contractor shall assist with establishing the order, timing, and duration of the activities requiring Quality Control for inclusion in the Project Schedule.

The electrical equipment and construction to be observed by the Quality Control Agent include the following:

- Manholes
- Spacers
- Grounding
- Bell Ends
- Concrete Pours

Provide the Quality Control Agent with reports, lists, forms, plans and drawings.

During the Shop Drawing Submittal Process, submit one set of the Shop Drawings to the Quality Control Agent for Review.

Return to the Quality Control Agent one set of the A/E reviewed and stamped Shop Drawings.

Correct the incomplete and non-conforming items that are identified by the Quality Control Agent.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u><b>Contract Item (Pay Item)</b></u>	<u><b>Unit</b></u>
DS_10' x 10' x 7' Precast Power Manhole .....	Each

Payment for **DS\_10' x 10' x 7' Precast Power Manhole** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work as described herein, including final grade adjustments of the structure and cleaning the structure, excavation, hauling, disposal, furnishing, installing, and compacting granular material, furnishing and installing the structure and appurtenances detailed on the plans, grounding rod, grounding and bonding cables, frame and cover, ladder, and protection measures.

CITY OF ANN ARBOR  
 DETAILED SPECIFICATION  
 FOR  
**TRAFFIC SIGNAL EQUIPMENT**

WT:MHM

1 of 1

02/03/2025

**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, and MDOT special provisions 20SG818-A060, 20SP-820CC-03, 20SP-820FF-01, 20SP-820W-03 and 20SP-820Z-03, which are included in this manual for reference.

**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, and MDOT special provisions 20SG818-A060, 20SP-820CC-03, 20SP-820FF-01, 20SP-820W-03 and 20SP-820Z-03, which are included in this manual for reference.

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

<u>Pay Item</u>	<u>Pay Unit</u>
DS_Controller and Cabinet, Rem.....	Each
DS_TS, Pedestrian, Pedestal Mtd, Rem.....	Each
DS_TS, Mast Arm Mtd, Rem.....	Each
DS_Pedestal, Rem.....	Each
DS_Fdn, Rem .....	Each
DS_Conduit, Rem .....	Each
DS_Cable, Rem .....	Each
DS_Pedestal, Rem.....	Each
DS_Pedestal Fdn, Rem .....	Each
DS_Controller Fdn, Base Mtd .....	Each
DS_Serv Disconnect .....	Each
DS_TS, Pedestrian, One Way Pedestal Mtd, Salv .....	Each
DS_TS, One Way Mast Arm Mtd (LED).....	Each
DS_Pedestal, Alum, Salv .....	Each
DS_Pedestal, Fdn .....	Each
DS_Cable, Sec, 600V, 1, 3/C#6.....	Foot

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.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**CONTROLLER, NEMA, ATC TYPE, CITY OF ANN ARBOR**

WT:JNB

1 of 2

01/13/25

**a. Description.** This work consists of furnishing, delivering, and installing a traffic signal controller, *NEMA* Advanced Transportation Controller (ATC) type meeting City of Ann Arbor specifications.

This work includes furnishing and delivering the controller to the City of Ann Arbor signal shop for controller timing and setup. This work includes transporting the controller from the signal shop to the job site for installation. This work includes installation of the traffic signal controller unit (CU) and accessories required to provide the traffic signal control operations as shown on the plans, in accordance with the *MMUTCD*, and this special provision.

**b. Material.** Provide materials meeting the requirements in sections 918 and 921 of the MDOT Standard Specifications for Construction, City of Ann Arbor requirements, and this special provision.

1. Controller Unit (CU).

A. Provide the following CU. Confirm the appropriate firmware version with the Engineer and City of Ann Arbor prior to ordering. No additional payment will be made based on the firmware version provided:

(1) Yuratraffic Blade Edge Capable Advanced Traffic Controller.

2. Packing and Marking. Ensure each CU is packed separately in such a manner that there will be no injury or defacement to the CU during transportation to the point of destination, unless otherwise specified in the contract. Ensure each carton is legibly marked with the CU description, purchase order number, and vendor's name.

3. Warranty. Provide a minimum manufacturer's or vendor's warranty of 1 year for CU software and 2 years for CU hardware beginning with the acceptance date for the traffic signal, transferable to City of Ann Arbor. Furnish the warranty and other applicable documents from the manufacturer or vendor, and a copy of the invoice showing the date of shipment, to the Engineer prior to final written acceptance.

**c. Construction.** Complete this work in accordance with sections 818 and 820 of the MDOT Standard Specifications for Construction, City of Ann Arbor requirements, as shown on the plans and 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**

DS\_Controller, NEMA, ATC Type, City of Ann Arbor .....Each

**DS\_Controller, NEMA, ATC Type, City of Ann Arbor** includes:

1. Installing the traffic signal controller unit (CU), and accessories required to provide the traffic signal control operation as shown on the plans and in accordance with the *MMUTCD* and this special provision.
2. Furnishing and delivering the controller to the City of Ann Arbor signal shop for controller timing setup.
3. Transporting the controller from the maintaining signal shop to the job site for installation.

The Engineer may process a partial payment for units delivered to the signal shop or other approved location after initial inspection and acceptance and after the Contractor provides either a paid invoice/proof of payment or a receipt for delivery. If payment is based on the delivery invoice, the Contractor must provide a copy of the paid invoice/proof of payment to the supplier within 10 calendar days of the prime Contractor receiving payment for the materials. Partial payments for delivered materials/units meeting all project specifications will be limited to the smaller of the actual invoice amount or 96 percent of the contract bid amount. Final payment will be processed after final acceptance of the individual traffic signal installation.

CITY OF ANN ARBOR  
 DETAILED SPECIFICATION  
 FOR  
**SALVAGE ACCESSIBLE PEDESTRIAN SIGNAL SYSTEM**

CON:WT:JNB

1 of 1

12-16-24

**a. Description.** This work consists of removing, storing, and re-installing an accessible pedestrian signal system and push button station(s) as shown on the plans, including all mounting brackets, hardware, wiring, grounding, and other associated materials as required to ensure a complete removal and installation

**b. Materials.** Provide materials, as directed by the Engineer, necessary to provide complete removal and operational re-installation. Provide materials in accordance with the City of Ann Arbor standards and specifications.

**c. Construction.** Remove, store, and re-install accessible pedestrian signal systems and components as shown on the plans, and in accordance with the City of Ann Arbor standards and specifications.

**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:

<b>Pay Item</b>	<b>Pay Unit</b>
Pedestrian Signal System, Accessible, Salv.....	Each
Push Button Station and Sign, Salv.....	Each

1. **Pedestrian Signal System, Accessible, Salv** includes removing and re-installing the accessible pedestrian signal system at an intersection, including the CCU, configurator, hardware, fittings, conduit(s), wiring, grounding and ground rod(s), and all appurtenant material required to complete the work.

2. **Push Button Station and Sign, Salv** includes removing and re-installing the push button station, sign (when specified), associated assembly, brackets, hardware, fittings, conduit(s), cable to controller, wiring, grounding, ground rod(s), and all other appurtenant material required to complete the work.

CITY OF ANN ARBOR

DETAILED SPECIFICATION  
FOR  
**TEMPORARY AUDIBLE MESSAGE DEVICE**

WT:AJK

1 of 4

01/13/2025

**a. Description.** This work will consist of furnishing and installing temporary audible message devices to be used in Temporary Pedestrian Alternate Routes (TPAR) for pedestrians with visual impairments in compliance with the latest version of the Michigan Manual on Uniform Traffic Control Devices (MMUTCD) and the Public Right-of-Way Accessibility Guidelines (PROWAG), published in November 2005. All work will be in accordance with the Special Provision for "Maintenance of Traffic" and as indicated on the plans, and as modified herein.

**b. Categories.**

Audible message devices (AMDs) will have two categories:

1. AMDs without a pushbutton - these devices will operate based on a proximity sensor; the audible message content will be given when the sensor is activated.
2. AMDs with a pushbutton and locator tone -these devices will have the capability of utilizing a locator tone for pedestrians with visual impairments to locate the pushbutton on the AMD. The pushbutton on the AMD will activate the audible message content. The AMD may continuously sound the locator tone, or the locator tone may be activated with a proximity sensor.

**c. Criteria.**

The following are the necessary criteria for all types of AMDs to be on the APL:

- a. Compliant with the latest version of the Michigan Manual on Uniform Traffic Control Devices (MMUTCD) and the Public Right-of-Way Accessibility Guidelines (PROWAG), published in November 2005.
- b. Be weatherproof and fully operational between -20° F to +130° F and in a humidity range of 0-100% non-condensing.
- c. Be able to be battery operated.
- d. Proximity sensor will be able to detect pedestrians from 15 feet away.
- e. The ability to verbalize a custom voice messages for a minimum of 60 seconds.
- f. Volume requirements
  - Volume measured at 3 feet from the AMD will be 2 dB minimum and 5 dB maximum above ambient noise level in standard operations and

- will be responsive to ambient noise level changes.
- The ability to maximize volume at 100 dBA

The following are the additional necessary criteria for AMDs with pushbuttons and locator tones:

- g. The device will be designed such that the pushbutton is within the Reach Ranges identified in PROWAG when the device is placed on level ground. In addition, the pushbutton will be placed approximately at 42 inches (but no more than 48 inches) from the bottom of the device.
- h. Pushbuttons will incorporate a locator tone at the pushbutton. Pushbutton locator tone volume measured at 3.0 feet from the pushbutton will be 2 dB minimum and 5 dB maximum above ambient noise level and will be responsive to ambient noise level changes. The duration of the locator tone will be 0.15 seconds maximum and will repeat at intervals of one second. The locator tone may be activated by a proximity sensor.

#### **d. Materials.**

Approved Temporary Audible Message Devices are as follows:

- Model 400ADA audible Device, manufactured by Empco-Lite, 1675 Shanahan Drive, South Elgin, IL USA 60177.
  - The 400ADA is an audible information device that can be mounted on various safety devices like the ADA Wall, 42" Cones, and the Safety Wall. Or it can just be a stand-alone device.
  - Easily program your message with built-in microphone and speaker.
  - Record up to a 60 second message.
  - Customize message for each location. See "Messages for Audible Information Devices" for message guidelines and helpful information.
  - When routes are blocked (especially mid-block closings), there are alternate crossings or alternate routes that are not continuous, these units provide positive guidance for the visually impaired by providing needed audible information. See 2009 MUTCD Section 6D.01 E, Section 6D.02, Section 6F.14, Section 6F.16 and notes on Figure 6H-28 and Figure 6H-29 (see PDF).
  - Unit can be mounted on a standard barricade light housing utilizing two 6V spring terminal batteries or can be a self contained unit operating on four D-Cell batteries.

- Unit is triggered by motion detector when pedestrians get within 15 feet of the unit.
- SpeakMaster 500, manufactured by MDI Worldwide, 38271 W Twelve Mile Road, Farmington Hills, MI 48331.
  - The ADA SpeakMaster™ is an audible warning device that alerts pedestrians of a sidewalk closure ahead and provides navigation instructions. Rugged design, simple to install and programmable through Bluetooth connectivity, the 9" DFB sign promotes safety where ever they're installed.
  - The all aluminum ADA SpeakMaster stands 5.5 feet high, is completely weather resistant, and ADA compliant. The two-sided frame at the top has snap-open side rails to easily change custom signs. The frame can rotate 360° to accommodate the different requirements of multiple urban areas. The unit is powered by an extended-life battery stored in a key-locked compartment in the base, and the base can be weighted for added stability and security. The electronics are housed in the upright, also in a key-locked compartment, and messages can be programmed on site, by cell phone, or computer. The base tilts and rolls on hidden wheels.
  - The ADA SpeakMaster is positioned approximately 100 feet before the actual sidewalk closure. As the pedestrian approaches, he hears a unique locator tone, which the visually impaired have been taught to recognize. The tone is either on continuously or is activated by an optional motion sensor and indicates that there is more information. The pedestrian locates the push button and activates the voice module to hear navigation instructions. He can then safely pass through the temporary pedestrian accessible route.

#### **e. Construction.**

Installer's Qualifications: Engage an experienced Installer who has successfully completed AMD installations similar in material, design, and extent to that indicated for this Project.

The contractor will follow manufacturer specifications for installation, except where they conflict with MMUTCD or other project requirements.



**f. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit prices for the following contract items (pay items):

<b><u>Contract Item (Pay Item)</u></b>	<b><u>Pay Unit</u></b>
DS_Temporary Audible Message Device .....	Each

Payment for **DS\_Temporary Audible Message Device** will be measured by each unit completely installed, maintained, and removed and will include all costs for labor, materials, and equipment required to complete this work, including furnishing and installing temporary audible message device, maintaining, relocating, and removing from the site after contract work is completed or at the direction of the Engineer.

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**

DS\_ Recable, TS.....Foot

DS\_ **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  
**ACCESSIBLE PEDESTRIAN SIGNAL SYSTEM**

SIG:EMS

1 of 6

APPR:DJA:NJB:06-11-24  
FHWA:APPR:06-17-24

**a. Description.** This work consists of either furnishing and installing an accessible pedestrian signal system and push button station(s) or removing a system and push button station(s) at locations as shown on the plans.

The following terminology is used in this special provision.

1. Accessible pedestrian signal system, or system hereafter, refers to central control unit (CCU) and multiple push button stations.

2. CCU, refers to the unit installed in an existing traffic signal controller cabinet, frame, and all required mounting hardware and the configurator. The CCU is the power supply and signaling interface, between the intersection traffic signal controller and the push button stations. Configurator refers to a handheld, password secure, infrared device capable of setting and resetting all push button stations on the intersection from a single push button station (global updating). Each CCU will control multiple push button stations. A complete system includes one CCU.

3. Push button station (PBS), refers to a Public Rights-of-Way Accessibility Guidelines (PROWAG) compliant push button station including signs when specified, installed at crosswalk termini, and all required mounting hardware. A system can include 2 to 12 PBS (maximum of 3 per phase).

**b. Materials.** Furnish an accessible pedestrian signal system including CCU and PBS meeting the requirements of this subsection. Furnish all hardware and other appurtenant materials in accordance with sections 918 and 921 of the Standard Specifications for Construction and this special provision.

1. Accessible Pedestrian Signal System.

A. Furnish an accessible pedestrian signal system from the following list.

(1) Polara Navigator.

(2) Approved equal (AE). Ensure the AE is evaluated, tested, and approved per the MDOT New Traffic Signal Device Product Review Guidelines. The review time is not justification to delay the project.

2. The system must:

A. Furnish various audible features including but not limited to locator tones. All

locator tones must emanate from push button stations and be synchronized;

B. Have multiple language capability, selectable by user, and able to play an emergency preemption message;

C. Be able to self-test and report any faults to the traffic controller;

D. Furnish the following audible feature, each with a minimum and maximum volume independently settable using the configurator:

(1) One locating tone;

(2) Five walk sound choices (field selectable);

(3) Three pedestrian - clearance sound choices (field selectable) ensuring one of which is an audible countdown;

(4) Direction of travel (as standard feature with extended push); and

(5) Information message (custom feature with extended push).

E. Automatically adjust audible features to ambient noise levels over a 60 decibel (dB) range; and

F. Mute sounds on all crosswalks except the activated crosswalk (selectable feature).

3. The CCU must meet the following requirements:

A. Be compatible with solid-state pre-timed or actuated traffic signal control equipment and cabinet environments;

B. Be capable of controlling up to and including 12 PBSs and controlling up to and including 4 pedestrian phases;

C. Receive timing from the walk and don't walk signals;

D. Have additional advanced configurations available by using general purpose inputs and outputs;

E. Ensure full optical isolation of all inputs and outputs and include transient voltage protection as follows:

(1) General Purpose Inputs. 10 to 36 VAC/VDC peak with a 10 milli Ampere (mA) maximum.

(2) General Purpose Outputs and Pedestrian Outputs. 36 VAC/VDC peak, 0.3 Ampere (A) solid state fused contact closure.

(3) Fault Output. Normally open and closed relay contacts, 125 VAC/VDC, 1 A maximum.

(4) Pedestrian Hand/Walking Person (Walk/Don't Walk) Inputs. 80-150 VAC/VDC, 5 mA maximum.

(5) A, B, C, D PBS Power Outputs. Nominal 22 VDC, short circuit protected, auto recovering.

(6) Environment Operation and Storage Range. -30 °F to 165 °F (-35 °C to 74 °C), 0 to 100 percent Humidity, Non-condensing.

(7) Line Power. 25 Watt (W) to 75 W typical, 120 W peak with 8 PBSs.

