PUBLIC IMPROVEMENT REQUEST FOR PROPOSAL

RFP# 26-24

INSTRUMENTATION AND CONTROLS IMPROVEMENTS

City of Ann Arbor
WATER TREATMENT SERVICES UNIT

Due Date: May 12, 2026 by 2:00 p.m. (local time)

Issued By:

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

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SECTION I - GENERAL INFORMATION

A. OBJECTIVE

The purpose of this Request for Proposal (RFP) is to select a firm to provide construction services to complete work at the Ann Arbor Water Treatment Plant including demolition and replacement of instrumentation, valves, and actuators.

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 April 20, 2026 at 5:00 p.m. (local time), and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to Ariana Wade – AWade@fishbeck.com

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - 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 and 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 **mandatory** pre-proposal conference for this project will be held on **April 16, 2026** at **1:30 at the Ann Arbor WTP located at 919 Sunset Road, Ann Arbor, MI 48103**. **Failure to attend the meeting and sign the RFP sign-in sheet at the pre-proposal meeting will automatically disqualify a bidder from submitting a valid proposal.** Any proposal submitted by a party not attending and signing the roster at the pre-proposal meeting will not be opened or considered. Administrative and technical questions regarding this project will be answered at this time. The pre-proposal meeting 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 May 12, 2026 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. 26-24 – INSTRUMENTATION AND CONTROLS IMPROVEMENTS"** 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 and time 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.

For the purposes of this RFP the Construction Type of Building will apply.

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.

Activity/Event	**Anticipated Date**
Pre-Proposal Conference	April 16, 2026, 1:30 p.m. (Local Time)
Written Question Deadline	April 20, 2026, 5:00 p.m. (Local Time)
Addenda Published (if needed)	Week of April 27, 2026
Proposal Due Date	May 12, 2026, 2:00 p.m. (Local Time)
Selection/Negotiations	May/June 2026
Expected City Council Authorizations	June/July 2026

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.

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

The scope of work includes replacement of instrumentation, valves, and actuators for WTP filters and other treatment units. The scope also includes replacement of associated conduit, wiring, and accessories, as well as a new control panel.

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 provided 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 likely result in the proposal being considered non-responsive and will not be considered for award.

Pursuant to Sec 1:324.5 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. 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 evidence of a bidder's safety program (link to information on bidder's publicly available web-site preferred) and evidence of a safety-training program for employees addressing potential hazards of the proposed job site. Bidders 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 of the county.

   Washtenaw County jurisdiction 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 environmental record, including findings of violations and penalties imposed by government agencies.

E. Schedule of Pricing/Cost – 20 Points

Company: _____

Notes:

1. All four (4) Base Bid sections and each of the two (2) Alternates shall be bid. Bidders shall provide a Unit Price for ALL bid items for each Base Bid section, Total Price for ALL Base Bid sections specified, and for each Bid Alternates.
2. Each item shall include all preparatory and post repair work, including but not limited to field measurements, shop drawings, scaffolding, demolition, dust control, protection of Owner equipment, protection of process water, clean up, restoration, and all related items.
3. The City, at its sole discretion, may elect to delete any portion of the work delineated below, with no change to the unit prices provided. Work shall be determined based upon the availability of funds.
4. Any item not provided in the following list shall be considered incidental.
5. Contract shall be awarded based on the Base Bid or any combination of a Base Bid(s) and Alternate Bid(s) in any manner the City believes to be in its best interest.
6. See Specification Section 01 22 00 “Unit Prices – Measurement and Payment” for scope of each bid item, and Section 01 23 00 “Alternates” for scope of each bid alternate.
7. Bid shall not include Work to be completed by Owner, as defined in Specification Section 01 11 00 “Summary of Work”.

Base Bid –

For the entire work outlined in these documents for **Instrumentation and Controls Improvements** complete as specified, using equipment and materials only of the type and manufacturers where specifically named.

BASE BID #1 – Instrumentation and Controls Improvements
Location: 919 Sunset Road, Ann Arbor, MI 48103

	Description	Units	Quantity	Unit Cost	Extended Cost
1.0	GENERAL				
1.1	General Conditions (Max 10%)	LS	1		$
1.2	Mobilization (Max 10%)	LS	1		$
1.3	Permit Allowance	LS	1	$5,000	$5,000
1.4	Miscellaneous Allowance	LS	1	$50,000	$50,000
2.0	Filter Gallery I&C Improvements				
2.1	Filters 1-10	LS	1	$	$
2.2	Filters 11-20	LS	1	$	$
2.3	Filters 21-26	LS	1	$	$
3.0	Finished Water Flow Meter Replacement	LS	1	$	$
4.0	Miscellaneous Instrument Replacement	LS	1	$	$
4.0	Closeout	LS	1	$	$
	BASE BID #1 TOTAL			$	

The bid items identified above include the major items of work anticipated for the project. Detailed requirements for each element of the project are presented on the contract drawings.

Total Bid (Items 1 through 4) $_____

Total Bid (Written)_____
Proposed Work Start Date_____

Total bid amount shall be shown in both words and numbers. In case of discrepancies, the amount shown in words shall govern.

Signature of Bidder_____ Date_____

Alternates –

Bidder shall list alternate bid item prices below.

Alternate No. 1 – Remove furnishing and installation of new filter backwash turbidity sensors and controllers from the scope of the project, for Filters 1 through 26.

Total Alternate No. 1 (Deduct) $_____

Total Alternate No. 1 (Deduct)
(Written)_____

Alternate No. 2 – Remove furnishing and installation of new filter backwash turbidity sensors and controllers from the scope of the project, for Filters 1 through 10.

Total Alternate No. 2 (Deduct) $_____

Total Alternate No. 2 (Deduct)
(Written)_____

Alternate bid amounts shall be shown in both words and numbers. In case of discrepancies, the amount shown in words shall govern.

Signature of Bidder_____ Date_____

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 and/or the City of Ann Arbor web site 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

Appendix

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 **Instrumentation and Controls Improvements RFP# 26-24** 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 **Water Treatment Services Unit**

Project means **Instrumentation and Controls Improvements RFP# 26-24**

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: **Emily Schlanderer** whose job title is **WTP Engineer**. 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 [**Insert job title**].

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 by June 30, 2028

(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 $1,000 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]

By: _____

Name: _____

Title: _____

Date: _____

CITY OF ANN ARBOR

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: Christopher Taylor

Title: Mayor

Date: _____

By: _____

Name: Jacqueline Beaudry

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)	(Name of Principal)
By _____	By _____
(Signature)	(Signature)
Its _____	Its _____
(Title of Office)	(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 Cityentitled _____

_____

_____

____, 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)

Approved as to form:

_____
Atleen Kaur, City Attorney

_____
(Name of Principal)
By _____

(Signature)
Its _____
(Title of Office)

Name and address of agent:

_____

_____

_____

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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 l3. 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 l80 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

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

Section 17 - Deductions for Uncorrected Work

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

Section 18 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials condemned by the Supervising Professional as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the 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 l0 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

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DETAILED SPECIFICATIONS

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SECTION 00 01 10 – TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 00 51 00 - NOTICE OF AWARD

Dated _____, 20____

TO:_____
(Bidder)

ADDRESS:_____

_____

_____

CONTRACT: Instrumentation and Controls Improvements
919 Sunset Road
Ann Arbor, MI 48109
Project Number 2501593

You are notified that your Bid dated _____, 20____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the Instrumentation and Controls Improvements.