F. Include a 50-pin connector and cable that plugs into the CCU for termination to the traffic signal controller terminal facilities. Ensure the connector is a Positronic MD50F20Z0X or equivalent, provided with 20-24 gauge wire, which complies with the requirements of *UL 1061*.

4. The PBS must meet the following requirements:

A. Design each PBS in accordance with the following:

(1) Produce sounds emanating from the back of the unit via an 8 ohms 15 W, weather-proof speaker protected by a vandal resistant screen;

(2) Require only two wires coming from the traffic control cabinet for each phase/crosswalk;

(3) Include push buttons which are audibly locatable and equipped with tactile arrows pointing in the same direction as the associated crosswalk;

(4) PROWAG compliant, cast aluminum, nickel plated, powder coated with raised tactile arrow on button;

(5) Include solid-state switch rated to 20 million activations (minimum); and

(6) Include a two inch button with a tactile raised directional arrow on the button that can be changed to one of four directions to coincide with the direction of travel of the associated crosswalk.

B. The PBS must include the following standard features:

(1) The arrow/button must vibrate during the walk period, following a button push;

(2) Confirm a button push via a "vibratactile" bounce and a red LED, clearly visible in direct sunlight, which latches ON when the button is pushed;

(3) Indicate the direction of travel with extended button push;

(4) Transmit a standard locating tone, custom sound, or verbal countdown during pedestrian clearance;

(5) Ensure sounds automatically adjust to ambient over 60 dB range;

- (6) Allow sounds to have minimum and maximum volume set independently;
- (7) Synchronize all sounds;
- (8) Extended button push can turn on, boost volumes, and/or mute all sounds except those on activated crosswalk; and
- (9) Include message to clear the intersection when preemption is activated.

C. Ensure the PBS is capable of custom message and sound options for the following features:

- (1) Custom locating tone;
- (2) Custom clearance sound;
- (3) Custom walk sounds/message;
- (4) Informational message;
- (5) Multiple languages (up to three, selected by user); and
- (6) Street name in Braille on the sign.

D. Ensure the PBS is fabricated in accordance with the following:

- (1) Available in three standard colors: Black, Green, and Yellow. The default color is yellow unless specified otherwise;
- (2) Have an operational temperature range of -40 °F to 165 °F (-40 °C to 60 °C);
- (3) Ensure the housing material is cast aluminum;
- (4) Chemically filmed and powder coated;
- (5) Face plate constructed of powder coated aluminum with ink marking; and
- (6) Have pre-drilled mounting holes to hold a 9 inch by 12 inch, R10-3b, 3d, or 3e pedestrian sign.

E. PBS LED display operational requirements:

- (1) Light when the button is pushed and remain lit until the next walk phase.
- (2) Luminous intensity greater than 1200 maximum continuous discharge (mcd), sunlight visible, ultra bright red, with a 160 degree viewing angle.

F. PBS audio operational requirements:

- (1) Audio amplifier power output of 10 W rms into 8 ohms.

(2) Volume control automatic adjustment range of 28 dB (maximum).

(3) Microphone ambient noise frequency range of approximately 170 Hertz (Hz) to 2.3 Kilo Hertz (kHz).

(4) Button tone provides a brief "tick" to confirm each button push.

(5) Audible locating tone operates during the pedestrian-clearance and don't walk interval at an 880 Hz plus harmonic, 0.1 second duration, 1 second interval.

(6) Audible "chirp" operates only during walk intervals at 2700 Hz to 1700 Hz, 0.2 second duration, 1 second interval.

(7) Audible "cuckoo" operates only during walk intervals at 1250 Hz to 1000 Hz, 0.6 second duration, 1.8 second interval.

5. Ensure the configurator meets the following requirements:

A. Be a handheld, password protected, remote that configures the CCU or an individual PBS;

B. Communicate via infrared technology with the CCU and the PBS with an interactive operation to select various configuration options at the intersection(s), by standing adjacent to either the CCU or a PBS;

C. Feature a LCD display, with two 16-character lines, with backlight and adjustable contrast;

D. Be powered by four AA 1.5 Volt cell batteries, include a low battery warning, and have an auto or manual shut-off switch; and

E. Have an operating temperature range of 32 °F to 122 °F (0 °C to 50 °C).

6. Warranty. Furnish a manufacturer's warranty, transferable to the Department or the local agency responsible for the project, that the supplied materials will be free from all defects in materials and workmanship for a 2-year period from the date of shipment. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing date of shipment, to the Engineer at the time of delivery.

**c. Construction.** Complete this work in accordance with sections 818 and 820 of the Standard Specifications for Construction, typical signal construction details, and this special provision.

1. Furnish and Install. Furnish and install a system at an intersection as shown on the plans and in accordance with the *MMUTCD*. Ensure that the arrow on the PBS button(s) points in the direction of pedestrian travel for the associated crosswalk.

2. Remove. Remove an accessible pedestrian signal system or a PBS and store, as directed by the Engineer, or dispose of all removed materials.

A. Where removal of an accessible pedestrian signal system is specified on the plans, remove the CCU, hardware, cable, connectors, and other appurtenant material required to complete the work.

B. Where removal of a PBS is specified on the plans, remove the PBS, sign, associated assembly, hardware, cable, connectors, and other appurtenant material required to complete the work.

**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:

<b>Pay Item</b>	<b>Pay Unit</b>
<del>Pedestrian Signal System, Accessible .....</del>	<del>Each</del>
<del>Push Button Station .....</del>	<del>Each</del>
<del>Push Button Station and Sign .....</del>	<del>Each</del>
<del>Pedestrian Signal System, Accessible, Rem .....</del>	<del>Each</del>
DS_ Push Button Station, Rem .....	Each

1. **Pedestrian Signal System, Accessible** includes installing the accessible pedestrian signal system at an intersection, including a CCU, configurator, hardware, fittings, conduit(s), wiring, grounding and ground rod(s), and all appurtenant material required to complete the work.

2. **Push Button Station and Push Button Station and Sign** includes installing the push button station, sign (when specified), associated assembly, brackets, hardware, fittings, conduit(s), cable to controller, wiring, grounding, ground rod(s), and all other appurtenant material required to complete the work.

3. **Pedestrian Signal System, Accessible, Rem**, includes removing an accessible pedestrian signal system at an intersection including a CCU, configurator, hardware, fittings, hardware, cable, connectors, conduit(s), grounding, and other material required to complete the work. **Pedestrian Signal System, Accessible, Rem** also includes storage or disposal of removed material.

DS\_ **Push Button Station, Rem**, includes removing a push button station, sign, associated assembly, brackets, hardware, fittings, cable, connectors, conduit(s), ground, and other material required to complete the work. **Push Button Station, Rem** also includes storage or disposal of removed material.



MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
**TRAFFIC SIGNAL BACKPLATE**

SIG:EMS

1 of 2

APPR:HLO:NJB:05-01-20  
FHWA:APPR:05-06-20

**a. Description.** This work consists of completing one or more of the following work types at location(s) shown on the plans:

1. Furnishing and installing a traffic signal backplate.
2. Removing and disposing of an existing traffic signal backplate.
3. Removing, storing and reinstalling an existing traffic signal backplate.

As applicable, this work includes removal or installation of hardware, connectors, fittings and all material necessary to complete the work.

**b. Materials.** Material must meet sections 819, 820, and 921 of the Standard Specifications for Construction.

1. Provide a one-piece backplate for three or four section traffic signal heads as indicated on the plans or as directed by the Engineer. Ensure that five section (doghouse) signal head combinations are provided with no more than three vacuum formed pieces.
2. Provide backplates that are designed to precisely fit the manufacturer's signal heads and supplied with necessary hardware to attach the backplate to the signal.
3. Provide backplates that are vacuum formed from 0.125 inch thick black acrylonitrile butadiene styrene (ABS) plastic with a hair cell finish on the front side (facing approaching traffic) to reduce glare.
4. Provide backplates that are constructed with a minimum 5/8 inch flange on all sides to provide structural rigidity. Ensure the backplates are provided with a three inch corner radius.
5. Ensure that all backplates extend approximately five inches around the perimeter of the traffic signal combinations after installation.
6. Provide backplates with an *ASTM Type IV* reflective yellow tape border. Ensure that a one inch border is used with yellow signal heads and visors, and a two inch border is used with black signal heads and visors.
7. **Warranty.** Provide materials with a manufacturer's warranty/guarantee, transferable to MDOT, that the supplied materials will be free from all defects in materials and workmanship for the stated time period from the date of shipment. Supply the Engineer with any warranty or guarantee documents from the manufacturer and a copy of the invoice showing date of

shipment.

**c. Construction.** Complete this work in accordance with sections 819 and 820 of the Standard Specification 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 Specification for Construction.

**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:

<b>Pay Item</b>	<b>Pay Unit</b>
DS_ Backplate, TS.....	Each
<del>Backplate, TS, Rem.....</del>	<del>Each</del>
<del>Backplate, TS, Salv.....</del>	<del>Each</del>

DS\_ **Backplate, TS** includes installing the backplate on existing or new signal head(s) at location(s) shown on the plans where installation is specified. Furnish and install a traffic signal backplate, as indicated on the plans or as directed by the Engineer.

2. **Backplate, TS, Rem** includes removing the existing backplate, hardware, and other appurtenances, required for a complete removal where removal is specified. Dispose of removed materials.

3. **Backplate, TS, Salv** includes removing the existing backplate, hardware, and other appurtenances required for a complete removal, storing salvaged materials in a clean environment, and reinstalling the materials where salvage is specified. Complete reinstallation in accordance with subsection c. of this special provision.

MICHIGAN  
DEPARTMENT OF TRANSPORTATION  
  
SPECIAL PROVISION  
FOR  
**WIRELESS VEHICLE DETECTION SYSTEM**

SIG:EMS

1 of 6

APPR:HLO:NJB:05-09-24  
FHWA:APPR:06-04-24

**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.** Furnish materials, as directed by the Engineer, necessary to provide a complete and operating job. Furnish materials in accordance with sections 918 and 921 of the Standard Specifications for Constructions and this special provision.

1. Vehicle Detection System (VDS).
  - A. Furnish a VDS from the following list.
    - (1) Sensys Flexmag.
    - (2) Approved equal (AE). Ensure the AE is evaluated, tested, and approved per the MDOT New Traffic Signal Device Product Review Guidelines. The review time is not justification to delay the project.

B. 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; and
- (6) Any associated cable, connectors, and hardware necessary to complete the work.

C. Furnish a VDS that:

- (1) Detects and counts vehicles using battery powered magnetometers utilizing wireless communications to transmit detection information;
- (2) Furnishes 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); and
- (3) Allows the time intervals for the above measurements to be user selectable from 30 seconds to 24 hours.

D. Furnish an SPP radio that:

- (1) Consists of a 2.4 gigahertz (Ghz) Master transceiver powered via CAT 5e cable;
- (2) Includes 600 V 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 VDC at 3 watt power or via non-isolated external 10 to 15 VDC at 2 watt power;
- (6) Operates in an ambient temperature range of -37 °F to +176 °F (-38 °C to +80 °C);
- (7) Furnishes 1500 V 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.

E. Furnish 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. Furnish 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 °F to +176 °F (-38 °C to +80 °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 APCC 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. Furnish 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 °F to +176 °F (-38 °C to +80 °C).

4. Bus Interface Unit (BIU). Furnish a BUI that meets the requirements of *Section 8 of the NEMA TS2-Specification*. Furnish one 6 foot Port 1 communications cable to connect from the detector rack BIU to the controller unit.

5. Wireless Communication. Furnish a VDS, RP, or VSN that operates in the unlicensed Industrial, Scientific, and Medical (ISM) 2.4 GHz band. Ensure the SPP and VSN operate in any one of the 16 channels available in the band. Furnish two-way communication between the SPP and VSN to ensure integrity over the RP interface. Furnish 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. Furnish a VDS that can accept software and firmware upgrades. Furnish 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. Furnish materials with a manufacturer's warranty, transferable to the Department or the local agency responsible for the project, 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 818 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 shown 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 shown 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
<del>Wireless Vehicle Detection System .....</del>	<del>Each</del>
DS_ Wireless Vehicle Sensor Node .....	Each
DS_ Wireless Repeater .....	Each
DS_ Wireless Vehicle Detection System, Rem.....	Each
DS_ Wireless Vehicle Sensor Node, Rem.....	Each
<del>Wireless Repeater, Rem .....</del>	<del>Each</del>
DS_ Wireless Vehicle Detection System, Salv .....	Each
<del>Wireless Repeater, Salv .....</del>	<del>Each</del>
DS_ 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.

**DS\_ 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.

**DS\_ Wireless Repeater** includes installing a wireless repeater including the RP, mounting brackets, hardware, and all appurtenant material required to complete the work.

**DS\_ 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.

**DS\_ 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.

DS\_ **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;

DS\_ **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 shown 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.



MICHIGAN  
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION  
FOR  
**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION TYPE TRAFFIC  
SIGNAL CABINET**

SIG:EMS

1 of 21

APPR:BA:HLO:03-14-24

FHWA:APPR:03-18-24

**a. Description.** This work consists of furnishing, delivering, and installing a traffic signal cabinet, *NEMA* type.

This work includes furnishing and delivering the cabinet to the maintaining agency for cabinet setup. This work includes transporting the cabinet from the maintaining agency to the job site for installation. This work includes installation of the cabinet, and accessories required to furnish the traffic signal control operations as shown on the plans, in accordance with the *MMUTCD* and this special provision. As applicable this work includes mounting brackets and hardware, conduit risers, wiring, connectors, grounding, terminating signal wiring, and all appurtenant materials required to ensure a complete installation.

**b. Material.** Furnish materials meeting the requirements in sections 918 and 921 of the Standard Specifications for Construction and this special provision.

1. Cabinet. This special provision defines the minimum acceptable requirements for a series of cabinets that differ in size, to house the controller unit (CU) and related devices. Furnish the base mounted size 6-ITS cabinet unless the plans show otherwise.

A. Furnish a cabinet from the following list.

(1) Mobotrex NEMA

(2) Econolite NEMA

B. Cabinet Dimensions. Outside dimensions are as shown in Table 1. These dimensions are outside dimensions exclusive of hinges, handles, overhang(s), vent housing, and adapters. Cabinet heights are measured to the lowest point of the top surface of the cabinet. Ensure the combined overhangs of the four sides of the cabinet does not exceed 4 inches.

**Table 1: Minimum Outside Dimensions**

Size	Height (inches)	Width (inches)	Depth (inches)
M36-ITS	71	36	17
6-ITS	66	44	25.5

C. Cabinet Types and Mountings.

(1) Base Mounted (6-ITS). Ensure the size 6-ITS cabinet can be constructed so

that it can be mounted on a 30 inch by 48 inch foundation. Anchor bolt mounting provisions for four bolts on 40<sup>3</sup>/<sub>4</sub> inch centers (side-to-side) on 18<sup>1</sup>/<sub>2</sub> inch centers (front-to-back). Include one base adaptor, 15 inches in height, with the same dimensions and bolt pattern as the cabinet. Furnish eight nuts and eight washers with each size 6-ITS cabinet.

(2) Pole Mounted/Base Mounted (M36-ITS). Ensure cabinets intended for side of pole mounting are furnished with any necessary adapter, inclusive of steel banding, to permit mounting to a 4<sup>1</sup>/<sub>2</sub> inch or larger diameter pole. Ensure the adapter accommodates lag bolts up to 3/8 inch and steel banding up to 1 inch wide. Ensure mounting points are furnished at or near the top and bottom of the cabinet. Ensure the adapter has provisions for two holes spaced horizontally, which will have a center-to-center distance of 3<sup>1</sup>/<sub>2</sub> inches. Furnish cabinets without conduit holes. In addition, ensure the cabinet is furnished with a removable bottom to enable it to be pole or base mounted.

(3) Anchor Bolts. Furnish anchor bolts for base mounted cabinets which are 3/4 inch in diameter by 42 inches long which includes a 90-degree bend with a 3-inch leg. Ensure the long leg is threaded for at least 3 inches with a 3/4 inch Unified Coarse Thread (UNC) -10 thread. Ensure anchor bolts are steel with a hot-dipped galvanize. Per standard *AISI 300 Series*.

D. Materials. Construct the traffic control cabinet of aluminum. Ensure the aluminum material is a minimum of 1/8 inch alloy sheet, *ASTM B209/B209M, 5052-H32* or equivalent.

E. Finish and Surface Preparation. Paint and prepare cabinets as specified herein.

(1) Prepare the surface of the cabinet to *Aluminum SSPC* or approved equal prior to painting, to avoid paint peeling.