The Contract Price of your Contract is _____
_____ Dollars
($_____). One electronic copy of the proposed Contract Documents as identified in the Agreement accompany this Notice of Award.

You must comply with the following conditions precedent within 15 days of the date of this Notice of Award, that is by _____, 20____.

1. Deliver to the Owner fully executed counterparts of the Contract Documents which accompany this Notice of Award, each of which must bear your signature at the designated location.

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

City of Ann Arbor

By: _____
(Authorized Signature)

_____
(Name and Title)

*Typed or printed in ink

Copy to Engineer

END OF SECTION 00 51 00

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SECTION 00 55 00 – NOTICE TO PROCEED

Dated _____, 20____

TO:_____
(Contractor)

ADDRESS:_____

_____

_____

CONTRACT: Instrumentation and Controls Improvements
919 Sunset Road
Ann Arbor, MI 48103
Project Number2501593

You are notified that the Contract Times under the above Contract will commence to run on _____, 20___. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement the date of Substantial Completion is _____, 20___ and the date of readiness for final payment is _____, 20___.

City of Ann Arbor

By: _____
(Authorized Signature)

_____
(Name and Title)

*Typed or printed in ink

Copy to Engineer

END OF SECTION 00 55 00

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SECTION 01 11 00 – SUMMARY OF WORK

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.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work covered by the Contract Documents comprises of replacement of drain piping located at the City of Ann Arbor Water Plant, 919 Sunset Road, Ann Arbor, MI 48103 for the City of Ann Arbor Water Treatment Services Unit, Owner.

B. The Work includes the following major items:
   1. Remove and replace filter valve actuators, flow meters, and instrumentation.
   2. Remove and replace miscellaneous flow meters and level instrumentation.

1.3 TYPE OF CONTRACT

A. Construct the Work of this Contract under a single lump sum Contract.

1.4 GENERAL

A. Imperative Language: These Specifications (Divisions 01 through 49) are written in the imperative and abbreviated form. This imperative language of the technical specifications is directed at Contractor unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be" and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings. The words "shall", "shall be" and similar mandatory phrases shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated in the imperative or otherwise.

B. Related Sections: Some Sections of these Specifications (Divisions 01 through 49) may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual user and is not intended to include all Sections which may be related. It is Contractor's obligation to coordinate all Sections whether indicated under "Related Sections" or not.

C. Reference to the General Conditions: In Divisions 01 through 49, a reference to the General Conditions includes by inference all amendments or supplements in the Supplementary Conditions.

1.5 WORK BY OWNER

A. The following work will be completed by Owner:
   1. Operating valves for isolation.
   2. Draining filters or basins, as needed.
   3. Programming and integration for all new and existing equipment and instrumentation to be replaced or revised as part of the Project.
   4. Involvement and coordination during startup and testing new equipment and instrumentation.

B. Coordinate the schedule of work by Owner with Owner.

C. Cooperate with Owner.

1.6 CONTRACTOR USE OF PREMISES

A. Limit use of premises to allow for Owner occupancy and work by other contractors.

B. Areas for Contractor's trailers, equipment, and material storage, and Contractor's employee parking, shall be as agreed by Owner prior to the start of construction.

C. Coordinate use of premises under direction of the Owner.

D. Where the Contract Documents identify certain site elements within the construction limits, such as sidewalks, drives, and streets, that must be kept open for public or the Owner’s use during construction, the Contractor shall be responsible for protection and maintenance of such elements as well.

E. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, all Work at the Water Treatment Plant shall be restricted to the following hours:
   1. Monday Through Friday (Except Legal Holidays): 7 a.m. to 7 p.m.
   2. Saturday, Sundays, or legal holidays with written approval of the Owner.

1.7 OCCUPANCY REQUIREMENTS

A. Owner Occupancy During Construction:
   1. The Owner will occupy or utilize premises during the entire period of construction, for conduct of the Owner’s normal operations. Cooperate with the Owner to minimize conflict and to facilitate the Owner's operations.
   2. All work requiring shutdown, dewatering, or otherwise taking units out of service must be coordinated with the Owner at least 2 weeks in advance.
   3. During the work period of May 1st through October 31st: 20 filters must remain in service at all times, with a maximum of 2 filters per bank (i.e. Filters 1-10, 11-20, and 21-26) taken out of service at once.
   4. During the work period of November 1st through April 30th: 15 filters must remain in service at all times, with a maximum of 3 filters per bank (i.e. Filters 1-10, 11-20, and 21-26) taken out of service at once.
   5. Work requiring shut down of the following unit processes must be completed between November 1st and April 30th. The contractor will be responsible for dewatering associated piping, in coordination with the Owner.
      a. WHS/EHS Flow Meter Vault
      b. Gravity #1 Flow Meter Vault
      c. Gravity #2 Flow Meter Vault
   6. Work involving the 4-inch PSW piping servicing the CO_2 Feed System must be completed prior to work involving Surface Wash valves and actuators.
   7. Access to the site for chemical deliveries must be maintained at all times.
   8. Limit parking for construction vehicles to an area designated by the Owner.
   9. Access to Abutting Properties, Facilities and Loading Docks: Provide at all times.
   10. Access for Emergency Vehicles:
      a. Provide at all times.
      b. Provide at least one clear lane during nonwork periods.
   11. Fire Hydrants: Provide access to at all times.
   12. Do not block fire access routes.

1.8 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner and Engineer. Provide 72 hours notice prior to the following:
   1. Contractor mobilization.
   2. Requiring Owner assistance for activities including, but not limited to:
      a. Operating valves.
      b. Bacteriological testing.

B. Sequence Submittal: Submit a proposed sequence with appropriate times of starting and completion of tasks to Engineer for review.

1.9 SECURITY AND ACCESS

A. The City of Ann Arbor's Water Treatment Plant is a limited access facility. The Contractor must comply with the City's operational provisions for security including, but not limited to:
   1. Provide proper identification of employees.
   2. Provide and use photos IDs for all Contractor personnel.
   3. Maintain daily sign-in log of personnel and visitors.
   4. Provide a list of personnel and vehicles onsite.
   5. Maintain a daily log of vehicle license plate numbers onsite.
   6. Allow Owner to conduct background checks on Contractor's personnel upon request.
   7. Notify the plant in advance of material deliveries to the site, including delivery contents. Owner will NOT accept deliveries on behalf of the Contractor.

PART 2 - PRODUCTS

2.1 OTHER MATERIALS

A. General: All other materials which are not specified herein and are not indicated on the Drawings, but are required for proper and complete performance of the Work.

B. Procedure:
   1. Select new, first quality material.
   2. Obtain Engineer's review.
   3. Provide and install.

PART 3 - EXECUTION

3.1 CONTROL OF WATER POLLUTION

A. General Requirements:
   1. The Contractor shall conduct their work in such manner as to prevent the entry of fuels, oils, bituminous materials, chemical, sewage, or other harmful materials into the City's water supply or on to the soil.
   2. The Contractor shall take all necessary precautions to prevent the entry of these harmful materials including the use of tarps, planks, protective trusses, or scaffolding systems, or other Owner and Engineer approved methods.
   3. Any vehicles or equipment with oil, fuel, or other fluid leaks shall not be allowed on the Site and shall be immediately removed upon detection.

END OF SECTION 01 11 00

SECTION 01 21 13 – CASH ALLOWANCES

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.