(2) Paint the interior surface white. Ensure the interior of the controller cabinet is finished with a durable two coat white paint having a total dry film thickness of not less than 0.75 mils.

(3) Ensure the exterior of the controller cabinet and all mounting attachments are finished with a durable and weather-resistant protective coating having a total dry film thickness of not less than 1.5 mils. Ensure the final coat is RAL 7040, aluminum in color, gives complete coverage, and is at least 0.75 mil in thickness.

(4) Repaint any scratched or damaged surface area. Ensure the final repair coat is RAL 7040, aluminum in color, yields complete coverage, and is at least 0.75 mil in thickness.

F. Top Surface Construction. Ensure the cabinet is manufactured to prevent the accumulation of water on its top surface.

G. Doors.

(1) Main Cabinet Door. Ensure the cabinet has a main door which permits access to all equipment within the cabinet. Ensure doors are hinged on the right side of the

cabinet as viewed from the outside facing the cabinet door opening. Ensure the door has a handle of one-piece construction and swings away from the locking mechanism.

(2) Hinges. Ensure all cabinet doors incorporate a piano type hinge utilizing stainless steel hinge pins.

(3) Door Stop. Ensure the cabinet door is furnished with a door stop which holds the door open at 90 degrees, 135 degrees and at 180 degrees ( $\pm 20$  degrees at each stop).

(4) Latches and Locking Mechanism.

(a) Ensure all cabinets incorporate a main door lock, Corbin No. 15481RS, Pelco (Type II) SM-1025 or equivalent, constructed of nonferrous or stainless materials, which operates with a Traffic Industry conventional #2 key, Corbin No. 1R6380 or Pelco (Type II) SM-0198-2 or equivalent. Ensure a minimum of two keys are included for the main door of each cabinet.

(b) Ensure the mounting for the door lock will accommodate the retrofit of an electronic lock.

(c) Ensure the cabinet door(s) is(are) furnished with a three-point latch. Ensure the top and bottom has rollers to secure the door in a closed position.

(d) When in the locked position, ensure the lock prevents the movement of the three-point latching mechanism.

(e) Ensure the cabinets are furnished with a means of externally padlocking the latching mechanism. Ensure a minimum of 3/8 inch diameter lock shackle is accommodated.

(5) Door Opening. Ensure the main door opening of all cabinets is at least 80 percent of the area of the cabinet side which the door closes, exclusive of the area of plenums.

(6) Switch Compartment.

(a) Mount a hinged switch compartment door to the outside of the main cabinet door. Ensure the door permits access to a switch panel but does not allow access to exposed electrical terminals or other equipment within the cabinet.

(b) Ensure the switch compartment with the door closed has minimum internal dimensions of 3½ inches high, 7½ inches wide, and 2 inches deep. Additionally, ensure the volume is not less than 70 cubic inches.

(c) Ensure switch compartment doors are equipped with a lock, which can be operated by a police key, Corbin Type Blank 04266 or Pelco Type SM-0200 long keys, or equivalent. Ensure a minimum of two keys are included for the switch compartment of each cabinet.

(7) Intelligent Transportation System (ITS) Compartment.

(a) M36-ITS and 6-ITS cabinets must include a hinged compartment door mounted to the outside front of the cabinet, above the main door. The door must permit access to shelf mounted ITS devices and electrical power components to power these devices.

(b) To allow for the ITS and power components, ensure the ITS compartment door has a minimum opening size of 8 inches high by 27 inches wide for the M36-ITS cabinet and 8 inches high by 41 inches wide for the 6-ITS cabinet. The depth of the compartment will be the full depth of the cabinet.

(c) The ITS compartment door is to be equipped with a Type 2 lock, cut for the Traffic Industry standard #1 key. Include a minimum of two keys for the ITS compartment.

(d) Ensure the mounting for the door lock will accommodate the retrofit of an electronic lock.

(e) Make accommodation to allow free air movement from the ITS compartment to the controller compartment.

(f) The ITS compartment will include U-channels mounted to the sides of the compartment for future mounting of shelves and/or Deutsches Institut für Normung (DIN) rail(s). Furnish U-channels, minimum of two on each side, installed vertically up the entire height of the compartment. Two additional U-channels installed horizontally across the entire back of the compartment. Mount an aluminum plate to fully cover the back U-channels stopping no less than 4 inches from each side. Mount DIN rail on the aluminum plate, centered between U-channels, running horizontally the full length of the aluminum plate.

(g) The installer must run flexible 1½ inch innerduct from the dedicated ITS conduit at the bottom of the cabinet to the ITS compartment. Run the flexible innerduct up the back-left corner inside the main compartment of the cabinet into the ITS compartment. Install the flexible innerduct in such a way that wires and cables can be run into the ITS compartment from outside the cabinet without accessing the main compartment of the cabinet.

(h) Furnish passageway for 1½ inch innerduct by cutting rear shelf corners and rear corners of top of signal cabinet.

#### H. Shelves.

(1) Ensure the cabinet is furnished with two shelves for supporting the control equipment. Each shelf will have one-inch upturned barrier at the rear of the shelf.

(2) Ensure the shelves are at least 10 inches in depth. Shelf height must leave a minimum of 2 inches of clear space between the top of the CU and the bottom horizontal surface of the shelf without blocking access to the back panel. Ensure the distance between the back of the shelves and the back of the cabinet does not exceed one inch. The upper shelf of the base mount cabinet will extend from the left side wall to the center of the cabinet.

(3) Ensure all cabinets have a provision for positioning shelves to within 12 inches of the bottom of the cabinet and to within 6 inches of the top of the cabinet in increments not more than 1/2 inch.

(4) Ensure the face of both shelves include a complete section of PVC slotted, 1 inch by 1.5 inches wiring finger duct installed across the face, leaving 4 inches of shelf exposed on both sides.

(5) Ensure a piece of DIN rail is installed across the back wall of the cabinet halfway between the upper shelf and divider to the ITS compartment. Run the DIN to within 4 inches of cabinet side walls.

#### I. Cabinet Risers.

(1) Ensure the 6-ITS are furnished with a 15 inch high cabinet riser.

(2) Ensure the riser matches the mounting base of the cabinet and is furnished with anchor bolt holes on the top and bottom of the risers.

(3) Ensure the risers come in two parts for ease of assembly.

J. Ventilation System. Ensure all cabinets incorporate a ventilation system to furnish circulation of external air through the enclosure to remove excess heat, fumes, or vapors. Ensure each cabinet is equipped with an electric fan mounted on the door with a capacity of at least 200 cubic feet of air per minute (CFM). Ensure each cabinet is equipped with an additional two 100 CFM electric fans mounted on the cabinet lid overhang.

(1) Fan. Ensure the fan on all aluminum door cabinets is installed so that it operates in the filtered incoming air stream so as not to create a negative pressure within the cabinet relative to its outside environment. Ensure all fans are equipped with a guard which inhibits a user from contacting the blades of the fan.

#### (2) Fan Controls.

(a) Ensure all cabinets equipped with a fan has a device to control the operation of the fan.

(b) Ensure the device switch-on point is manually adjustable at least in the range from 80 °F to 120 °F.

(c) Ensure the device has a differential between its switch-on point and its switch-off point. Ensure this differential is not greater than 25 °F.

(d) Ensure the device is installed and clearly visible inside the upper ITS compartment of the cabinet.

(3) Filter. Ensure the cabinet is equipped with a device to filter the incoming air. Ensure the cabinets are furnished with louvered vents in the main door with a replaceable air filter having a width of 16 inches, a height of 12 inches, and a thickness of 1 inch. Ensure the filter is a pleated type, moisture resistant, galvanized expanded

metal backing, and has a Minimum Efficiency Reporting Value (MERV) of 5 or better.

K. Terminal Facility. This special provision defines the minimum acceptable requirements for terminal facilities to interconnect the related devices within a traffic control cabinet.

(1) Mechanical Construction. Ensure the terminal facility is in accordance with the following mechanical requirements.

(a) Terminal Identification.

(i) Ensure all terminals are permanently identified in accordance with the cabinet wiring diagram. Ensure where through-panel terminal blocks are used, both sides of the panel have the terminals properly identified with the terminal position number.

(ii) Ensure identification is permanently attached as close as possible to the terminal strip and is not affixed to any part which is easily removable from the terminal block panel.

(iii) Ensure each input or output terminated on a terminal block is identified on the front of the panel by position number and function terminology (e.g., Ph 1 Red, Ph 2 Hold, etc.).

(iv) Ensure the same identification is used consistently on the cabinet wiring diagram.

(b) Component Identification. Ensure all components which make up the basic terminal facility are permanently identified in accordance with the cabinet wiring diagram. The following components are considered part of the basic terminal facility:

- (i) Load Switch Sockets;
- (ii) Flash Transfer Relay Sockets;
- (iii) Flasher Socket;
- (iv) Main and Auxiliary Circuit Breakers;
- (v) Radio Interference Suppressor and Surge Protector;
- (vi) Solid State Signal Power Relay; and
- (vii) Power Terminal Bus Bars.

Ensure where through-panel components are used, both sides of the panel have the components properly identified by relative symbols (e.g., FRI, LS1, etc.).

Ensure identification is permanently attached and as close to the component as possible and is not affixed to any part which is easily removable from the panel.

Ensure each component is identified on the front of the panel by symbol and function terminology (e.g., LF1 Filter, BR1 Signal Bus, etc.).

(c) Load Switch and Flasher Support.

(i) Design and construct load switch and flasher bases to receive all such devices which may be manufactured to the maximum size requirements permitted under the *NEMA Standards Publication*.

(ii) Ensure support(s) is(are) furnished so that, at a minimum, it(they) is(are) supporting the flasher and load switch of the maximum size at some point(s) between 3 inches and 7 inches from the panel.

(iii) Ensure at least 90 percent of the area beneath the load switch or flasher is open to allow for the free flow of air across the load switches or flasher. Ensure there is no obstruction within 1 inch above or below the units within the open area.

(d) Load Switch, Flasher, and Flasher Transfer Positions.

(i) Ensure wired load switch, flasher, and flash transfer relay sockets are furnished in the quantities listed in Table 2.

**Table 2: Load Switch, Flasher, and Flash Transfer Socket Relay Quantities**

Configuration	Load Switch	Flasher	Flash Transfer
A5	12	1	6
A16	16	1	6

(ii) Wire the flasher socket for a Type 3 solid state flasher in accordance with *Section 8 of NEMA Standards Publication*.

(iii) Ensure conflict flashing of load bay output numbers for *NEMA* configured main street approaches are placed on one flasher circuit, and the load bay output numbers for *NEMA* configured side street approaches are placed on the other flasher circuit. Ensure it is possible to flash either the amber or red indication on any load switch outputs. Ensure it is possible to easily change the flash indication from the front side of the panel using simple tools without the need to unsolder or re-solder connections.

(iv) Wire the load switch sockets for triple-signal load switches in accordance with *Section 5 of NEMA Standards Publication TS 2* for Type 2 CUs. Ensure all load switch driver outputs coming out of the CU are on separate terminal points from the respective inputs to the load switches. Ensure these separate termination points are bussed for normal operation. Ensure all load switch outputs are on separate points from the respective inputs to the malfunction management unit (MMU) inputs. Ensure these separate points are bussed for normal operation.

(v) Orient load switch sockets for the A5 configuration in a single row of



12. Ensure socket positions one thru eight are for phase one thru eight vehicles, respectively. Ensure socket positions 9 thru 12 are for phases 2, 4, 6, and 8 pedestrians, respectively.

(vi) Orient load switch sockets for the A16 configuration in two rows of eight positions each. Ensure the top row includes socket positions one thru eight and is for phase one thru eight vehicles respectively. Ensure the lower row includes socket positions 9, 10, 11, and 12 for overlaps A thru D, respectively, and are located below socket positions 1, 3, 5, and 7 respectively. Ensure socket positions 13, 14, 15, and 16 in the lower row are below and to the right of socket position 8, and is for pedestrian phases 2, 4, 6, and 8 respectively.

(vii) Ensure the back panel/load bay is hinged at the bottom corners to allow a 90 degree panel fold down.

(e) Terminal Blocks. Ensure terminal blocks have mechanical characteristics to properly support the wiring connected without warping the terminal block. Ensure all materials including screws and threaded portions used in terminals and terminal blocks are stainless steel. Ensure the maximum number of wire terminations or metal jumpers used in any combination under a single screw does not exceed two in number.

(i) Field Terminal Blocks. Include field terminal blocks for all inputs and outputs for a fully expanded CU. Ensure these blocks are either single terminal type with through-panel connection on the rear side of the mounting panel or double binder head screw terminals. Ensure either type of terminal block uses the correct ampacity for the application. Minimum acceptable ratings are 30 ampere (A), 300 volt (V), with 10-32 binder head screws. Furnish permanent color-coding on the signal field terminal blocks, indicating the signal colors to be connected to each terminal.

(ii) Control Terminal Blocks. Include control terminal blocks for inputs and outputs of the CU, MMU, flash transfer relays, load switches, etc. Ensure these blocks are either single terminal type with through-panel connections or double binder head screw terminals. Ensure either type of terminal block uses the correct ampacity for the application. Minimum acceptable ratings are 15 A, 250 V, with 6-32 by 1/4-inch pan or binder screws. Ensure the maximum number of wire terminations or metal jumpers used in any combination under a single screw does not exceed two in number. Furnish permanent color-coding on the load bay panel terminal blocks, indicating the signal colors to be connected to each terminal on controller unit outputs, load switch outputs, load switch inputs and MMU inputs.

Ensure the control terminal block wiring provides groupings of functions based on probable interconnect (bussing) for normal operation rather than based on the source of the wiring (e.g., CU, MMU, etc.).

(f) CU and MMU Harnesses.

(i) Ensure the CU and MMU harnesses are uniform in length, neatly



arranged and furnished with the flexibility for the connectors to reach at least 40 inches from the top of the terminal block panel which must be mounted directly below the CU shelf. Ensure the harness connectors do not have any sharp edges and the stress relief attachment screws do not extend greater than 1/4 inch beyond the stress relief.

(ii) Ensure terminal positions are furnished, completely wired, and neatly arranged, furnishing access to all inputs and outputs listed in the CU specification. Ensure all *NEMA Standards Publication* functions of the CU for the configuration selected are terminated, except those designated by *NEMA* as spares, reserved, no connection, and manufacturer's use need not be installed in the harness.

(iii) Ensure terminal positions are furnished, completely wired, and neatly arranged, furnishing access to inputs and outputs in the MMU. Ensure all MMU input is terminated. Ensure provisions are made to terminate any unused red monitoring inputs. Ensure type select and port one disable inputs are terminated.

(iv) Furnish a D connector for connection to the CU. Furnish a connector of the style for the controller approved for the project. Attach the connector terminal strip via channel nuts to the upper left side wall of the cabinet. Ensure the terminal strip is wired for the conflict flash and surge arrestor fail alarms.

(v) Ensure the MMU harness is configured for a 16 channel MMU operating in the type 12 mode. Ensure the MMU harness is configured as specified in Table 3.

**Table 3: MMU Harness Configuration**

Configuration	Load Switch	MMU
A5	12	12 Channel
A16	16	12 Channel

(g) Power Distribution. Supply the following equipment as part of the power distribution panel:

- (i) Main Circuit Breaker;
- (ii) Six Auxiliary Circuit Breakers;
- (iii) Solid State Signal Power Relay;
- (iv) Primary and Secondary Surge Protector;
- (v) Neutral Bus Bar;
- (vi) Equipment Ground Bus Bar;
- (vii) AC Power (Filtered) Terminal Strip;

(viii) AC Power (Unfiltered) Terminal Strip.

(h) Supply the following equipment as part of the ITS compartment power panel:

(i) Three Auxiliary Circuit Breakers;

(ii) Neutral Bus Bar; and

(iii) Equipment Ground Bus Bar.

(2) Electrical Requirements. Ensure the terminal facility conforms to the following electrical requirements:

(a) Power Distribution. Ensure the terminal facility operates properly when supplied with single-phase AC power [95-135 V, 57-63 hertz (Hz)] when non-ITS cabinets and 240 V when an ITS type cabinet. Ensure all breakers and grounding devices are wired in accordance with the *NEC* and the *Michigan Electrical Code*.

(i) Circuit Breakers. Ensure provisions are made for mounting and wiring up to nine circuit breakers in the terminal facility. Ensure a quantity of seven circuit breakers are furnished with ampacities as specified in Table 4.