1.2 SUMMARY

A. This Section provides for cash allowances which are included in the Contract Price.

B. Related Sections include Sections in Divisions 01 through 49, as identified below, provide additional information on what is covered by the respective allowances.

1.3 SCHEDULE OF ALLOWANCES

A. Include in the Contract Price the following amounts:
   1. Permit Allowance: $5,000.
   2. Miscellaneous Allowance: $50,000.

1.4 CASH ALLOWANCES

A. Costs Associated With Allowances:
   1. All costs, associated with allowances, which are not specifically defined in the Schedule of Allowances, paragraph 1.3 of this Section shall be included in the Base Bid.
   2. Allowance for permits shall only be used to pay for the documented permit fees, no other associated costs may be included.
   3. Associated costs for the Miscellaneous Allowance not specifically defined in the Schedule of Allowances may include, but are not necessarily limited to:
      a. Unloading.
      b. Handling on the Site.
      c. Labor.
      d. Installation.
      e. Overhead.
      f. Profit.

B. Allowances shall only be used to pay for additional and necessary work as approved by the Owner.

1.5 ADJUSTMENT OF COSTS

A. Change Order: To adjust Contract Price if final cost is different from allowance.

B. Documentation:
   1. Submit:
      a. Within 60 days after completion of the work under the allowance.
      b. Documentation of actual costs.
   2. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.
   3. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 21 13

SECTION 01 22 00 - UNIT PRICES - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes descriptions of the method of measurement and the basis of payment for Unit Price Work under this Contract.

B. Basis of Contract Payments:
1. Final Contract Price shall be determined by actual quantities installed at unit prices stated in Contractor's Bid.
2. Engineer shall determine actual as-built quantities.
3. All work identified on the Drawings, but not included as a Bid item shall be considered incidental to construction and not paid for directly, except Work that would be considered additional Work due to unforeseen conditions.
4. Unit price payments for individual items shall include everything necessary for such item to function as intended in the system.
5. Owner reserves the right to increase, decrease or eliminate any quantities for items listed in Contractor's Bid or which become a part of the Contract Documents.

C. Items included as incidental to Unit Prices for systems and appurtenances. Unless there is a specific pay item identified, the unit price payment shall include, but not be limited to:
1. Clear, excavate, trench, bedding, trench backfill, compaction, disposal of items for clearing and unsuitable or excess excavated materials.
2. Drainage of excavations including by-pass pumping of sewers if necessary.
3. Temporary sheeting, bracing and shoring of excavations.
4. Support, relocation, replacement, connection or reconnection of existing pipelines and utilities.
5. Cleanup and surface restoration.
6. Water service repair.
7. Sewer lead repair.
8. Bulk head of pipes to be abandoned.
9. Removal of pipes, valves, conduit, and appurtenances located within the limits of work whether identified on the removal Drawings or not.
10. Coordination of mail delivery and refuse removal with residents, post office, and refuse collectors.
11. Dewatering for the installation of sanitary sewer, water main and storm sewer.
12. Support of utility poles and existing underground utilities during excavation and installation of sanitary sewer, water main and storm sewer.
13. Remove, salvage, and replace street signs.
14. Remove and dispense of trees less than 6-inches in diameter.
15. Temporary enclosures and sources of heat and humidity control to allow construction activity to proceed during cold weather and adverse conditions.
16. Testing of concrete repair materials.

1.3 GENERAL

A. Item No. 1.1 – General Conditions, Max 10% of Individual Base Bid:
1. Includes:
   a. General Overhead.
   b. Project Management.
   c. Provide insurance, bonds, and other costs associated with the project in general and not included in other pay items.
   d. All required submittals.

2. Unit of Measure:
   a. Lump sum.
   b. 50% payment will be made after 5% of the original contract amount is earned.
   c. Final 50% payment will be made after 25% of the contract amount is earned.

B. Item No. 1.2 – Mobilization, Max 10% of Individual Base Bid:
1. Includes:
   a. Preparatory work and expenses incurred prior to beginning work onsite.
   b. Transport materials, personnel, and equipment to the Site.
   c. Establish temporary onsite construction facilities.
   d. Where applicable, establish, maintain and remove all temporary and permanent soil erosion control measures as indicated on the Drawings or as required by local enforcement authorities.
2. Unit of Measure:
   a. Lump sum.
   b. 50% payment will be made after 5% of the original contract amount is earned.
   c. Final 50% payment will be made after 25% of the contract amount is earned.

C. Item No. 1.3 – Permit Allowance:
1. Includes cash allowance for $5,000 for obtaining permits not included in the Contract Documents, only. Cash allowance shall not be used for Contractor markup.
2. Unit of Measure: Lump Sum.

D. Item No. 1.4 – Miscellaneous Allowance:
1. Includes cash allowance for $50,000 for Miscellaneous Scope that may get added to the project.
2. Unit of Measure: Lump Sum.

E. Item No. 2.1 – Filter 1-10 Gallery I&C Improvements:
1. Includes the demolition and replacement of Filter 1-10 valves, actuators, flow meters, and instrumentation, and all associated power and control wiring and conduit as shown on the following sheets. See “Location” in schedules to identify relevant valves, actuators, flow meters, and instrumentation.
   a. D402 and D403.
   b. D702 and D703.
   c. P101 through P104.
   d. P202 and P203.
   e. P301.
   f. E202 and E203.
   g. I101 and I102.
   h. I106.
2. Includes the demolition and replacement of Cistern 1 level instrumentation, and all associated power and control wiring and conduit.
3. Includes rerouting of 4-inch PSW piping for CO2 Carrier Water, new valves, and associated hardware and accessories.
4. Includes new control panel and remote I/O racks.
5. Unit of Measure: Lump Sum.

F. Item No. 2.2 – Filter 11-20 Gallery I&C Improvements:
1. Includes the demolition and replacement of Filter 11-20 valves, actuators, and instrumentation, and all associated power and control wiring and conduit as shown on the following sheets. See “Location” in schedules to identify relevant valves, actuators, and instrumentation.
   a. D404 and D405.
   b. D704 and D705.
   c. P105 through P107.
   d. P204 and P205.
   e. P302.
   f. I103 through I104.
   g. I106.
2. Includes new remote I/O racks.
3. Unit of Measure: Lump Sum.

G. Item No. 2.3 – Filter 21-26 Gallery I&C Improvements:
   1. Includes the demolition and replacement of Filter 21-26 valves, actuators, and instrumentation, and all associated power and control wiring and conduit as shown on the following sheets. See “Location” in schedules to identify relevant valves, actuators, and instrumentation.
      a. D406 and D407.
      b. D706 and D707
      c. P106.
      d. P108 and P109
      e. P206 and P207.
      f. P303.
      g. I105 through I107.
   2. Includes new remote I/O racks.
   3. Unit of Measure: Lump Sum.

H. Item No. 3.0 – Finished Water Flow Meter Replacement:
   1. Includes the demolition and replacement of WHS, EHS, and Gravity flow meters, transmitters, and all associated power and control wiring and conduit.
   2. Unit of Measure: Lump Sum.

I. Item No. 4.0 – Miscellaneous Instrument:
   1. Includes the demolition and replacement of Cistern 2 and Clearwell 2 level instrumentation, transmitters, and all associated power and control wiring and conduit.
   2. Unit of Measure: Lump Sum.