**Table 4: Circuit Breaker Ampacity (in A)**

Configuration	Main	ITS	Vehicle Load Switch	Pedestrian Load Switch	Flasher	Miscellaneous	Channel Reds	Illuminated Sign
A5	30	30	10	10	10	10	10	10
A16	30	30	10	10	10	10	10	10

The cabinets will include an additional 30 A circuit breaker mounted on the main cabinet power panel, utilizing a single phase of the AC power to power the ITS compartment devices. Two 15 A and one 10 A circuit breakers will be furnished in the ITS compartment, wired to the load side of the 30 A breaker.

Ensure the main circuit breaker is wired to protect the entire facility and is identified as the "MAIN" breaker. Ensure the Vehicle Load Switch breaker and the Pedestrian Load Switch breaker are fed by the load side of the bus relay and furnishes power to the vehicle and pedestrian load switches, respectively. Ensure the Flasher breaker has the flasher connected to its load side. Ensure the miscellaneous breaker has the cabinet fan, light, and door mounted duplex receptacle connected to its load side. Ensure the Channel Red breaker is connected to the input to the MMU for the Red enable and cabinet flash transfer relay coils. Ensure the Illuminated Sign breaker is available to power auxiliary devices such as illuminated signs. Ensure the breaker for the ITS compartment is fed by a separate phase connected to the power disconnect. Ensure the circuit breakers are capable of manual operation with markings to indicate rating and whether it is in the open or closed position. Ensure Square D series bolt-on (QOB) circuit breakers are used and mounted on QO Breaker Mounting Base (QON3B) triple position breaker blocks.

Ensure a four pole fuse holder with screw terminals for connecting individual illuminated sign loads is furnished and wired to the load side of Illuminated Sign breaker. Include a 5 A time delay fuse with each holder.

Ensure panel mount fuse holders are furnished to protect the flash transfer relay circuit, and the controller unit/MMU AC power circuits. Each fuse holder is to have a 3AG type, 5 A slow blow fuse. The fuse holder to include a neon or LED light indicating the fuse is not blown. Ensure the fuse holders are mounted near the top right of the door opening or on the door switch shield and are to be clearly visible.

(ii) Cabinet Surge Protection. Ensure the power panel has devices to furnish both primary and secondary surge protection devices. Ensure the Line In, Neutral In and Ground leads of the primary device are to be kept as short as possible (18 inches maximum), with no sharp bends and not bundled with other conductors.

Ensure the primary surge protection device (SPD) has two separate hot legs. Ensure the second leg is connected to the load side of the main circuit breaker for the ITS compartment. Ensure the primary SPD is connected in parallel to the load and have a surge capacity of 120 kiloamperes (kA) per phase or greater. Ensure the let through voltage measured 6 inches outside the unit does not exceed 430 V for 3 kA 8/20 microseconds( $\mu/s$ ) pulse or 700 V for 10 kA 8/20  $\mu/s$  pulse. Ensure modes protected are Line to Ground, Line to Neutral, Line to Line and Neutral to Ground. Ensure the SPD furnishes green LED indications that protection is operational and red LED indications that a fault has occurred. Ensure in addition, an audible alarm sounds indicating a fault has occurred. Ensure there is a set of normally open and normally closed contacts available for remote monitoring of the SPD. Ensure the SPD is no larger than 9.3 inches wide by 3 inches high by 4.93 inches deep. Ensure the SPD is mounted on the lower right hand side of the cabinet and easily accessible for replacement.

Ensure the secondary SPD is connected to the load side of the main circuit breaker and its output is used to supply AC power for the CU, MMU, and cabinet electronics power strip. Ensure the surge current capacity is 50 kA or greater, with the unit connected in series to the load. Ensure the secondary SPD is a 5-stage hybrid design with integrated filter with series load current of 12 A. Ensure the let through voltage measured 6 inches outside the unit does not exceed 260 V for 2 kA 8/20  $\mu/s$  pulse or 300 V for 3 kA 8/20  $\mu/s$  pulse. Ensure modes protected are Line to Ground, Line to Neutral, and Neutral to Ground.

Ensure a gas tube device is installed on the load side of the main circuit breaker. Ensure it is possible to replace this device without interrupting power to the rest of the terminal facility. The cabinets must have a second gas tube device installed on the load side of the main circuit breaker feeding the ITS compartment. Ensure the ITS compartment includes a switched, surge protected, outlet strip. This outlet strip is to furnish a minimum 3,300 joule suppression rating and is wired to the load side of one of the 15 A ITS compartment breakers. Ensure the outlet strip is mounted on the panel on the

right side of the cabinet.

(iii) Solid State Signal Power Relay. Ensure the terminal facility includes a single-pole, single-throw (SPST)-no signal power relay wired to furnish power from the main circuit breaker and radio frequency interference (RFI) filter to the AC signal power bus bar and load switches. Ensure the solid-state relay is energized to furnish power to the signal bus and have ampacity of 75 A. Ensure it furnishes zero voltage switching from 47 – 63 Hz. Mount the signal power relay on a panel on the lower right side of the controller cabinet and easily accessible for replacement.

(iv) AC-Common Bus Bar. Furnish two AC-Common Bus Bars (Primary and Secondary). Terminate the AC-common (Neutral) on a solid metallic multi-terminal bus bars that will accept #4 - #16 AWG copper conductors. Insulate these bus bars from the cabinet. Run separate wires from the bus bar to each unit or group of similar units in the terminal facility which requires AC-common connection. Ensure only one conductor is allowed in each termination position.

The Primary AC-Common Bus Bar must have a minimum of 16 open positions and will be utilized to terminate the incoming utility company neutral. It is bonded to the Secondary AC-Common Bus via a jumper wire.

The Secondary AC-Common Bus Bar is used to terminate the balance of control cabinet neutral conductors. Ensure a minimum of 24 open positions are available for field wiring neutral return conductors. Install the Secondary Bus Bar at the bottom of the left side wall of the cabinet.

(v) Equipment Ground Bus Bar. Terminate the equipment ground on a solid metallic multi-terminal bus bar that will accept #4 - #16 AWG copper conductors. Connect this bus bar to the cabinet. Allow only one conductor in each termination position. Ensure a minimum of 24 open termination positions are available for field wiring ground connections.

Run separate wires from this bus bar to each unit or group of similar units in the terminal facility which requires equipment ground connection.

(vi) In addition to the three breakers and surge protected outlet strip, ensure the upper ITS compartment includes: a ground fault interrupter (GFI) outlet wired to the load side of one of the 15 A breakers, a minimum 6 position ground bus, LED lighting mounted above the air plenum above the door powered via a door switch and 10 A breaker.

(b) Conductors. Ensure all conductors used in the terminal facility wiring are #22 AWG, or larger, with a minimum of 19 strands. Ensure conductors terminated on the AC-common bus bar and safety ground bus bar are tinned and a minimum size of #16 AWG. Ensure the insulation has a minimum thickness of 10 mils and is nylon jacketed PVC or is irradiated cross-link PVC. Ensure conductors #8 AWG are *UL Type THHN*.

Ensure all conductors used in the terminal facility wiring are in accordance with the following color-code requirements:

- (i) Ensure the AC-neutral conductor of a circuit is a continuous white color.
- (ii) Ensure the equipment ground conductor of a circuit is a continuous green color or a continuous white color with one or more green stripes.
- (iii) Ensure the AC ungrounded power conductor of a circuit is a color other than white or green.
- (iv) Ensure the low-level DC (+24 or less) conductor of a circuit is a continuous blue color.
- (v) Ensure other conductors, not conforming to one of the above, are any continuous color not defined above.

(c) Wiring (Power Distribution within the Facility).

- (i) Ensure all terminal facility wiring is neat, firm, and routed, where practical, to minimize crosstalk and electrical interference. Do not use printed circuit boards to eliminate or reduce facility wiring. Do not use adhesive-backed means to support any wiring.
- (ii) Ensure connectorized multi conductor wiring are covered in non-split type looming material.
- (iii) Ensure all terminal facility conductors are of sufficient size to carry the maximum current of the circuit or circuits they are furnished for. Ensure they are sized based on the ampacity ratings per Table 5.

**Table 5: Terminal Facility Conductor Size**

AWG Wire Size	Ampacity Rating
#22	5 A
#16	10 A
#14	15 A
#12	20 A
#10	30 A
# 8	50 A
# 6	70 A

- (iv) Ensure the conductor feeding power from the main circuit breaker to the auxiliary breakers, solid state signal power relay, primary and secondary SPD terminal blocks, and AC signal power bus bar has an ampacity of 30 A.
- (v) Ensure the conductor feeding power to the flasher socket has, as a minimum, an ampacity of 10 A.
- (vi) Ensure the conductor feeding power to the signal power bus bar to each load switch socket has an ampacity of 10 A.

(vii) Ensure the conductors feeding power from the load switch to the field signal terminals has an ampacity of 10 A.

(viii) Ensure the conductors feeding power from the flasher socket to the flash transfer relay sockets, which feed flashing power to same, has an ampacity of 10 A. The remaining wires to and from the flash transfer relay socket, which are in the circuit between the load switch socket and the field signal terminals, are covered in the previous paragraph.

(d) Control Circuits.

(i) Flash Transfer Control. Ensure the control circuit to the flash transfer relay sockets can furnish flashing operation when the MMU or optional auxiliary equipment call for flash (e.g., police panel flash switch and maintenance panel). Ensure the flash transfer control also conforms to the following:

Ensure the flash transfer relay socket is wired so the coil of the relay(s) is(are) de-energized for flashing operation. Ensure the flash transfer relay sockets are near the load switches, flasher, and field signal terminals.

(ii) MMU Control. Ensure the MMU is wired to furnish flashing operation when the fault relay de-energizes or if the MMU is disconnected. Ensure it also provides "Stop Time" to the CU when the fault relay de-energizes. Ensure the MMU is wired to furnish AC power to the controller unit via the "Start Delay" relay.

(3) Field Wire Terminal Locations. Ensure the terminal facility furnishes field wire terminals located in accordance with the following requirements:

(a) AC Service Hookup. Terminate incoming AC power service on the right side of the cabinet on the power distribution panel. Terminate the incoming AC power service using listed pressure connectors capable of accepting a #4 AWG conductor for the grounded, ungrounded, and equipment grounding conductors. Terminate the ungrounded conductor directly to the main circuit breaker. Terminate the neutral and equipment ground conductors directly to their respective bus bars. Ensure this service hookup meets *NEC* code, and the *Michigan Electrical Code*.

(b) Signal Hookup. Terminate signal wires on terminal blocks on the back of the cabinet at least 3 inches but not over 6 inches from the bottom of the cabinet. Locate the field terminal block for signal circuits a minimum of 4 inches below the load switches and angled up 30 to 45 degrees from vertical for ease of access. Ensure signal terminals are directly accessible from the front of the cabinet. Furnish one terminal for each load switch output. Ensure it is possible to terminate a minimum of 16 #14 AWG neutral leads on the signal neutral bar.

(c) Detector Panel. Ensure the detector panel is mounted on the left wall of the cabinet toward the bottom. The panels are to be manufactured of FR4 G10 fiberglass 0.062 inches thick with a minimum of 2 ounces of copper for all traces and are to be secured to a mounting plate. The panels must have 3 positions for each loop input including one position to accommodate a varistor surge protector.

Ensure the panel is connectorized for ease of installation and maintenance.

(4) Auxiliary Equipment.

(a) Ensure the terminal facility includes provisions for the following equipment in a panel accessible from a police door on the front of the cabinet.

(i) Signals On-Off Switch. Ensure a signals on-off switch is included, installed, and wired.

Ensure the switch and wiring energizes or de-energizes the solid-state signal power relay. Ensure the AC signal power is not routed through this switch. Label the switch "Signal-Off". Ensure when in the "Off" position, all signal field terminals are de-energized and the Red Enable input to the MMU is inactive.

(ii) Flash Normal Switch. Ensure a flash-normal switch is included.

Ensure when in the Flash position, the flash transfer relays and solid state signal power relay is de-energized, and power is removed from the MMU and CU, resulting in flash being displayed to traffic. Ensure neither AC signal power nor flashing power is routed through this switch. Ensure the switch is labeled "flash-normal".

Ensure when the switch is returned to the "Normal" position, the signals return to the initialization phase and begin cycling.

Ensure operation of the signal-off switch overrides this switch. That is, when in the "Off" position, the signal-off switch prevents flashing operation as called for by all flash control circuits.

(iii) Manual Control Cord and Switch. Install a manual control cord and auto-hand switch and wired in the police panel of the cabinet.

Ensure the switch and wiring energizes the "manual control enable" input to the CU and connects the manual control cord to the "interval advance" input to the CU. Label the switch "auto-hand".

(b) Maintenance Panel Options.

(i) Stop Time Switch. Furnish a stop time switch in a panel on the inside of the front cabinet door. Ensure the switch and wiring furnishes three modes of operation which are:

1) Normal. Furnishes "Stop time" to the CU as required by the MMU.

2) Run. Prevents "Stop time" from being applied to the CU from other devices.

3) Stop. Applies "Stop time" to the CU. Ensure this switch is labeled "stop-run-normal".



(ii) Flash-Normal Switch. Furnish a flash-normal switch in a panel on the inside of the front cabinet door.

Ensure the switch and wiring furnishes flashing operation as defined for police panel flash-normal switch except that it does not terminate power to the CU. Ensure provisions are furnished so that this flash-normal switch operates as a CU power switch by removing a control terminal link. Label this switch "flash-normal".

(iii) Duplex Receptacle. Furnish a duplex receptacle of a three-wire GFI type in a panel on the inside of the front cabinet door.

Furnish a duplex receptacle of a three-wire GFI type in the ITS compartment on the right side, towards the front. Wire the receptacle to one of the 15 A circuit breakers in the ITS compartment.

(c) Miscellaneous Options.

(i) Cabinet Convection Heater. Furnish a convection type heater for all cabinets, rated at 150 watt (W), minimum completely wired and operational. Ensure the heater is a touch-safe design with a low surface temperature, Din rail mounted on the lower left side wall of the cabinet. Furnish a heater thermostat installed and clearly visible. Ensure the heater thermostat has a red dial (indicating heat), with a minimum setting range of +20 °F to +60 °F.

(ii) Cabinet Lights. Install two LED lighting panels with a switch in the cabinet. Furnish a door switch to activate the lights when the door is opened. Install one lighting panel above the top shelf and install the second to the bottom of the lower shelf's storage drawer. Each panel must furnish at least 450 lumens of light and consume no more than 15 W of power.

Wire the switches and lights to the miscellaneous circuit breaker.

Install one LED light strip in the ITS compartment of the cabinets. Ensure the door switch activates the light when the door is opened.

(iii) Outlet Strips. Furnish a 9 position, metallic housing, illuminated on/off switch, outlet strip. Install the outlet strip on the top right side wall of the cabinet. Mount the outlet strip horizontally in the 6-ITS cabinet and vertically in the M36-ITS cabinet. Wire the outlet strip to the load side of the secondary SPD. Furnish a permanent label applied immediately adjacent to the outlet strip. Ensure label reads "CABINET ELECTRONICS ONLY" and is in clear view.

Furnish a 15 A, industrial grade 3,300 joule surge protected multiple outlet strip with no less than six outlets in the ITS compartment. Wire the outlet strip with resettable circuit breaker and to one of the 15 A circuit breakers in the ITS compartment. Ensure the outlet strip is mounted on the aluminum plate covering the back wall of the ITS compartment. Install outlet strip horizontally and centered safely below the DIN rail toward the bottom of the ITS compartment.



(iv) Additional Grounding. Install a #10 AWG bonding jumper from the right-hand DIN rail mounting screw in the ITS compartment to the ground bar in the ITS compartment.

Install a #10 AWG bonding jumper from both shelves in the signal cabinet to the ground bar and from the back panel in the cabinet to the ground bar.

(v) Furnish a Synchronous Data Link Control (SDLC) hub panel capable of bussing up to eight SDLC cables in parallel. Ensure cable locking means on the ports are of the "clip" variety, and do not utilize screws to secure the cables to the panel. Install the SDLC hub panel to the U-channel on the left side wall of the cabinet between the main cabinet shelves closest to the door using screws and channel nuts designed for the purpose.

(5) Detector Rack Assembly. Not factory installed. Furnished only when loop detectors are shown on plans. Ensure detector rack assembly and each component meets the *NEMA-TS2-2016 standards* and conforms to the following requirements:

(a) Detector Rack. Furnish 16 channel TS-2 detector rack. The detector rack must have a means to program the address of the bus interface unit (BIU) slot and be connectorized for the input/output, and power connections for ease of installation and maintenance.

(b) Detector Panel. Furnish detector panel manufactured of FR4 G10 fiberglass, 0.062 inches thick with a minimum of 2 ounces of copper for all traces and are to be secured to a mounting plate. The panels must have 3 positions for each loop input including one position to accommodate a varistor surge protector. Ensure the panel is connectorized for ease of installation and maintenance.

(c) Detector Bus Interface Unit (BIU). Furnish one BIU. Ensure one 4 foot SDLC cable with clips on both ends is included for each BIU.

(d) Cabinet Power Supply. Provide one Cabinet Power Supply (CPS). Ensure the CPS includes a complete wiring harness.

(6) Push Button Rack Assembly. Furnished only, not factory installed. Furnished only when Non-Accessible Pedestrian Signal (APS) pushbuttons are shown on plans. Ensure push button rack assembly and each component meets the *NEMA-TS2 standards* and conforms to the following requirements:

(a) Detector Rack. Furnish 4 channel detector rack complete with all necessary wiring harnesses.

(b) Push Button Control Unit (PBCU). Furnish 4 channel PBCU card complete with all necessary wiring harnesses.

(c) Termination Panel. Furnish a 12 position, 30 A pushbutton termination panel, labeled for phases 2, 4, 6, and 8 pedestrian inputs.

(7) Prints, Functional Data, and Parts List. Ensure the manufacturer supplies each

of the following items with each cabinet:

- (a) Two complete sets of schematics and wiring diagrams of the cabinet and terminal facilities.
- (b) Cabinet mounting diagram.
- (c) Complete parts list of cabinet and accessories.

Ensure each of these items applies directly to the cabinet with which it is applied. One set is to be put in the installed cabinet, and one set is to be furnished to the maintaining agency.

2. Accessories. This special provision defines the minimum acceptable requirements for plug-in accessories for the traffic controller assembly within a traffic control cabinet.

A. Malfunction Management Unit (MMU). Furnish an MMU from the following list.

(1) EDI Smart Monitor MMU2-16LE(ip).

(2) Approved Equal (AE). The AE must be evaluated, tested, and approved per the *MDOT New Traffic Signal Device Product Review Guidelines*. The review time is not justification to delay the project.

B. This subsection defines the minimum requirements for a shelf-mountable, 16 channel, Ethernet capable MMU. Ensure the MMU meets, all applicable sections of the *NEMA Standard TS-2* for MMU2 configuration while maintaining compatibility with *NEMA TS1* assemblies. Where differences occur, this special provision governs.

Furnish the following monitoring functions in addition to those required by the *NEMA standard*:

(1) Dual Indication Monitoring. Ensure the MMU can detect simultaneous input combinations of active green (or walk), yellow and red inputs on the same channel. Ensure the channels enabled for dual indication monitoring are user determined. Ensure dual indication monitor is disabled when the red enable input is not active.

(2) Field Check Monitoring. Ensure when the field signal inputs states sensed by the MMU do not correspond with the data furnished by the CU in the type #0 message for 10 consecutive messages, the MMU enters the fault mode and indicates the field check fail fault.

(3) Recurrent Pulse Monitoring. Ensure the MMU detects conflict, red fail, and dual indication faults that result from intermittent or flickering field signal inputs.

(4) Ensure when the MMU detects a conflict flash indication it furnishes an output to the "D" connector indicating an MMU/conflict flash status input.

(5) Ensure the MMU monitors an intersection with up to four approaches using the four section Flashing Yellow Arrows (FYA) movement outlined by the *NCHRP Research Project 3-54* on Protected/Permissive signal displays with FYA. Ensure the

MMU furnishes the same fault coverage for the FYA approaches as it does for conventional movements including conflict, red fail, dual indications, and minimum clearance monitoring.

Ensure the MMU furnishes alternate configuration options as follows:

(a) Red/Yellow/Green (RYG) Only Red Fail Option. This function excludes the walk input from the red fail fault algorithm when operating the Type 12 mode.

(b) LED Signal Threshold Adjust. This function furnishes the capability to sense field inputs with an alternate set of voltage thresholds to better determine the state of LED signal indications. Conflict and dual indication thresholds for Green/Yellow/Red inputs are set for: No Detect is less than 15 root-mean-square voltage (Vrms). Detect is greater than 25 Vrms. Red fail thresholds for Green/Yellow/Red are set for: No Detect is less than 50 Vrms. Detect is greater than 70 Vrms.

(c) Controller Voltage Monitor (CVM) Log Disable Option. Ensure the MMU furnishes a means to disable the logging of CVM faults events.

(d) Furnish a 4 line by 20-character LCD to report MMU status, time and date, and menu navigation. Furnish a separate Red, Yellow, Green LCD indicator, display for the input status of signal inputs. Furnish individual icons to indicate channels involved in a fault.

(e) Furnish a mode to display the Vrms of each field signal input and each cabinet control signal voltage, and the frequency of the AC line, the ambient temperature measured at the MMU.

(f) Ensure when the MMU is in the fault mode, a display screen is furnished to identify all field signal inputs with field check status, and all field signal inputs with recurrent pulse status.

(g) Additional display functions include a configuration display of settings and all MMU configuration parameters; logs of previous fault, AC line, and MMU reset logs; clock set.

(h) Ensure the program card supplied with the MMU furnishes non-volatile memory that contains the configuration parameters for the enhanced features of the MMU, such that transferring the program card to a different MMU completely configures that MMU. Ensure the non-volatile memory device used on the program card does not utilize any input/output (I/O) pins designated as "Reserved" by *NEMA TS2*.

(i) Ensure a minimum of five logs are furnished that graphically display all field signal states and red enable for up to 30 seconds prior to the current fault trigger event. Ensure the resolution of the display is at least 50 milliseconds. Ensure these signal sequence logs are accessible from the front panel registered jack (RJ)-45 Ethernet port with software available from the manufacture.

C. Flasher. Furnish a *NEMA* two-circuit, 15 A per circuit, flasher for installation in the

cabinet. Ensure each flashing circuit contains zero-voltage switching, a 25 A power triac, a snubber, and a LED across the AC circuitry, directly indicating the AC load that is activated. Ensure the flasher conforms to a *Type 3 per Section 8 of the NEMA Standards Publication*. Fabricate the flasher such that internal components are completely enclosed by the chassis.

D. Flash Transfer Relay. Furnish six each flash transfer relays for the A5 and A16 configurations for installation in the cabinet. Ensure the flash transfer relays conform to the following requirements:

(1) Mechanical Requirements. Enclose the relay in a transparent plastic case which protects the relay from dust, moisture, and other contamination. Ensure the case protects the user from contact with live parts and be sufficiently rugged to permit insertion and removal of the relay from its mating socket.

(2) Connector. Mount the relay on an eight-pin spade plus base and wire the socket and relay/base as follows:

Pin 1 - Coil	Pin 2 - Coil
Pin 3 - #1 Closed	Pin 4 - #2 Closed
Pin 5 - #1 Common	Pin 6 - #2 Common
Pin 7 - #1 Open	Pin 8 - #2 Open

(3) Contacts. Furnish the relay with two single-pole, double-throw (form C) contact sets. Pin 8 - #2 Open each contact is rated to switch a 20 A tungsten load for a minimum of 30,000 operations. The contact material must minimize welding.

(4) Coil Rating. Ensure the relay coil is rectified to reduce heat/power consumption and furnish chatter free operation. Power consumption to be less than 3 VA. Ensure an indicator LED is present to indicate the coil is energized.

E. Load Switches. Use solid-state load switching assemblies for opening and closing signal light circuits and be jack-mounted external to the CU. Ensure each load switch furnishes three independent switching circuits. Ensure each of the three circuits contains a zero-voltage switching optically coupled electrically isolating the DC input circuitry from the AC output circuitry, a 25 A power triac and LED indicators on both the DC input circuitry and the AC output circuitry. . Furnish 12 load switch assemblies (36 circuits) for the A5 configuration unit. Furnish 16 load switch assemblies (48 circuits) for the A16 configuration unit

3. Warranty. Furnish 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 this work in accordance with sections 818 and 820 of the Standard Specifications for Construction, as shown on the plans and 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**

DS\_ Cabinet, NEMA Type.....Each

**DS\_ Cabinet, NEMA Type** includes:

- 1 Installing the traffic signal cabinet, and accessories required to furnish the traffic signal control operation as shown on the plans and in accordance with the *MMUTCD* and this special provision.
2. Furnishing and delivering the cabinet to the maintaining agency for cabinet setup.
3. Transporting the cabinet from the maintaining agency to the job site for installation.

The Engineer may process a partial payment for units delivered to MDOT signals shop or other approved location after initial inspection and acceptance and after the Contractor furnishes either a paid invoice/proof of payment or a receipt for delivery. If payment is based on the delivery invoice, the Contractor must furnish a copy of the paid invoice/proof of payment to the supplier within 10 calendar days of the prime Contractor receiving payment for the materials. Partial payments for delivered materials/units meeting all project specifications will be limited to the smaller of the actual invoice amount or 96 percent of the contract bid amount. Final payment will be processed after final acceptance of the individual traffic signal installation.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**TURF ESTABLISHMENT, PERFORMANCE**

WT:AJK:MHM

1 of 5

12/20/2024

**a. Description.** This work consists of providing all labor, materials, and equipment required to perform turf establishment in accordance with Section 816 of Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, and as directed by the Engineer.

**b. Contractor's Responsibility for the Work.** This modifies subsection 107.11 of the Michigan Department of Transportation 2020 Standard Specifications for Construction to require that the Contractor repair turf establishment work damaged by storm events up to 3 inches of rain in a 24-hour period as documented by local meteorological data submitted to the Engineer for review and approval.

**c. Materials.** The materials shall meet the requirements specified in the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as specified herein.

Topsoil shall be furnished from an approved source or salvaged from the site as approved by the Engineer and blended with compost that will support vigorous growth. Topsoil shall be humus bearing and screened to be free of stones and undesirable materials.

Swale area seed mixtures shall follow the seed mixtures indicated on the plans.

Outside of swale areas indicated on the plans, seed mixtures shall be composed of four or more species of perennial grass that are legally saleable in Michigan, suited to the site use and conditions, salt tolerant, does not contain more than 10 percent inert minerals, comes from an MDOT certified source, and guaranteed to be hardy for southeast Michigan.

Recommended species of perennial grasses include Kentucky Bluegrass, Perennial Ryegrass, Hard Fescue, Creeping Red Fescue, Chewings Fescue, Turf-type Tall Fescue, Buffalo grass, and Alkaligrass-Fults Puccinellia distans. Select cultivars or varieties of grasses that are disease and insect resistant and of good color. Ensure no one species in the mixture is less than 5 percent or more than 25 percent of the mixture by weight. Do not select grass species considered noxious or objectionable, such as Quack Grass, Smooth Brome, Orchard Grass, Reed Canary Grass and others.

Herbicides shall comply with all federal, state, and local laws. As part of the MDA weed control application, the Contractor is required to make proper notifications and/or postings as per label and MDA requirements for all locations that will be sprayed. Notify the Engineer at least 48 hours prior to any applications being made. Furnish and apply herbicide(s) needed. It is the Contractor's responsibility to select the herbicide(s) and the rate at which it is used. Obtain the Engineer's approval of work methods and herbicide(s)

selected prior to the application of the herbicide(s). Complete a spray log and submit to the Engineer each day an application is made.

Fertilizers. Furnish and apply fertilizer(s) as needed. It is the Contractor's responsibility to select the fertilizer(s) and the rate at which it is used. The use of phosphorus is strongly discouraged and is only allowed only when required by soil conditions. Obtain the Engineer's approval of work methods and fertilizer(s) prior to the application of the fertilizer(s).

Water shall come from a source approved by the Engineer. Do not draw water from any waterway (i.e. river, ditch, creek, lake etc.) located on state, county or municipal right-of-way, for mixing with herbicides.

The Contractor shall ensure all plant materials comply with ANSI Z60.1 (American Standard for Nursery Stock) and shall ensure that plant materials are grown in USDA hardiness zones 5 and/or 6 and are sound, healthy, and free from plant diseases, pests, and eggs.

All plant materials shall be subject to final approval by the Engineer. The Contractor shall furnish in writing a list of the proposed sources of nursery stock. The Engineer may reject a proposed source at no additional cost to the project.

The Contractor shall provide the Engineer a Michigan Department of Agriculture and Rural Development certificate of inspection to assure that the materials supplied fully comply with these Specifications.

Artificial mulch shall not be approved for use.

Any plant listed on the City of Ann Arbor invasive plants list found at <https://www.a2gov.org/departments/Parks-Recreation/NAP/Pages/InvasivePlants.aspx> shall not be approved for use.

**d. Construction.** Turf Establishment construction activities shall be performed by the Contractor in accordance with Subsections 816.03 of the Michigan Department of Transportation 2020 Standard Specifications for construction, except as modified herein.

The Contractor is responsible for all work and all construction methods used in completing this work. Implementation of any part of the standard specifications or standard plans by the Contractor does not relieve the Contractor of responsibility for acceptability of the construction methods or for the quality of the work.

The Contractor shall restore all lawn areas disturbed by construction, where indicated on the plans, or at the direction of the engineer to a condition equal to their original condition or better. Restoration shall also include the replacement of any brickwork, decorative stone, or other adjacent materials.

The Contractor shall seed swale areas where indicated on the plans with the appropriate seed mixture and exhaust all efforts to prevent swale seed mixtures from combining with other turf restoration areas and prevent other turf restoration area seed mixtures from combining with swale seed mixtures. If seed mixtures are combined and/or overlap as determined by the Engineer, the Contractor shall remove the seed areas and apply the appropriate mixture for the application at the direction of the Engineer.

The Contractor shall select, provide, and implement proven turf establishment industry practices utilizing turf establishment materials to establish a vigorous, permanent, weed-free, mature perennial turf and shall be responsible for the performance and quality of turf growth in the areas indicated on the plans and as directed by the Engineer. Comply with all local, state, and federal laws when completing this work.

The Contractor shall provide the Engineer with credentials for the contractor performing the turf establishment work which document that they either have a degree or certificate in turf management, horticulture, or a related field or that they employ at least one person assigned to the jobsite who has at least five years of experience in turf establishment and native plantings or both.

The Contractor shall prepare the existing earth bed shall be graded such that the placement of topsoil will meet the final Plan grades. Grading, soil preparation, and removal and disposal of excess or unsuitable materials shall be considered as part of the restoration work. All rocks larger than 1-inch shall be removed from the seed bed. All lumps and clods greater than 1-inch shall be pulverized and raked into the seed bed before planting.

The Contractor shall ensure that earth beds are prepared in advance of all work including ensuring weed control is applied 7 to 10 days before sowing seed and is performed by a commercial herbicide applicator, licensed by the State of Michigan and certified by the Michigan Department of Agriculture in the appropriate category to apply herbicides.

The Contractor shall place a minimum of 4 inches of topsoil in all areas that are to be restored with seeding or sodding.

The Contractor shall moisten all prepared areas before planting if soil is dry. Surface shall be watered thoroughly and allowed to dry before planting. Muddy soil shall not be created. Before planting, the Engineer's acceptance of finish grading shall be obtained. Planting areas shall be restored if eroded or otherwise disturbed after finish grading.

Restoration must be performed upon the completion of each stage of work, to prevent erosion, and not as one single operation at the completion of the entire project.

The Contractor shall water turf establishment areas as necessary to establish lush growth.



The Engineer recommends that the Contractor water at a rate of 3.5 gallon per square yard at least twice per day through the months of June, July, and August and at least once per day during all other months for at least two weeks after sowing seed or until lush growth is established in all turf establishment and swale areas.

Seed shall be sown at the rate of 250 lbs/acre with spreader or seeding machine. Seeds shall not be broadcast or dropped when wind velocity exceeds 5 mph. Seed shall be evenly distributed by sowing equal quantities in two directions at right angles to each other.

The Contractor shall ensure that seed is set into soil and shall not broadcast seed without a means of covering it in the soil.

Seeded areas with slopes exceeding 1:4 shall be protected with erosion-control blankets installed and stapled according to manufacturer's written instructions.

The Contractor shall mow the turf to maintain visual appeal and shall not allow the grass to grow more than 8 inches in height at any time prior to the acceptance by the Engineer.

The Contractor shall ensure that the established turf is free of weeds. Weeds must be controlled to less than 10 percent of the turf establishment area at all times prior to acceptance.