J. Item No. 5.0 – Closeout:
   1. Includes closeout activities as described in Division 01 Section “Closeout Procedures”.
   2. Unit of Measure: Lump Sum.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 22 00

SECTION 01 23 00 – ALTERNATES

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.

1.2 SUMMARY

A. This Section identifies each alternate and describes the basic changes to be incorporated into the Work, only when that alternate is made a part of the Work by specific provisions of the Contract Documents.

1.3 SCHEDULE OF ALTERNATES

A. Alternate 1:
   1. Remove furnishing and installation of new filter backwash turbidity sensors and controllers from the scope of the Project, for Filters 1 through 26.
      a. Delete furnishing and installation of new filter backwash turbidity sensors and controllers for Filters 1-26, as specified in Division 40 Section “Instrumentation and Control for Process Systems” and as indicated on Drawings P101-P109, P202-P207, P301-P303, E202-E207, I101-I107.
      b. Demolition of existing filter backwash turbidity sensors and controllers for Filters 1-26, as indicated on Drawings D402-D407, D409, D702-D707, shall not be deleted from the scope

B. Alternate 2:
   1. Remove furnishing and installation of new filter backwash turbidity sensors and controllers from the scope of the Project, for Filters 1 through 10.
      a. Delete furnishing and installation of new filter backwash turbidity sensors and controllers for Filters 1-10, as specified in Division 40 Section “Instrumentation and Control for Process Systems” and as indicated on Drawings P101-P104, P202-P203, P301, E202-E203, I101-I102, I106.
      b. Demolition of existing filter backwash turbidity sensors and controllers for Filters 1-10, as indicated on Drawings D402-D403, D409, D702-D703, shall not be deleted from the scope

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 23 00

SECTION 01 25 13 – PRODUCT SUBSTITUTION PROCEDURES

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.

1.2 SUMMARY

A. This Section includes the administration of substitutions and Product options.

1.3 SUBMITTALS

A. List of all products proposed for installation:
   1. Submit 1 electronic copy within 30 days after the Effective Date of Agreement unless otherwise indicated elsewhere in the Contract Documents.
   2. Tabulate the list by each Specification Section.

1.4 CONTRACTOR'S OPTIONS

A. Products specified only by reference standards or by description:
   1. Select any Product meeting the standards or description by any Supplier unless otherwise required elsewhere in the Contract Documents.
   2. Submit for Engineer's review:
      a. Name and address of Supplier.
      b. Trade name.
      c. Model or catalog designation.
      d. Manufacturer's data including:
         1) Performance and test data
         2) Compliance with reference standards.

B. Products specified by naming one or more suppliers without an "or equal" clause:
   1. Use specified Product of one of the Suppliers named.
   2. No substitutions.

C. Products specified by naming one or more suppliers with an "or equal" clause:
   1. Indicates the option of selecting equivalent Products by stating "or equal" after the specified Suppliers.
   2. Engineer may waive some or all of the requirements specified for substitutions if, at Engineer's sole discretion, the proposed equivalent Product is considered an "or equal".
   3. If, at Engineer's sole discretion, the proposed equivalent Product does not qualify as an "or equal", it will be considered as a proposed substitute and a substitution request submittal will be required.

1.5 SUBSTITUTIONS

A. Substitutions after the effective date of agreement:
   1. Within 30 days after the Effective Date of Agreement.
   2. Engineer will consider formal requests for substitution of Products in place of those specified unless otherwise prohibited elsewhere in the Contract Documents.

B. Substitution Request Submittals: Submit electronic copy of the request for substitution including the following:
   1. Complete data substantiating compliance of the proposed substitution with the Contract Documents.
   2. For Products:
      a. Names and addresses of Manufacturer and Supplier.
      b. Product identification.

c. Manufacturer's literature, including:
   1) Product description.
   2) Performance and test data
   3) Reference standards.
d. Samples.
e. Name and address of similar projects on which the Product was used and date of installation.

3. For Construction Methods:
   a. Detailed description of the proposed method.
   b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with Product or method specified.
5. Data relating to changes in the construction schedule.
6. Accurate cost data on the substitution and comparison with the Product or method specified.
7. Changes to the Work which would be caused by the substitution.

C. Contractor's Responsibilities: In making a request for a substitution, Contractor represents:
1. Contractor has personally investigated the proposed Product or method and determined that it is equal or superior in all respects to that which is specified.
2. Contractor will provide the same guarantee for the substitution as for the Product or method specified.
3. Contractor will coordinate installation of the accepted substitution into the Work making such changes as may be required for the Work to be completed in all respects.
4. Contractor waives all claims for additional cost related to the substitution which consequently become apparent.
5. Cost data is complete and includes all related costs under Contractor's contract, but excludes costs under separate contracts and Engineer's redesign costs.

D. Substitutions Not Considered: Substitutions will not be considered if:
1. They are indicated or implied on Shop Drawings or Product data submittals without formal request submitted in accordance with this Section.
2. Acceptance will require substantial revision of the Contract Documents.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 25 13

SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

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.

1.2 SUMMARY

A. This Section includes procedures for modifying the Contract Documents.

1.3 BULLETIN

A. Procedures: As indicated on the form following this Section.

B. If Bulletin is accepted, Owner may issue one or more Change Orders for some or all items listed.

1.4 FIELD ORDER

A. Changes in Contract Price or Contract Times not permitted by use of Field Orders.

B. Format:
   1. May take form of any written communication mutually acceptable to Engineer and Contractor, including, but not necessarily limited to:
      a. Letter or memo.
      b. Email correspondence.
      c. Hand drawn or computer generated sketch.

C. Procedures: Refer to the General Conditions.

1.5 WORK CHANGE DIRECTIVE

A. Procedures: Refer to the General Conditions.

1.6 CHANGE ORDER

A. Procedures: Refer to the General Conditions and use Owner-provided form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01 26 00

SECTION 01 26 13 – REQUESTS FOR INFORMATION

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.

1.2 SUMMARY

A. This Section includes procedures for Contractor to give notice of conflicts, errors, ambiguities, or discrepancies in the Contract Documents.

1.3 DEFINITIONS

A. Abbreviation: Request for Information (RFI).

1.4 REQUESTS FOR INFORMATION

A. Format:
   1. Use the enclosed RFI form or, at Contractor's option, generate form.
   2. Minimum required content of Contractor's RFI form:
      a. Project name.
      b. Name and address of Contractor.
      c. RFI number.
      d. RFI date.
      e. Name of initiator.
      f. Complete written request, with sketches as required.
      g. Signature of initiator.
      h. Space for written response by Engineer, with signature and date of Engineer's representative.

B. Procedures:
   1. Maintain a log of RFIs, including the RFI date and the date of the response.
   2. Allow at least 15 full working days for Engineer's response following Engineer's receipt of RFI.
   3. Submit written justification for shorter response time.
   4. Do not submit RFIs for information already included in the Contract Documents.
   5. Illegitimate RFIs may be cause for deductions in the Contract amount. See the Supplementary Conditions.
   6. RFIs submitted directly by subcontractors or vendors will be rejected.
   7. Changes in Contract Price or Contract Times not permitted within an RFI form.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 SCHEDULES

A. Attached is the following form:
   1. Request for Information.

REQUEST FOR INFORMATION
PAGE 1 OF 1

CONTRACT FOR:	PROJECT NO.:
OWNER:	
CONTRACTOR:	
ENGINEER:	
THE CONTRACTOR SHALL COMPLY WITH THE PROCEDURES IN DIVISION 01 SECTION “REQUESTS FOR INFORMATION.”	

RFI No.: _____

Fishbeck Project Manager: _____

REQUEST		
RFI From:	**Signature:**	**Date:**

RESPONSE		
Response From:	**Signature:**	**Date:**

END OF SECTION 01 26 13

SECTION 01 29 16 – PAYMENT PROCEDURES

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.

1.2 SUMMARY

A. This Section includes submittal to the Owner's designee of Applications for Payment and supporting documentation as specified herein.

1.3 SUBMITTALS

A. Application for Payment: Submit 1 electronic copy on attached form or AIA Documents G702 and G703.

B. An incomplete or incorrect Application for Payment will constitute reason for refusing to recommend payment as indicated in Article 16 of the General Conditions.

1.4 FORMS

A. Copies of the forms to be used for the above requirements are attached and include the following:
   1. Application for Payment.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

APPLICATION AND RECOMMENDATION FOR PAYMENT
PAGE 1 OF 3

TO: City of Ann Arbor
In Care of: Fishbeck
1515 Arboretum Drive, SE
Grand Rapids, MI 49546

FROM (Contractor): _____

Application No: _____
Period From: _____
To: _____

Project: _____
Fishbeck Project Number: _____

APPLICATION FOR PAYMENT:

Application for Payment is made, as indicated below, in connection with the Contract. Schedule of Values sheet is attached as page 3 of 3.

1. Original Contract Price $_____

2. Net change by Change Orders $_____

3. Current Contract Price (1 plus 2) $_____

4. Total Completed and Stored to Date (Column F) $_____

5. Retainage (Per Agreement) _____% of Work Completed: $_____
_____% of Stored Material: $_____
Total Retainage (Equal to Column H) $_____

6. Amount Eligible to Date (4 minus 5) $_____

7. Less Previous Payments $_____

8. Amount Due This Application (6 minus 7) $_____

9. Balance to Finish, Plus Retainage (Column G plus 5) $_____

CHANGE ORDER SUMMARY:

Change Orders Approved by Owner	ADDITIONS	DEDUCTIONS
Change Order No. 1 Change Order No. 2 Change Order No. 3 Change Order No. 4 Change Order No. 5		
Net Change by Change Orders		

APPLICATION AND RECOMMENDATION FOR PAYMENT
PAGE 2 OF 3

CONTRACTOR'S CERTIFICATION:

The undersigned Contractor certifies that to the best of its knowledge (1) all previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with Work covered by prior Applications for Payment; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Owner at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest or encumbrances); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Dated _____, 20___

_____
Contractor

By _____
(Signature)

_____
Name and Title of Signatory

ENGINEER'S RECOMMENDATION:

To: City of Ann Arbor

In accordance with the Contract, the undersigned recommends payment to Contractor.

AMOUNT RECOMMENDED: .....$_____
(Attach explanation if amount recommended differs from the amount applied for.)

ENGINEER: Fishbeck

Dated _____, 20___

By _____
(Signature)

_____
Name and Title of Signatory

This Recommendation is not negotiable. The AMOUNT RECOMMENDED is payable only to Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of Owner or Contractor under this Contract.

This recommendation for payment is based on a review of the Work performed as compared to the amount of the application. This recommendation does not imply that Engineer is reviewing construction lien documents nor does it imply that Engineer is acting as a guarantor of the property. Any review of construction lien documents by Engineer is for information purposes only.

APPLICATION AND RECOMMENDATION FOR PAYMENT
PAGE 3 OF 3

Schedule of Values

	A	B	C	D	E	F		G	H
SPEC. ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED			TOTAL COMPLETED AND STORED TO DATE (C+D+E)	% (F/B)	BALANCE TO FINISH (B-F)	RETAINAGE
			From Previous Applications (C + D)	This Period					
				Work in Place	Presently Stored Materials (not in C or D)				

In tabulations above, amounts are stated to the nearest dollar.
Attach additional copies of Page 3 as required. Total on the last page.

END OF SECTION 01 29 16

SECTION 01 29 73 – SCHEDULE OF VALUES

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.

1.2 SUMMARY

A. This Section includes preparation and submittal of a schedule of values.

1.3 GENERAL

A. Timing of Submittal: Submit to Engineer a schedule of values allocated to the various portions of the Work, within 10 days after the Effective Date of the Agreement.

B. Supporting Data: Upon request of Engineer, support the values with data which will substantiate their correctness.

C. Use of Schedule: The schedule of values, unless objected to by Engineer, shall be used only as the basis for the Contractor's Applications for Payment.

1.4 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Form and Identification:
   1. Submit electronic copy.
   2. Contractor's standard forms and automated printout may be used.
   3. Identify Schedule with:
      a. Title of Project and location.
      b. Engineer.
      c. Project number.
      d. Name and address of Contractor.
      e. Contract designation.
      f. Date of submission.

B. Detail: Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Format:
   1. Follow the Table of Contents of this Project Manual as the format for listing component items.
   2. Identify each line item with the number and title of the respective major Section of the Specifications.

D. Subvalues: For each major line item list subvalues of major Products or operations under the item.

E. Allowances:
   1. Include in each line item the amount of the respective allowances specified in Division 01 Section “Cash Allowances.”
   2. For unit cost allowances, give quantities measured from Contract Documents multiplied by the unit cost equal to the total cost for the item.

F. Change Orders: For each Application for Payment, revise schedule to list Change Orders.

G. For the various portions of the Work:
   1. Each item shall include a directly proportional amount of Contractor's overhead and profit.
   2. For items on which progress payments will be requested for stored materials, break down the value into:
      a. The cost of the materials, delivered and unloaded, with taxes paid.
      b. The total installed value.

H. The sum of all values listed in the schedule shall equal the total Contract Price.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 29 73

SECTION 01 31 13 – PROJECT COORDINATION

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.

1.2 SUMMARY

A. This Section includes provisions for coordination of the Work.

1.3 GENERAL COORDINATION

A. Coordinate scheduling, submittals and work of the various Sections of the Specifications to:
   1. Ensure efficient and orderly sequence of installation of interdependent construction elements.
   2. Provide for items to be installed later.

B. Interrelated Operating Equipment:
   1. Verify that characteristics of elements are compatible.
   2. Coordinate work of various sections having interdependent responsibilities for:
      a. Installation.
      b. Connection.
      c. Placing in service.

C. Space Coordination Between the Trades:
   1. General:
      a. Coordinate the layout and space requirements of all trades including but not limited to:
         1) Electrical distribution system.
         2) Communication network.
         3) Process piping.
   2. Drawings:
      a. The Drawings of the following system are diagrammatic and not to scale. Each trade shall use required offsets, bends, and special connections, which are not necessarily indicated on the Drawings, but which are required for proper installation:
         1) Electrical distribution.
         2) Communication network.
         3) Process piping.
      b. Follow the routing diagrammatically indicated in the Drawings as closely as practical.
   3. Ceiling Space:
      a. Coordinate the sequence and exact routing of all components installed above the ceiling or at a clearance point.
      b. Take into consideration sloping requirements of continuous runs of systems.
   4. Space Utilization and Accessibility:
      a. Utilize space efficiently to maximize accessibility for:
         1) Other systems.
         2) Maintenance.
         3) Repairs.
   5. Layout: Layout systems parallel with lines of the building.
   6. Shop Drawings: Carefully review and revise the Shop Drawings from the various trades to ensure that space requirements for all systems are coordinated.
   7. Additional Payments: No additional payments will be made by Owner due to location adjustments of systems or installations of offsets, bends, and special connectors necessary for proper installation.