**e. Maintenance and Acceptance.** The Contractor shall ensure the establishment of a uniform, dense, vigorous, and weed-free stand of specified grasses and shall maintain all lawn areas until they have been accepted by the Engineer. Lawn maintenance shall begin immediately after the grass seed or sod is in place and shall continue until final acceptance.

Maintenance includes but is not limited to: deposition of additional topsoil; reseeding; watering; fertilizing; mowing, and any other work as required to correct all settlement, erosion, germination, and establishment issues until final acceptance and payment is made.

If, in the judgment of the Engineer, adequate site restoration efforts are not being expended, then the City will take the necessary steps to perform such restoration and shall charge the Contractor for all the costs until restoration is completed satisfactorily.

Damage to seeded areas resulting from erosion shall be repaired by the Contractor at the Contractor's expense. Scattered bare spots in seeded areas will not be allowed over 3 percent of the area, nor greater than four square inches in size.

Any portion of a seeded area that fails to show a uniform germination shall be reseeded. Such reseeding shall be at the Contractor's expense and shall continue until a dense weed-free lawn is established in a growing and vigorous condition.

Establishment of a dense stand of wet meadow perennial grasses and/or flowers as specified in Plans is the responsibility of the Contractor. Any part of the area that fails to

thrive shall be re-planted until a dense planting in these areas is established. When the above requirements have been fulfilled, the Engineer will accept the lawn.

**f. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Pay Item</u>	<u>Pay Unit</u>
DS_Turf Establishment, Performance .....	Square Yard

Payment for **DS\_Turf Establishment, Performance** will be measured by the square yard for units in place and will include all costs for labor, materials, and equipment required to furnish and install Engineer approved topsoil, approved seed mixtures, hydroseeding, watering, warranty, weed control, fertilizer and mulch, including grading of the area to receive the topsoil, preparing the earth bed, spreading and raking the topsoil to provide a uniform surface free of large clods, lumps, rocks, brush, roots, or other deleterious materials, as determined by the Engineer.

After the Contractor restores restoration areas with topsoil and seed, fifty percent of all quantities measured in place will be paid. Payment for the remaining fifty percent of all quantities measured will be paid only after the Contractor establishes lush turf growth in those areas and the Engineer has accepted the established turf.

**Watering of Trees and Ornamental Grasses** will not be paid for as part of this work and shall be paid for separately.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**PLANTING SOIL AND MULCH**

WT:CEW

1 of 2

01/30/2025

**a. Description.** This work consists of providing all labor, materials, and equipment required to provide and place planting soil (topsoil) and mulch/woodchips in landscape planters, lawn areas, and tree pits, and rain garden soils as shown on the plans, and as detailed herein or as directed by the Engineer. All work must be conducted in accordance with the City of Ann Arbor 2025 Public Services Standard Specifications and the Michigan Department of Transportation 2020 Standard Specifications for Construction, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Planting Soil: 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.

Mulch/woodchips: Compliant Michigan Department of Transportation 2020 Standard Specifications for Construction Section 917 and as approved by the Engineer.

**c. Construction.**

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 Planter Soil, removing all debris and stones larger 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.

The depth of the tree root balls may required the excavation into the soil subgrade to accommodate the root ball.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Planting Soil and Mulch.....	Cubic Yard

Payment for **DS\_Planting Soil and Mulch** will be measured by the cubic yard and will include all costs for labor, material, and equipment required to complete the work as indicated on the plans and as directed by the engineer. Mulch is considered incidental to the landscape and soils pay items and will not be paid for separately.

CITY OF ANN ARBOR  
DETAILED SPECIFICATION  
FOR  
**BIKE HOOP**

WT:AJK:MHM

1 of 1

01/31/2025

**a. Description.**

This work consists of furnishing all labor, equipment and materials required to place bike loops in the areas shown on the plans in accordance with City of Ann Arbor 2025 Public Services Standard Specifications, University of Michigan Master Specifications, and Michigan Department of Transportation 2020 Standard Specifications, except as modified herein, or as directed by the Engineer.

**b. Materials.**

Provide bike hoop materials selected and approved by the University of Michigan. The material will include hardware required for installation in accordance with the specifications herein, details included on the plan and per the manufacturer's recommendations.

Shop drawings from the manufacturer are to be submitted to the Engineer for approval prior to fabrication.

Concrete footings shall be 3500 psi.

**c. Construction.**

Review the proposed bike hoop locations with the Engineer prior to installation. Evenly space the hoops at the dimensions shown on the plans or as directed by the Engineer. Bike hoops must be installed plumb and in line with each other and shall be firmly connected with the concrete foundation as to prevent rocking.

Perform construction methods in accordance with Section 803 of the MDOT 2020 Standard Specifications for Construction unless otherwise stated in this special provision.

**d. Measurement and Payment.** The completed work, as described, will be paid for at the contract unit price for the following contract items (pay items):

<u>Contract Item (Pay Item)</u>	<u>Unit</u>
DS_Bike Hoop, Cored .....	Each

Payment for **DS\_Bike Hoop, Cored** will be measured by each unit completely installed and will include all costs for labor, material, and equipment required to complete the work as described herein, including coring, excavation, hauling, disposal, furnishing, installing, and compacting granular material, furnishing and installing the bike hoops.

**Testing Engineers & Consultants, Inc.**

City of Ann Arbor  
Engineering Public Services Area  
301 E. Huron Street  
P.O. Box 8647  
Ann Arbor, Michigan 48107-8647

**GEOTECHNICAL INVESTIGATION  
& SOIL INFILTRATION TESTING**

**FOR**

**State Street, Thayer Street &  
N. University Avenue Pavement Improvements  
Ann Arbor, Michigan**

**TEC Report: 63608**

**By:**

**Testing Engineers & Consultants, Inc.  
1343 Rochester Road  
P.O. Box 249  
Troy, Michigan 48099-0249  
(248) 588-6200**

**September 6, 2023**



## Testing Engineers & Consultants, Inc.

1343 Rochester Road • PO Box 249 • Troy, Michigan 48099-0249  
(248) 588-6200 or (313) T-E-S-T-I-N-G • Fax (248) 588-6232  
www.testingengineers.com

*Engineering Client Success*

TEC Report: 63608

Date Issued: September 6, 2023

Mr. Igor Kotlyar, P.E., Project Manager  
City of Ann Arbor  
Engineering Public Services Area  
301 E. Huron Street  
P.O. Box 8647  
Ann Arbor, Michigan 48107-8647

Re: Geotechnical Investigation  
& Soil Infiltration Testing for  
State Street, Thayer Street &  
N. University Avenue Pavement Improvements  
Ann Arbor, Michigan

Dear Mr. Kotlyar:

We submit herewith the results of a geotechnical investigation and soil infiltration testing performed at the above referenced site. The field and laboratory data are included.

It is a pleasure to have been of service to you. Please feel free to call at your earliest convenience if you desire additional service or if you need any other information. We would also be pleased to furnish quality control testing on the project during construction.

Respectfully submitted,

TESTING ENGINEERS & CONSULTANTS, INC.

Carey J. Suhan, P.E.,  
Vice President, Geotechnical  
& Environmental Services

CJS/ln  
Enclosure

Copyright 2007 Testing Engineers & Consultants, Inc. All rights reserved.

All services undertaken are subject to the following policy. Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and the comprehensiveness of the tests, examinations and surveys made. No quotation from reports or use of TEC's name is permitted except as expressly authorized by TEC in writing.

CONSULTING ENGINEERS & FULL-SERVICE PROFESSIONAL TESTING AND INSPECTION  
OFFICES IN ANN ARBOR, DETROIT, AND TROY  
FOUNDED IN 1966



**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**TABLE OF CONTENTS**

1.0	INTRODUCTION	1
2.0	FIELD INVESTIGATION	1
3.0	LABORATORY TESTING	2
4.0	GENERAL SUBSURFACE CONDITIONS	2
4.1	Subsoil Conditions	2
4.2	Ground Water Observations	4
5.0	CASED BOREHOLE INFILTRATION TEST	4
6.0	DESIGN REVIEW AND FIELD MONITORING	5

**APPENDIX**

TESTING BORING LOCATION PLANS

LOGS OF TEST BORINGS

SIEVE ANALYSIS RESULTS

GENERAL NOTES FOR SOIL CLASSIFICATION



## **Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

### **1.0 INTRODUCTION**

This report presents the results of a geotechnical investigation and soil infiltration testing for State Street between N. University Avenue and S. University Avenue, Thayer Street between E. Washington Street and N. University Avenue and N. University Avenue between State Street and Fletcher Street. The borings at State Street and N. University were for soil infiltration testing only. Authorization to perform this investigation was given by Mr. Igor Kotlyar, P.E. in the form of an electronic message on July 10, 2023 and in accordance with TEC Proposal No. 060-23-179.

The purpose of this investigation was to obtain information necessary to determine basic engineering properties of soils at the site through a series of test borings and laboratory tests performed on the soil samples obtained during the field investigation.

### **2.0 FIELD INVESTIGATION**

Six test borings were drilled on the site at the locations shown on the Test Boring Location Plans. The borings were staked in the field by TEC. The boring locations are accurate to within a short distance of the locations shown on the location plans included in the appendix. The test borings were drilled on August 9 and 10, 2023 with truck-mounted auger equipment to a depth of 5 feet below the existing surface.

Drilling methods and standard penetration tests were performed in accordance with the current ASTM D-1452 and D-1586 procedures, respectively. These procedures specify that a standard 2-inch O.D. split-barrel sampler be driven by a 140-pound hammer with a free fall of 30 inches. The number of hammer blows required to drive the split-barrel sampler through three successive 6-inch increments is recorded on the Test Boring Log. The first 6-inch increment is used for setting the sampler firmly in the soil and the sum of the hammer blows for the second and third increments is referred to as the "Standard Penetration Index" (N). N values were obtained with an automatic trip hammer.

From the standard penetration test a soil sample is recovered in the liner sampler tubes that are located inside the split-barrel sampler. Upon recovery of a soil sample, the liner tubes are removed from the split-barrel sampler and placed in a container which is sealed to prevent moisture losses during transportation to the laboratory. Standard penetration tests are usually made at depths of 2 ½, 5, 7 ½ and 10 feet and at 5-foot depth intervals thereafter. These parameters may vary for a given project depending on the nature of the subsoils and the geotechnical information required.

## **Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

### **2.0 FIELD INVESTIGATION (Cont'd)**

In addition, cased borehole infiltration tests were performed in the boreholes at State Street and N. University Avenue. The casings were set in the sand and clayey sand at a depth of 5 feet below existing paving surface.

### **3.0 LABORATORY TESTING**

The laboratory testing consisted of determining the natural bulk density and the natural moisture content of the soil samples recovered in the liner sampler tubes. The above referenced test data are recorded on the boring logs. Some test results may deviate from the norm because of variations in texture, imperfect samples, presence of pebbles and/or sand streaks, etc. The results are still reported although they may not be relevant.

Samples taken in the field are retained in our laboratory for 60 days and are then disposed of unless special disposition is requested by the client. Samples retained over a long period of time are subject to moisture loss and are then no longer representative of the conditions initially encountered.

### **4.0 GENERAL SUBSURFACE CONDITIONS**

#### **4.1 Subsoil Conditions**

The soil conditions encountered in the borings are presented on the individual boring logs. Each log presents the soil types encountered at that location as well as laboratory test data, ground water data, and other pertinent information. Descriptions of the various soil consistencies, relative densities and particle sizes are given in the Appendix. Definitions of the terms and symbols utilized in this report may be found in ASTM D-653.

#### Thayer Street

The pavement consisted of hot mix asphalt (HMA) over concrete at Boring No. 1. No concrete was encountered at Boring No. 2. The HMA pavement thickness was measured to be 5  $\frac{3}{4}$  and 5  $\frac{1}{2}$  inches at Boring Nos. 1 and 2, respectively. The concrete pavement thickness was measured to be 4  $\frac{1}{4}$  inches at Boring No. 2.

## Testing Engineers & Consultants, Inc.

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

### 4.1 Subsoil Conditions (Cont'd)

The underlying native soil was loose clayey well graded sand that extended to a depth of 2 feet below existing pavement surface at Boring No. 1 and to the terminal depth of Boring No. 2. At Boring No. 1, the clayey sand was underlain by medium compact sand that extended to the terminal depth of the boring.

Standard penetration values range from 5 to 18 blows per foot. Bulk densities range from 128 to 143 pounds per cubic foot with moisture contents of 8 to 12 percent of the dry weight of the soil.

#### N. University Avenue

The pavement consisted of HMA over brick. In addition, at Boring No. 16, the brick pavement was underlain by 4 inches of concrete pavement. The HMA pavement thickness was measured to be 3 ½ and 4 inches at Boring Nos. 13 and 16, respectively. The brick pavement thickness was measured to be 3 and 5 ¼ inches at Boring Nos. 13 and 16, respectively. At Boring No. 16, 4 ¾ inches of sandy fill was encountered below the pavement.

The underlying native soils were very loose to medium compact clayey well graded sands.

Standard penetration values range from 2 to 14 blows per foot. Bulk densities range from 119 to 137 pounds per cubic foot with moisture contents of 9 to 19.5 percent of the dry weight of the soil.

#### State Street

The pavement consisted of HMA pavement. The pavement thickness was measured to be 24 and 12 inches at Boring Nos. 8 and 10, respectively. At Boring No. 8 the pavement was underlain by medium compact clayey sand fill that extended to the terminal depth of the boring. A trace of gravel and asphalt was encountered in the fill. At Boring No. 10, the pavement was underlain by 6 inches of medium compact sand fill.

The underlying native soil underlying the fill at Boring No. 10 was medium compact clayey medium to coarse sand with some gravel. The clayey sand extended to the terminal depth of the boring.

Standard penetration values range from 11 to 25 blows per foot. Bulk densities range from 126 to 139 pounds per cubic foot with moisture contents of 4 to 14 percent of the dry weight of the soil.

**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**4.2 Ground Water Observations**

Water level readings were taken in the bore holes during and after the completion of drilling. These observations are noted on the respective Test Boring Logs. No ground water was noted in the borings either during drilling or after completion of drilling.

**5.0 CASED BOREHOLE INFILTRATION TEST**

A cased borehole test was performed at Boring Nos. 8 and 10 on N. University Drive and Boring Nos. 13 and 16 on State Street in the very loose to medium compact clayey sand. The casing is pushed to the infiltration interface depth and filled with water. In this case, the casing was set at a depth of 5 feet below existing pavement surface. The testing was performed in accordance with the Low Impact Design Manual for Michigan.

The table below outlines the encountered soil, the depth at which the test was performed and the determined infiltration rate in inches per hour. The infiltration rate is based on the Horslev Case G Variable Head Method.

<b>Boring No.</b>	<b>Soil Description</b>	<b>Test Depth (A)</b>	<b>Infiltration Rate, Inches Per Hour</b>	<b>Design Infiltration Rate, Inches Per Hour (B)</b>
8	Brown clayey sand with trace of gravel & asphalt	5	0.59	0.29
10	Brown clayey medium to coarse sand with some gravel	5	0.20	0.10
13	Brown clayey well graded sand with trace of gravel	5	0.87	0.43
16	Brown clayey well graded sand with trace of gravel	5	0.65	0.32

- A. Below existing pavement surface
- B. Based on a safety factor of 2

The infiltration capacity of these soils will be limited by the limited vertical extent of these sandy layers, and the ground water encountered below. Furthermore, variations in the silt and clay content can greatly reduce the infiltration.

A safety factor of 2 should be incorporated in the design of the infiltration by the designer.

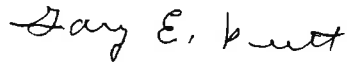
**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**6.0 DESIGN REVIEW AND FIELD MONITORING**

Soil conditions at the site could vary from those generalized on the basis of test borings made at specific locations. It is therefore recommended that Testing Engineers & Consultants, Inc. be retained to provide soil engineering services during the site preparation and pavement phases of the proposed project. This is to observe compliance with the design concepts, specifications and findings. Also, this provides opportunity for design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.



Gary E. Putt, P.E.  
Senior Project Engineer



Carey J. Suhan, P.E.  
Vice President, Geotechnical  
& Environmental Services

GEP/CJS/ln

**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**APPENDIX**

**Test Boring Location Plans**

**Logs Of Test Borings**

**Sieve Analysis Results**

**General Notes For Soil Classification**



hayer Street  
roposed Soil  
oring Locations

Legend  
Untitled Pat



oogle Earth  
Landsat, NOAA, ArcGIS

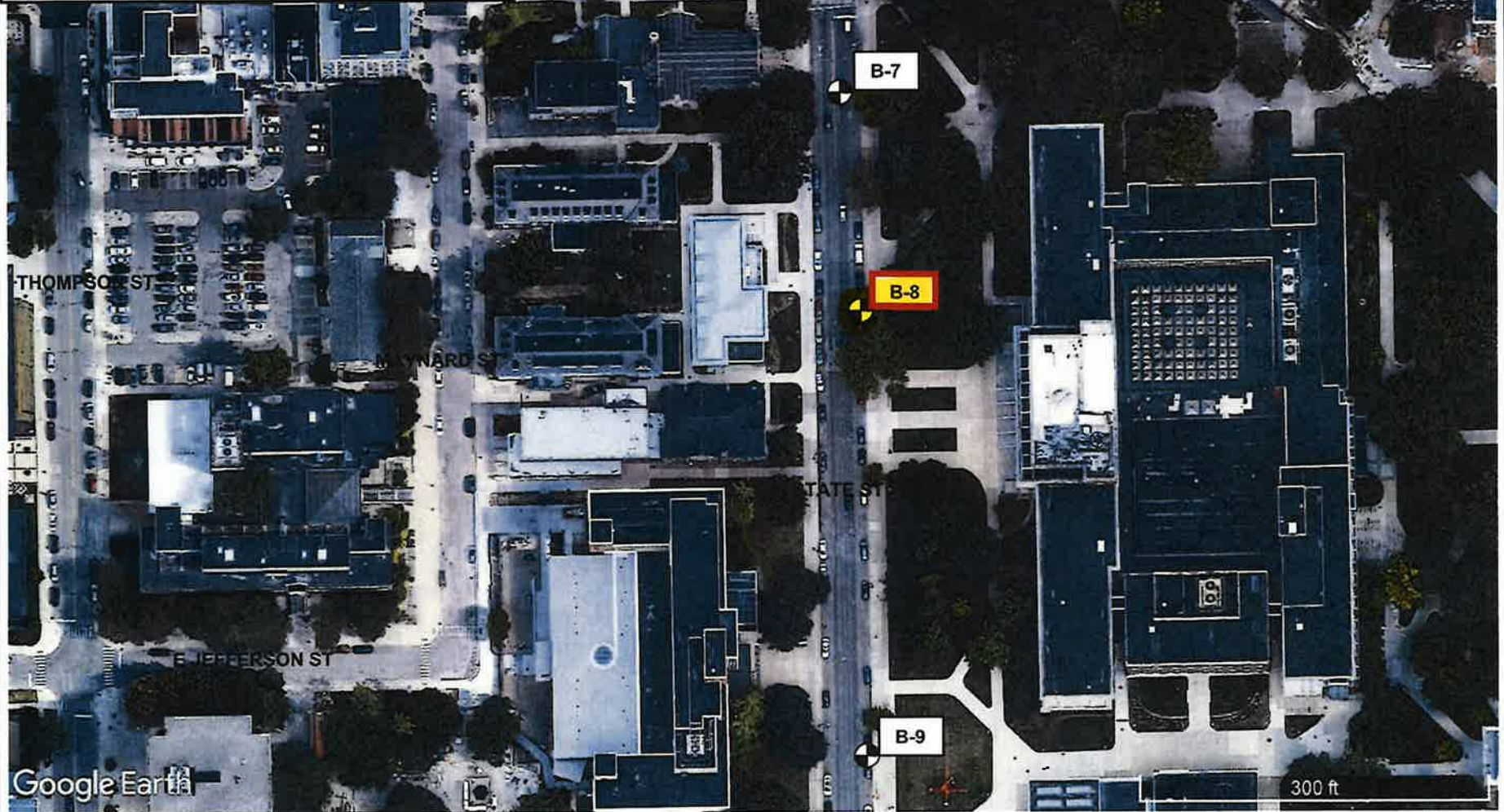
200 ft



**LEGEND**

 BORING LOCATION (TYP)

NOTE: AERIAL IMAGE FROM GOOGLE EARTH



TITLE: BORING LOCATION PLAN

PROJECT: CITY OF ANN ARBOR STATE STREET AND NORTH UNIVERSITY

SCALE: VISUAL

DATE: 10/22/2021

PROJECT NO.: 211279



FIG. NO.: 3

DR. BY: KLV

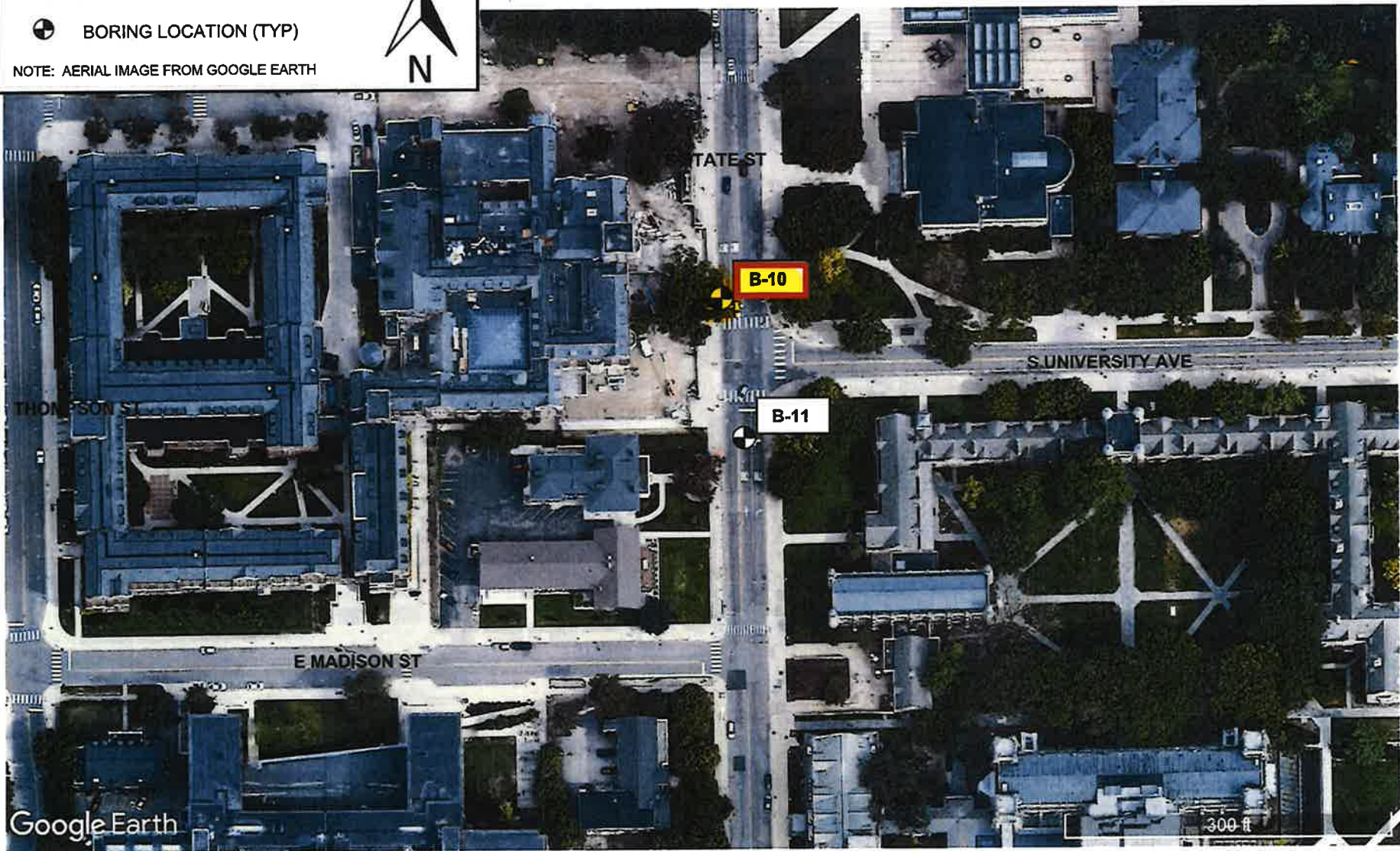
REV. BY: RW




**LEGEND**

 BORING LOCATION (TYP)


NOTE: AERIAL IMAGE FROM GOOGLE EARTH



TITLE: BORING LOCATION PLAN		PROJECT: CITY OF ANN ARBOR STATE STREET AND NORTH UNIVERSITY	
SCALE: VISUAL	DATE: 10/22/2021	PROJECT NO.: 211279	
FIG. NO.: 4	DR. BY: KLV	REV. BY: RW	





TITLE: BORING LOCATION PLAN		PROJECT: CITY OF ANN ARBOR STATE STREET AND NORTH UNIVERSITY	
SCALE: VISUAL	DATE: 10/22/2021	PROJECT NO.: 211279	
FIG. NO.: 1	DR. BY: KLV	REV. BY: RW	



# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249  
 (248) 588-6200 or (313) T-E-S-T-I-N-G  
 Fax (248) 588-6232

<b>Boring No.:</b> 1	<b>Job No.:</b> 63608	<b>Project:</b> State Street, Thayer Street & N. University Avenue
<b>Client:</b> City of Ann Arbor		<b>Location:</b> Ann Arbor, Michigan
<b>Type of Rig:</b> Truck		<b>Drilled By:</b> I. Mickle
<b>Drilling Method:</b> Solid Stem Augers		<b>Started:</b> 8/9/2023
<b>Ground Surface Elevation:</b>		<b>Completed:</b> 8/9/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
0.0			.48				
0.83			.83				
2.5	LS	3	2	ASPHALT (5 3/4")	9.2	133	
3.0		3					
3.6		6		CONCRETE (4 1/4")			
5.0	LS	4	5	Loose Moist Brown Clayey Well Graded SAND With Trace Of Gravel	8.2	143	
5.7		7					
11.0		11		Medium Compact Moist Brown SAND With Trace Of Gravel			
7.5				Bottom of Boring at 5'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance  
 SS - 2" I.D. Split Spoon Sample  
 LS - Sectional Liner Sample  
 ST - Shelby Tube Sample  
 AS - Auger Sample

w - H<sub>2</sub>O, % of dry weight  
 d - Bulk Density, pcf  
 qu - Unconfined Compression, psf  
 DP - Direct Push  
 RC - Rock Core

**Water Encountered:** None

**At Completion:** None

**Boring No. 1**



# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249

(248) 588-6200 or (313) T-E-S-T-I-N-G

Fax (248) 588-6232

<b>Boring No.:</b> 2	<b>Job No.:</b> 63608	<b>Project:</b> State Street, Thayer Street & N. University Avenue
<b>Client:</b> City of Ann Arbor		<b>Location:</b> Ann Arbor, Michigan
<b>Type of Rig:</b> Truck		<b>Drilled By:</b> I. Mickle
<b>Drilling Method:</b> Solid Stem Augers		<b>Started:</b> 8/9/2023
<b>Ground Surface Elevation:</b>		<b>Completed:</b> 8/9/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.46	ASPHALT (5 1/2")			
2.5	LS	5 2 4		Loose Moist Brown Clayey Well Graded SAND With Trace Of Gravel	10.9	130	
5.0	LS	2 3 2	5	Bottom of Boring at 5'	12.2	128	
7.5							
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

<p>"N" - Standard Penetration Resistance          SS - 2" I.D. Split Spoon Sample          LS - Sectional Liner Sample          ST - Shelby Tube Sample          AS - Auger Sample</p>	<p>w - H<sub>2</sub>O, % of dry weight          d - Bulk Density, pcf          qu - Unconfined Compression, psf          DP - Direct Push          RC - Rock Core</p>	<p><b>Water Encountered:</b> None</p> <p><b>At Completion:</b> None</p> <p><b>Boring No. 2</b></p>
--	---	--





# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249  
 (248) 588-6200 or (313) T-E-S-T-I-N-G  
 Fax (248) 588-6232

<b>Boring No.:</b> 8	<b>Job No.:</b> 63608	<b>Project:</b> State Street, Thayer Street & N. University Avenue
<b>Client:</b> City of Ann Arbor		<b>Location:</b> Ann Arbor, Michigan
<b>Type of Rig:</b> Truck		<b>Drilled By:</b> I. Mickle
<b>Drilling Method:</b> Solid Stem Augers		<b>Started:</b> 8/10/2023
<b>Ground Surface Elevation:</b>		<b>Completed:</b> 8/10/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	3 9 13	2	ASPHALT	14.3	134	
5.0	LS	6 12 13	5	Medium Compact Moist Brown Clayey Sand With Trace Of Gravel & Asphalt-FILL	4.8	139	
5.0 - 22.5				Bottom of Boring at 5'			

"N" - Standard Penetration Resistance  
 SS - 2" I.D. Split Spoon Sample  
 LS - Sectional Liner Sample  
 ST - Shelby Tube Sample  
 AS - Auger Sample

w - H<sub>2</sub>O, % of dry weight  
 d - Bulk Density, pcf  
 qu - Unconfined Compression, psf  
 DP - Direct Push  
 RC - Rock Core

**Water Encountered:** None  
**At Completion:** None  
**Boring No.** 8



# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249

(248) 588-6200 or (313) T-E-S-T-I-N-G

Fax (248) 588-6232

<b>Boring No.:</b> 10	<b>Job No.:</b> 63608	<b>Project:</b> State Street, Thayer Street & N. University Avenue
<b>Client:</b> City of Ann Arbor		<b>Location:</b> Ann Arbor, Michigan
<b>Type of Rig:</b> Truck		<b>Drilled By:</b> I. Mickle
<b>Drilling Method:</b> Solid Stem Augers		<b>Started:</b> 8/10/2023
<b>Ground Surface Elevation:</b>		<b>Completed:</b> 8/10/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
1.5	LS	8	1	ASPHALT	3.9	126	
2.5		6	1.5	Medium Compact Moist Brown Sand With Trace Of Gravel-FILL			
5.0	LS	3	5	Medium Compact Moist Brown Clayey Medium To Coarse SAND With Some Gravel	10.9	138	
5.0		5		Bottom of Boring at 5'			
7.5							
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance  
 SS - 2" I.D. Split Spoon Sample  
 LS - Sectional Liner Sample  
 ST - Shelby Tube Sample  
 AS - Auger Sample  
 w - H<sub>2</sub>O, % of dry weight  
 d - Bulk Density, pcf  
 qu - Unconfined Compression, psf  
 DP - Direct Push  
 RC - Rock Core

**Water Encountered:** None  
**At Completion:** None  
**Boring No.** 10



# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249

(248) 588-6200 or (313) T-E-S-T-I-N-G

Fax (248) 588-6232

**Boring No.:** 13

**Job No.:** 63608

**Project:** State Street, Thayer Street & N. University Avenue

**Client:** City of Ann Arbor

**Location:** Ann Arbor, Michigan

**Type of Rig:** Truck

**Drilled By:** I. Mickle

**Drilling Method:** Solid Stem Augers

**Started:** 8/9/2023

**Ground Surface Elevation:**

**Completed:** 8/9/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
2.5	LS	968	.29 .54 3	ASPHALT (3 1/2") BRICK (3")	11.3	137	
5.0	LS	211	5	Medium Compact Moist Brown Clayey Well Graded SAND With Trace Of Gravel Very Loose Moist Brown Clayey Well Graded SAND With Trace Of Gravel	9.6	134	
7.5				Bottom of Boring at 5'			
10.0							
12.5							
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance  
SS - 2" I.D. Split Spoon Sample  
LS - Sectional Liner Sample  
ST - Shelby Tube Sample  
AS - Auger Sample

w - H<sub>2</sub>O, % of dry weight  
d - Bulk Density, pcf  
qu - Unconfined Compression, psf  
DP - Direct Push  
RC - Rock Core

**Water Encountered:** None

**At Completion:** None

**Boring No. 13**



# Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249  
 (248) 588-6200 or (313) T-E-S-T-I-N-G  
 Fax (248) 588-6232

Boring No.: 16

Job No.: 63608

Project: State Street, Thayer Street & N. University Avenue

Client: City of Ann Arbor

Location: Ann Arbor, Michigan

Type of Rig: Truck

Drilled By: I. Mickle

Drilling Method: Solid Stem Augers

Started: 8/9/2023

Ground Surface Elevation:

Completed: 8/9/2023

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
0.0			.33				
0.33			.77				
0.77			1.1				
1.1	LS	8	1.5	ASPHALT (4")	9.3	134	
1.5							
2.5		5					
		4	3	BRICK (5 1/4")			
5.0	LS	2		CONCRETE (4")	19.5	119	
		1					
		1	5	Medium Compact Moist Brown Sand With Trace Of Gravel-FILL			
7.5				Loose Moist Brown Clayey Well Graded SAND With Trace Of Gravel			
10.0				Very Loose Moist Brown Clayey Well Graded Sand With Trace Of Gravel			
12.5				Bottom of Boring at 5'			
15.0							
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance  
 SS - 2" I.D. Split Spoon Sample  
 LS - Sectional Liner Sample  
 ST - Shelby Tube Sample  
 AS - Auger Sample

w - H<sub>2</sub>O, % of dry weight  
 d - Bulk Density, pcf  
 qu - Unconfined Compression, psf  
 DP - Direct Push  
 RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 16





# Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249  
 248-588-6200 or 313 T-E-S-T-I-N-G  
 Fax 248-588-6232

## SIEVE ANALYSIS RESULTS

**PROJECT:** State Street, Thayer Street & N. University  
 Avenue Pavement Improvements  
**LOCATION:** Ann Arbor, Michigan  
**CLIENT:** City of Ann Arbor

**TEC REPORT NUMBER:** 63608

**DATE:** 8/16/2023

**Material Description:** Brown Clayey Well Graded Sand  
 With Trace of Gravel

**Date Sampled:** 8/9/23

**Sample Source / Depth:** B-2 5.5"-1.5'

**Sampled By:** I. Mickle

**Sample Location:**

**TEC Lab Sample Number:** 2064

**Intended Use:**

**Remarks:**

AGGREGATE ANALYSIS					SAMPLE DATA	
Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range		
3"					Initial Sample Weight (g)	492.0
2-1/2"					Weight After Wash (g)	390.9
1-1/2"					Loss in Weight (g)	101.1
1"					Loss by Wash (%)	20.5%
3/4"						
1/2"		0.0	100.0			
3/8"	1.0	0.2	99.8			
#4	34.5	7.0	93.0			
#10	127.6	25.9	74.1			
#20	214.0	43.5	56.5			
#30	245.2	49.8	50.2			
#40	276.2	56.1	43.9		Tested By:	J. Johnson
#100	350.9	71.3	28.7		Reviewed By:	G. Putt
#200	390.9	79.5	20.5			
<b>Total Sample</b>	<b>492.0</b>	<b>100.0</b>	<b>0.0</b>			

**Test Method:** ASTM C117/C136     X     AASHTO T11/T27                      MTM 108/109                     

**Remarks:**

Respectfully Submitted:  
 Testing Engineers and Consultants, Inc.



# Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249

248-588-6200 or 313 T-E-S-T-I-N-G

Fax 248-588-6232

## SIEVE ANALYSIS RESULTS

**PROJECT:** State Street, Thayer Street & N. University  
Avenue Pavement Improvements  
**LOCATION:** Ann Arbor, Michigan  
**CLIENT:** City of Ann Arbor

**TEC REPORT NUMBER:** 63608

**DATE:** 8/16/2023

**Material Description:** Brown Clayey Medium to Coarse  
Sand With Some Gravel

**Date Sampled:** 8/10/23

**Sample Source / Depth:** B-10 @ 5'

**Sampled By:** I. Mickle

**Sample Location:**

**TEC Lab Sample Number:** 2063

**Intended Use:**

**Remarks:**

AGGREGATE ANALYSIS					SAMPLE DATA	
Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range		
3"					Initial Sample Weight (g)	249.3
2-1/2"					Weight After Wash (g)	199.2
1-1/2"					Loss in Weight (g)	50.1
1"					Loss by Wash (%)	20.1%
3/4"		0.0	100.0			
1/2"	10.0	4.0	96.0			
3/8"	18.0	7.2	92.8			
#4	42.8	17.2	82.8			
#10	103.5	41.5	58.5			
#20	148.4	59.5	40.5			
#30	160.3	64.3	35.7			
#40	170.6	68.4	31.6		Tested By:	J. Johnson
#100	186.9	75.0	25.0		Reviewed By:	G. Putt
#200	199.2	79.9	20.1			
<b>Total Sample</b>	<b>249.3</b>	<b>100.0</b>	<b>0.0</b>			

**Test Method:** ASTM C117/C136          X          AASHTO T11/T27      \_\_\_\_\_      MTM 108/109      \_\_\_\_\_

**Remarks:**

Respectfully Submitted:  
Testing Engineers and Consultants, Inc.



# Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249  
 248-588-6200 or 313 T-E-S-T-I-N-G  
 Fax 248-588-6232

## SIEVE ANALYSIS RESULTS

**PROJECT:** State Street, Thayer Street & N. University  
 Avenue Pavement Improvements  
**LOCATION:** Ann Arbor, Michigan  
**CLIENT:** City of Ann Arbor

**TEC REPORT NUMBER:** 63608

**DATE:** 8/16/2023

**Material Description:** Brown Clayey Well Graded Sand  
 With Some Gravel

**Date Sampled:** 8/9/23

**Sample Source / Depth:** B-16 @ 5'

**Sampled By:** I. Mickle

**Sample Location:**

**TEC Lab Sample Number:** 2065

**Intended Use:**

**Remarks:**

AGGREGATE ANALYSIS					SAMPLE DATA	
Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range		
3"					Initial Sample Weight (g)	242.2
2-1/2"					Weight After Wash (g)	174.6
1-1/2"					Loss in Weight (g)	67.6
1"					Loss by Wash (%)	27.9%
3/4"						
1/2"		0.0	100.0			
3/8"	4.8	2.0	98.0			
#4	23.0	9.5	90.5			
#10	72.6	30.0	70.0			
#20	103.3	42.7	57.3			
#30	109.9	45.4	54.6			
#40	118.0	48.7	51.3			
#100	154.8	63.9	36.1		Tested By:	J. Johnson
#200	174.6	72.1	27.9		Reviewed By:	G. Putt
Total Sample	242.2	100.0	0.0			

**Test Method:** ASTM C117/C136     X     AASHTO T11/T27      MTM 108/109     

**Remarks:**

Respectfully Submitted:  
 Testing Engineers and Consultants, Inc.

**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**SOIL DESCRIPTIONS**

In order to provide uniformity throughout our projects, the following nomenclature has been adopted to describe soil characteristics:

**CONSISTENCY AND RELATIVE DENSITY**

COHESIVE SOILS			GRANULAR SOILS	
UNCONFINED COMPRESSIVE STRENGTH, PSF	"N" VALUES	CONSISTENCY	"N" VALUES	RELATIVE DENSITY
Below 500	0 – 2	Very Soft	0 – 4	Very Loose
500 – 1,000	3 – 4	Soft	5 – 10	Loose
1,000 – 2,000	5 – 8	Plastic	11 – 30	Medium Compact
2,000 – 4,000	9 – 15	Firm	31 – 50	Compact
4,000 – 8,000	16 – 30	Stiff	50+	Dense
8,000 – 16,000	31 – 50	Ex. Stiff		
Over 16,000	51+	Hard		

**Material Types By Particle Size**

BOULDERS

COBBLES

GRAVEL

COARSE SAND

MEDIUM SAND

**ASTM D2487**

Stones Over 12" In Diameter

Stones 3" To 12" In Diameter

#4 To 3" Diameter

#10 To #4 Sieves

#40 To #10 Sieves

**Testing Engineers & Consultants, Inc.**

Mr. Igor Kotlyar, P.E.  
City of Ann Arbor  
September 6, 2023

TEC Report: 63608

**SOIL DESCRIPTIONS (Cont'd)**

**Material Types By Particle Size**

FINE SAND

SILT

CLAY

PEAT

MARL

SWAMP BOTTOM DEPOSITS

**ASTM D2487**

#200 To #40 Sieves

Minus #200 Sieve Material,  
Fairly Non-Plastic, Falls Below  
"A"-Line

Minus #200 Sieve Material Plastic  
Material That Has A Tendency To  
Stick Together, Can Be Rolled  
Into Fine Rods When Moistened;  
Falls Above "A"-Line

Black Organic Material  
Containing Partially Decayed  
Vegetable Matter

Fresh Water Deposits Of Calcium  
Carbonate, Often Containing  
Percentages Of Peat, Clay  
& Fine Sand

Mixtures Of Peat, Marl,  
Vegetation & Fine Sand  
Containing Large Amounts Of  
Decayable Organic Material

## APPENDIX

**ATTACHMENT B**  
**GENERAL DECLARATIONS**

City of Ann Arbor  
Guy C. Larcom Municipal Building  
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 City Nondiscrimination requirements and Declaration of Compliance Form, Living Wage requirements and Declaration of Compliance Form, Prevailing Wage requirements and Declaration of Compliance Form, Vendor Conflict of Interest Form, 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 City of Ann Arbor, 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 \_\_\_\_\_, 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 City under this Contract, with the wage and reporting requirements stated in the City Code provisions cited. Bidder certifies that the statements contained in the City Prevailing Wage and Living Wage Declaration of Compliance Forms are true and correct. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

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 City 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 City.

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 City 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 City believes to be in its best interest.

SIGNED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 202\_.

\_\_\_\_\_  
Bidder's Name

\_\_\_\_\_  
Authorized Signature of Bidder

\_\_\_\_\_  
Official Address

\_\_\_\_\_  
(Print Name of Signer Above)

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
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 \_\_\_\_\_, for whom \_\_\_\_\_, bearing the office title of \_\_\_\_\_, 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** \_\_\_\_\_, 202\_

(Print) Name \_\_\_\_\_ Title \_\_\_\_\_

Company:

---

Address:

---

Contact Phone ( ) \_\_\_\_\_ Fax ( ) \_\_\_\_\_

Email \_\_\_\_\_

**ATTACHMENT D**  
**PREVAILING WAGE DECLARATION OF COMPLIANCE**

The “wage and employment requirements” of Section 1:320 of Chapter 14 of Title I of the Ann Arbor City Code mandates that the city not enter any contract, understanding or other arrangement for a public improvement for or on behalf of the city unless the contract provides 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. Where the contract and the Ann Arbor City Code 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. Further, to the extent that any employees of the contractor providing services under this contract are not part of the class of craftsmen, mechanics and laborers who receive a prevailing wage in conformance with section 1:320 of Chapter 14 of Title I of the Code of the City of Ann Arbor, employees shall be paid a prescribed minimum level of compensation (i.e. Living Wage) for the time those employees perform work on the contract in conformance with section 1:815 of Chapter 23 of Title I of the Code of the City of Ann Arbor.

At the request of the city, any contractor or subcontractor shall provide satisfactory proof of compliance with this provision.

The Contractor agrees:

- (a) To pay each of its employees whose wage level is required to comply with federal, state or local prevailing wage law, for work covered or funded by this contract with the City,
- (b) To require each subcontractor performing work covered or funded by this contract with the City to pay each of its employees the applicable prescribed wage level under the conditions stated in subsection (a) or (b) above.
- (c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.
- (d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the wage and employment provisions of the Chapter 14 of the Ann Arbor City Code. The undersigned certifies that he/she has read and is familiar with the terms of Section 1:320 of Chapter 14 of the Ann Arbor City Code and by executing this Declaration of Compliance obligates his/her employer and any subcontractor employed by it to perform work on the contract to the wage and employment requirements stated herein. The undersigned further acknowledges and agrees that if it is found to be in violation of the wage and employment requirements of Section 1:320 of the Chapter 14 of the Ann Arbor City Code it shall have been deemed a material breach of the terms of the contract and grounds for termination of same by the City.

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

\_\_\_\_\_  
 Signature of Authorized Representative      Date

\_\_\_\_\_  
 Print Name and Title

\_\_\_\_\_  
 Address, City, State, Zip

\_\_\_\_\_  
 Phone/Email address

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500

## ATTACHMENT E

### LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than \$10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than \$10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than \$10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

*Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here  No. of employees \_\_\_\_\_*

The Contractor or Grantee agrees:

- (a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as \$16.43/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than \$18.32/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

**Check the applicable box below which applies to your workforce**

- Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits
- Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

- (b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.
- (c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.
- (d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.
- (e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

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

\_\_\_\_\_  
Street Address

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
City, State, Zip

\_\_\_\_\_  
Print Name and Title

\_\_\_\_\_  
Phone/Email address

## Attachment F

# CITY OF ANN ARBOR LIVING WAGE ORDINANCE

**RATE EFFECTIVE APRIL 30, 2024 - ENDING APRIL 29, 2025**

**\$16.43 per hour**

If the employer provides health care benefits\*

**\$18.32 per hour**

If the employer does **NOT** provide health care benefits\*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than \$10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

## **ENFORCEMENT**

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than \$500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

\* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed \$.50 an hour for an average work week; and the employer cost or contribution must equal no less than \$1/hr for the average work week.

**The Law Requires Employers to Display This Poster Where Employees Can Readily See It.**

**For Additional Information or to File a Complaint contact  
Colin Spencer at 734/794-6500 or [cspencer@a2gov.org](mailto:cspencer@a2gov.org)**



**ATTACHEMENT G**

<b>Vendor Conflict of Interest Disclosure Form</b>
--

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor’s conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee’s immediate family member has an ownership interest in vendor’s company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor’s Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

<b>Conflict of Interest Disclosure*</b>	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	<input type="checkbox"/> Relationship to employee <hr style="border: 0; border-top: 1px solid black;"/> <input type="checkbox"/> Interest in vendor’s company <input type="checkbox"/> Other (please describe in box below)

\*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

<b>I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:</b>		
<b>Vendor Name</b>	<b>Vendor Phone Number</b>	
<b>Signature of Vendor Authorized Representative</b>	<b>Date</b>	<b>Printed Name of Vendor Authorized Representative</b>

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, [procurement@a2gov.org](mailto:procurement@a2gov.org)

# ATTACHMENT H

## DECLARATION OF COMPLIANCE

### Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

- (a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy, including but not limited to an acceptable affirmative action program if applicable.
- (b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.
- (c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.
- (d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

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

\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name and Title

\_\_\_\_\_  
Address, City, State, Zip

\_\_\_\_\_  
Phone/Email Address

**Questions about the Notice or the City Administrative Policy, Please contact:**

Procurement Office of the City of Ann Arbor  
(734) 794-6500

## ATTACHMENT I

### **CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE**

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below.

You can review the entire ordinance at [www.a2gov.org/humanrights](http://www.a2gov.org/humanrights).

**Intent:** It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

**Discriminatory Employment Practices:** No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

**Discriminatory Effects:** No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

**Nondiscrimination by City Contractors:** All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

**Complaint Procedure:** If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at [www.a2gov.org/humanrights](http://www.a2gov.org/humanrights). Then submit it to the Human Rights Commission by e-mail ([hrc@a2gov.org](mailto:hrc@a2gov.org)), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at [hrc@a2gov.org](mailto:hrc@a2gov.org).

**Private Actions For Damages or Injunctive Relief:** To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND  
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

## MICHIGAN DEPARTMENT OF TRANSPORTATION CERTIFIED PAYROLL

COMPLETION OF CERTIFIED PAYROLL FORM FULFILLS THE MINIMUM MDOT PREVAILING WAGE REQUIREMENTS

(1) NAME OF CONTRACTOR / SUBCONTRACTOR (CIRCLE ONE) (2) ADDRESS

(3) PAYROLL NO. (4) FOR WEEK ENDING (5) PROJECT AND LOCATION (6) CONTRACT ID

(a)	(b)	(c)	(d) DAY AND DATE							(e)	(f)	(g)	(h)	(i)	(j) DEDUCTIONS					(k)	
															TOTAL HOURS ON PROJECT	PROJECT RATE OF PAY	PROJECT RATE OF FRINGE PAY	GROSS PROJECT EARNED	GROSS WEEKLY EARNED		TOTAL WEEKLY HOURS WORKED ALL JOBS
EMPLOYEE INFORMATION	WORK CLASSIFICATION	Hour Type	HOURS WORKED ON PROJECT							TOTAL HOURS ON PROJECT	PROJECT RATE OF PAY	PROJECT RATE OF FRINGE PAY	GROSS PROJECT EARNED	GROSS WEEKLY EARNED	TOTAL WEEKLY HOURS WORKED ALL JOBS	FICA	FEDERAL	STATE	OTHER	TOTAL DEDUCT	TOTAL WEEKLY WAGES PAID FOR ALL JOBS
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00



Date \_\_\_\_\_

I, \_\_\_\_\_ (Name of Signatory Party) \_\_\_\_\_ (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

\_\_\_\_\_ on the \_\_\_\_\_ (Contractor or Subcontractor)  
 \_\_\_\_\_; that during the payroll period commencing on the \_\_\_\_\_ (Building or Work)  
 \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, and ending the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_,  
 all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

\_\_\_\_\_ from the full \_\_\_\_\_ (Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

- in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION
REMARKS:	
NAME AND TITLE	SIGNATURE
THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.	