D. In finished areas, except as otherwise indicated:
   1. Conceal pipes, ducts and wiring in the construction.
   2. Coordinate locations of fixtures and outlets with finish elements.

E. WTP Coordination:
   1. Coordinate scheduling and work with other construction projects at the WTP.
   2. Coordinate scheduling and work with work to be completed by Owner.

1.4 ACCEPTANCE OF CONDITIONS

A. Inspection:
   1. Prior to performing any work under a section:
      a. Carefully inspect the installed work.
      b. Verify that all such work is complete to the point where the work under that Section may properly commence.
      c. Starting of work indicates acceptance of the condition of components to which the work will be applied.
   2. Verify that all materials, equipment and Products to be installed under a Section may be installed in strict accordance with the original design and reviewed Shop Drawings.

B. Discrepancies:
   1. Resolve all discrepancies and conflicts between the trades.
   2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.5 SLEEVES AND INSERTS

A. Function: For pipes, conduits and similar items in forms, walls, partitions and floors.

B. Trades: Furnish required sleeves and inserts.

C. Place sleeve and inserts in ample time so as to not delay work.

D. Except as approved by Engineer, do not place sleeves vertically through:
   1. Beams.
   2. Girders.
   3. Similar construction.

E. Maintain in proper position during subsequent work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 31 13

SECTION 01 31 19 – PROJECT MEETINGS

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.

1.2 SUMMARY

A. This Section includes scheduling and administering of preconstruction and progress meetings.

B. Scheduling and Administration of Meetings:
   1. Responsibility:
      a. Preconstruction Meeting: Engineer.
      b. Progress Meetings: Contractor.
   2. Procedures:
      a. Prepare agenda.
      b. Distribute written notice and agendas of meetings 4 days in advance of the meeting date.
      c. Make physical arrangements for the meetings.
      d. Preside at meetings.
      e. Record minutes and include significant proceedings and decisions.
      f. Distribute copies of the minutes within 4 days after meetings to:
         1) Participants.
         2) Others affected by proceedings.

1.3 PRECONSTRUCTION MEETING

A. Schedule: Preconstruction meeting will be scheduled by Engineer:
   1. Within 20 days after the Effective Date of Agreement.
   2. Before starting the Work at the Site.

B. Attendance: Representatives of the following parties are to be in attendance at the meeting:
   1. Owner.
   2. Engineer.
   3. Contractor.
   4. Major Subcontractors.
   5. Governmental or regulatory agencies when appropriate.

1.4 PROGRESS MEETINGS

A. Types of Progress Meetings:
   1. Regular.
   2. Called.

B. Schedule meetings as follows unless otherwise approved by Engineer:
   1. Regular: Monthly.
   2. Called: As the progress of the Work dictates.
   3. Preinstallation: At least 5 working days prior to start of installation.

C. Location: Hold meetings at the City of Ann Arbor WTP or as indicated in the notice.

D. Attendance: Representatives of the following parties are to be in attendance at the meeting:
   1. Engineer.
   2. Contractor.
   3. Major Subcontractors as pertinent to the agenda.
   4. Owner's representative as appropriate.
   5. Governmental or other regulatory agencies as appropriate.

E. Minimum Agenda: The minimum agenda for progress meetings shall consist of the following:
   1. Review and approve minutes of previous meetings.
   2. Review progress of the Work since the previous meeting.
   3. Note field observations, problems and decisions.
   4. Identify problems which impede planned progress.
   5. Review offsite fabrication problems.
   6. Develop corrective measures and procedures to regain plan schedule.
   7. Revise construction schedule as indicated.
   8. Review submittal schedules; expedite as required to maintain schedule.
   9. Maintenance of quality and work standards.
   10. Review changes proposed by Owner for their effect on the construction schedule and completion date.
   11. Identify all claims and potential claims.
   12. Pending changes and substitutions.
   13. Complete other current business.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 31 19

SECTION 01 32 16 – CONSTRUCTION PROGRESS SCHEDULE

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.

1.2 SUMMARY

A. This Section includes the preparation, furnishing, distribution and periodic revision of construction progress schedules.

PART 2 - PRODUCTS

2.1 FORM OF SCHEDULE

A. Preparation:
   1. Prepare in the form of a horizontal bar chart, CPM network, or other form as previously approved by Engineer.
   2. Provide a separate horizontal bar column or path for each trade or operation.
   3. Prepare the schedule in the chronological order of the beginning of each item of work.
   4. Identify each column or path by:
      a. Major Specification Section number.
      b. Distinct graphic delineation.
   5. Use a horizontal time scale and identify the first work day of each week.
   6. Allow space for updating.

B. Size: The schedule sheets shall be 11 inches x 17 inches unless otherwise approved by Engineer.

2.2 CONTENT OF SCHEDULES

A. Construction Sequence:
   1. Provide a complete sequence of construction by activity and Milestones.
   2. For Shop Drawings, project data and Samples indicate the following:
      a. Submittal dates.
      b. Dates review copies will be required.
   3. Show decision dates for selection of finishes.
   4. Show Product procurement and delivery dates.
   5. Show dates for beginning and completion of each element of construction.

B. Percentage Completion: Show the projected percentage of completion for each item of work as of the first day of each month.

C. Subschedules:
   1. Provide separate subschedules showing submittals, review times, procurement schedules and delivery days.
   2. Provide subschedules to define critical portions of the entire schedule.

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Preliminary Schedule:
   1. Submit the preliminary schedule within 10 days after the Effective Date of Agreement.
   2. Engineer will review schedules and will return the reviewed copy within 15 days after receipt.
   3. If required, resubmit within 7 days after receipt of a returned review copy.
   4. Meet with Engineer at least 10 days prior to the submission of the first Application for Payment to review the schedule.

B. Periodic Adjustment: Monthly, submit a revised schedule accurately depicting adjustments and progress to the first day of each month.

C. Number of Copies: Submit the number of copies required by Contractor, plus 4 copies to be retained by Engineer.

3.2 DISTRIBUTION

A. Reviewed Schedules: Distribute copies of the reviewed schedules to the following:
   1. Job Site file.
   2. Subcontractors.
   3. Other concerned parties.

B. Instructions to Recipients: Instruct recipients to report all inability to comply with the schedule, and provide detailed explanations with suggested remedies.

3.3 ADJUSTMENT OF PROGRESS SCHEDULE

A. Changes: Show all changes occurring since previous submission of the schedule.

B. Progress: Indicate progress of each activity and show completion dates.

C. Other Items:
   1. Include major changes in scope.
   2. Include activities modified since previous updating.
   3. Include revised projections due to changes.
   4. Include other identifiable changes.

D. Narrative Report: Provide a narrative report including:
   1. A discussion of problem areas including current and anticipated delay factors and their impact.
   2. Direct action taken, or proposed, and its effect.
   3. A description of revisions including:
      a. Their effect on the schedule due to change of scope.
      b. Revisions in duration of activities.
      c. Other changes that may affect the schedule.
   4. The status of completion of Milestones.

END OF SECTION 01 32 16

SECTION 01 33 00 – SUBMITTAL PROCEDURES

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.

1.2 SUMMARY

A. This Section includes procedures for the submittal of Shop Drawings, Product Data, Samples, Operation and Maintenance Manuals, and other information.

B. Related Sections include pertinent Sections of these Specifications for the individual Submittals required.

1.3 DEFINITIONS

A. Submittal: Information sent by Contractor to convey information about systems, equipment, materials, products, and administrative matters for the Work.

B. Resubmittal: Submittal sent for review a second or further time.

C. Product Data: Illustrations, standard schedules, diagrams, performance charts, instructions, brochures, or manufacturer's literature that describe the physical size, appearance, and other characteristics of materials or equipment for a portion of the Work.

D. Shop Drawings: Drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

E. Action Submittals: Submittals that require Engineer's response.

F. Informational Submittals: Submittals that do not require Engineer's response.

G. 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. All PDF files shall be searchable.

1.4 SUBMITTAL PROCEDURES

A. Submittal Schedule:
   1. Prepare and submit a Submittal schedule that identifies the following for each Submittal:
      a. Submittal number
      b. Submittal description
      c. Projected date Submittal will be submitted.
   2. An electronic copy (MS Excel file) of a blank Submittal schedule, in the preferred format, will be furnished by Engineer at the preconstruction meeting.
   3. Submittal Numbers:
      a. Use the applicable Specification Section number followed by a decimal point and then a sequential number (e.g., 06 10 00.1). Where a Submittal is required via a Drawing (instead of a Specification Section), use the applicable Drawing Number followed by a decimal point and then a sequential number (e.g., M501.1.1).
      b. Resubmittals shall include a letter suffix after another decimal point (e.g., 06 10 00.1.A).
      c. Include the Specification Title (e.g. Rough Carpentry) in the Submittal name.
      d. Submittals that are not numbered and titled correctly may be rejected.

B. Delivery Method:
   1. Web-Based Collaboration and Document Sharing System:
      a. A web-based collaboration and document sharing system may be utilized at Contractor's, Owner's, or Engineer's option.
      b. Use of such a system will be discussed during the preconstruction meeting.
      c. All parties must agree on use of a web-based collaboration and document sharing system.
      d. Training and licensing will be provided for all parties by the party suggesting use of a web-based collaboration and document sharing system.
   2. Where a web-based collaboration and document sharing system is not utilized, Submittals may be delivered as paper copies or electronic files at Contractor's option; except for Operation and Maintenance Manuals, which shall be delivered as specified herein.
   3. Advise Engineer and Owner of delivery method to be used at the preconstruction meeting.
   4. Where Submittals include information that is intended to be printed on sheets larger than 11 inches x 17 inches, or where scale or drawing size are critical for proper review, submit 2 paper copies for review.
   5. Paper Copies:
      a. Unless indicated otherwise, submit 2 copies of each Submittal.
      b. One copy of each Action Submittal will be returned to Contractor.
      c. Extra copies submitted by Contractor will be discarded.
   6. Electronic Files:
      a. Unless indicated otherwise, submit 1 copy of each Submittal in PDF format.
      b. Scanned Submittals shall be produced in such a way as to not compromise the graphic quality or accuracy of scale, where applicable; and text shall be searchable.
      c. One copy of each Action Submittal will be returned to Contractor.
      d. Transmit Submittals via electronic mail (e-mail) or web-based collaboration and document sharing system, where used. Submittals that are transmitted electronically will be returned electronically.
   7. Transmit Submittals to party and address identified by Engineer at preconstruction meeting.

C. Coordination and Timing: Coordinate preparation and processing of Submittals with performance of construction activities. Contractor is responsible for cost of delays caused by lack of coordination or tardiness of Submittals. Incomplete Submittals will be rejected.
   1. Coordinate each Submittal with fabrication, purchasing, testing, delivery, other Submittals, and related activities that require sequential activity.
   2. 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.

D. Processing Time: Allow 15 full working days for Engineer to review each Submittal, including Resubmittals. Time for review shall commence on Engineer'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. Engineer will advise Contractor when a Submittal being processed must be delayed for coordination.

E. Identification: Place a permanent label on each Submittal or generate a separate cover sheet.
   1. Indicate name of firm or entity that prepared Submittal.
   2. Provide space to record Contractor's review and approval markings and action taken by Engineer.
   3. Include the following information:
      a. Project name.
      b. Date.
      c. Name and address of Engineer.
      d. Name and address of Contractor.
      e. Name and address of Subcontractor(s).
      f. Name and address of Supplier(s).
      g. Name of Manufacturer.
      h. Submittal number, including revision identifier.
      i. Drawing number and detail references, as applicable.
      j. Location(s) where product is to be installed, as applicable.
      k. Other necessary identification.

F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on Submittals. Submittals that include deviations that are not identified may be rejected. Engineer may or may not consider deviations. Deviations are not substitutions. Refer to Division 01 Section “Product Substitution Procedures” for procedures regarding requests for substitutions.

G. Transmittal: Package each Submittal individually and appropriately for transmittal and handling. Transmit each Submittal using a transmittal form. Engineer will reject Submittal(s) received from sources other than Contractor.

H. Resubmittals: Make Resubmittals in same form and number of copies as initial Submittal.
1. Note date and content of previous Submittal.
2. Clearly identify additions and revisions.
3. Resubmit Submittals until they are marked, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

I. Distribution: Furnish copies of Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted,” to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.

J. Use for Construction: Unless otherwise indicated by Engineer, use only Submittals with mark indicating, “Reviewed, No Exceptions Noted” or “Reviewed With Corrections Noted.”

1.5 CONTRACTOR'S USE OF ENGINEER’S ELECTRONIC DRAWING FILES

A. At Contractor's written request, copies of Engineer’s electronic Drawing files may be provided to Contractor for Contractor's use in connection with Project, including Submittal preparation. Electronic files may be furnished by Engineer for the convenience of the Contractor. Conclusions or information obtained or derived from such electronic files will be at the Contractor’s sole risk. Materials furnished by Engineer that may be relied upon are limited to printed Contract Documents.

B. When Contractor uses Engineer’s electronic Drawing files to facilitate Submittal preparation, prepare Submittals to be project specific. Submittals that are not project specific, including Engineer’s Drawing files submitted on a new title block, will be rejected.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit project specific Action Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. 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 printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each Submittal to indicate which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Color charts as required by individual Specification Sections.
   e. Manufacturer's catalog cuts.
   f. Wiring diagrams showing factory-installed wiring.
   g. Printed performance curves.
   h. Operational range diagrams.
   i. Mill reports.

j. Standard product operation and maintenance manuals.
k. Compliance with specified referenced standards.
l. Testing by recognized testing agency.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Maintain copy of returned Submittal for Project records.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale where appropriate. Scale shall be sufficiently large to indicate pertinent features of the item and its method of connection to the Work.
1. Preparation: Fully illustrate requirements of the Contract Documents. Include the following information, as applicable:
a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Colors and materials as applicable.
e. Roughing-in and setting diagrams.
f. Wiring diagrams showing field-installed wiring, including power, signal, control, and communication wiring. Differentiate between Manufacturer-installed and field-installed wiring.
g. Manufacturing instructions.
h. Templates and patterns.
i. Schedules.
j. Calculations.
k. Compliance with specified standards.
l. Notation of coordination requirements.
m. Notation of dimensions established by field measurement.
n. Relationship to adjoining construction clearly indicated.
2. Sheet Size: Submit Shop Drawings on sheets at least 8-1/2 inches x 11 inches but no larger than 24 inches x 36 inches.
3. Maintain copy of returned Submittal for Project records.

D. Operation and Maintenance Manuals:
1. General:
a. Where manuals are required to be submitted covering items included in the Work, prepare such manuals in durable plastic binders approximately 8-1/2 inches x 11 inches in size and with at least the following:
1) Identification on, or readable through, the front cover stating general nature of the manual.
2) Include a table of contents or index with each Submittal, near the front of the manual. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.
3) Complete instructions regarding operation and maintenance of equipment involved, including:
a) Equipment function, normal operating characteristics, and limiting conditions.
b) Assembly, installation, alignment, adjustment, and checking instructions.
c) Operating instructions for start-up, routine and normal operating, regulation and control, shutdown, and emergency conditions.
d) Maintenance instructions, including lubrication requirements where applicable.
e) Guide to "troubleshooting".
f) Parts lists and predicted life of parts subject to wear.
g) Project specific outline and cross sections, assembly drawings, engineering data, and wiring diagrams. Wiring diagrams shall reflect final, as-installed conditions and include wire numbers.
h) Test data and performance curves.
4) Complete nomenclature of all replaceable parts, their part numbers, current costs, and name and address of nearest vendor of parts.
5) Copies of guarantees and warranties issued.
6) Copies of the reviewed Submittals.
7) Copies of data concerning changes made during construction.

2. Extraneous Data: Where contents of the manuals include Manufacturer's catalog pages, clearly indicate the precise items included in this installation and delete all Manufacturers' data with which this installation is not concerned. Do not use highlighting that would not be reproducible.
3. Number of Copies Required: Unless otherwise specifically directed by Engineer, or stipulated in the pertinent Section of these Specifications:
   a. For review, submit 1 paper and 1 electronic copy.
   b. For record, deliver 4 paper and 1 electronic copies to Engineer.
4. Schedule delivery of record copies of operation and maintenance manuals at least 14 days prior to startup of respective equipment, unless otherwise specified.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections. Do not use highlighting that would not be reproducible. Include a table of contents or index with each Submittal. As part of electronic submittals, the table of contents or index shall include electronic bookmarks to the first page of the respective Section(s) identified.

B. Certificates and Certifications: Provide a notarized 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. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects/engineers and owners, and other information specified.

D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

E. Installer Certificates: Prepare 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 Project.

F. Manufacturer Certificates: Prepare written statements on Manufacturer's letterhead certifying that Manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

G. Product Certificates: Prepare written statements on Manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

H. Material Certificates: Prepare written statements on Manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

I. Material Test Reports: Prepare 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.

J. Product Test Reports: Prepare written reports indicating 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.

K. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.

4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

L. Preconstruction Test Reports: Prepare 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.

M. Compatibility Test Reports: Prepare 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.

N. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

O. Manufacturer's Instructions: Prepare written or published information that documents Manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of Manufacturer. Include the following, as applicable:
1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

P. Manufacturer's Field Reports: Prepare written information documenting tests and inspections of factory-authorized service representative. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement of substrate condition and acceptability of substrate for installation or application of product.
3. Statement that products at Site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Document settings in writing.
8. Other required items indicated in individual Specification Sections.

Q. Safety Data Sheets (SDSs): Submit information directly to Owner; do not submit to Engineer.
1. Engineer will not review Submittals that include SDSs and will return the entire Submittal for Resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each Submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Verify field dimensions and conditions; note corrections as necessary. Mark with approval stamp before submitting to Engineer.
1. Approval Stamp: Stamp each Submittal with an approval stamp. Use the same stamp format for each Submittal. 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.

B. Submittals that are not approved and stamped by Contractor will be rejected.

3.2 ENGINEER'S REVIEW

A. Action Submittals: Engineer will review Action Submittals, make marks to indicate corrections or modifications required, and return Submittal. Engineer will stamp each Submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
   1. Reviewed, No Exceptions Noted: Submittal appears to conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   2. Reviewed With Corrections Noted: Upon incorporation of review comments, it appears that Submittal will conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   3. Revise and Resubmit: Submittal has one or more specific segments that are incomplete, do not appear to conform to the information given in the Contract Documents, or are incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Except as noted, Contractor shall not proceed with Work related to Submittal.
   4. Rejected, Resubmit: Submittal as a whole is incomplete, does not appear to conform to the information given in the Contract Documents, or is incompatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Contractor shall resubmit information for review to demonstrate understanding of comments and portions of Work to be provided. Contractor shall not proceed with Work related to Submittal.

B. Informational Submittals: Other Submittals required by the Contract Documents are for information only. Engineer will acknowledge receipt of Informational Submittals. Such Submittals include, but are not limited to:
   1. Qualifications Data.
   2. Certificates.
   3. Test Reports.
   4. Manufacturer's Instructions.
   5. Maintenance Data.
   6. Field Reports.

C. Delegated-Design Submittals: Review of Delegated-Design Submittals by Engineer shall not relieve Contractor of Contractor's sole responsibility for design and achieving specified performance.

D. Submittals not required by the Contract Documents will be returned without being reviewed.

E. Partial Submittals are not acceptable, will be considered non-responsive, and will be rejected.

END OF SECTION 01 33 00

SECTION 01 42 00 – REFERENCES

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.

1.2 SUMMARY

A. This Section includes provisions for references throughout the Contract Documents.

1.3 DEFINITIONS

A. Abbreviations:
1. ACI - American Concrete Institute, 38800 Country Club Dr., Farmington Hills, MI 48331.
2. AISC - American Institute of Steel Construction, Inc., One East Wacker Dr., Suite 700, Chicago, IL 60601-1802.
3. ANSI - American National Standards Institute, 25 West 43rd St., 4th Floor, New York, NY 10036.
4. ASTM - American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.
5. AWS - American Welding Society, Inc., 550 N.W. LeJeune Road, Miami, FL 33126.
6. AWWA - American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.
7. CRSI - Concrete Reinforcing Steel Institute, 933 Plum Grove Road, Schaumburg, IL 60173-4758.
8. EGLE - Michigan Department of Environment, Great Lakes and Energy, 525 West Allegan Street, P.O. Box 30473, Lansing, MI 48909-7973.
9. MDCH - Michigan Department of Community Health, 201 Townsend Street, Lansing, MI 48913.
10. MIOSHA - Michigan Department of Licensing and Regulatory Affairs, Michigan Occupational and Health Administration, State Secondary Complex, 7150 Harris Drive, P.O. Box 30643, Lansing, MI 48909-8143.
11. NSF – National Sanitation Foundation International; 789 N. Dixboro Road, Ann Arbor, MI 48105.

1.4 REFERENCES

A. The provisions of the Contract Documents shall govern over any conflicting provisions of the referenced documents.

B. The provisions of laws and regulations shall govern over any conflicting provisions of the referenced documents.

C. Comply with the referenced document that is in effect as of the Bid date, except when a specific date is specified.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 42 00

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of construction facilities as follows:
   1. Temporary Utilities: Water, electricity.
   2. Contractor's field offices.
   3. Sanitary facilities.
   4. Enclosures such as tarpaulins, barricades, and canopies.
   5. Storage areas.

1.3 STORAGE AREAS

A. Locations:
   1. The following general areas are available for storage:
      a. Areas indicated on Drawings around Water Treatment Plant.
   2. Specific storage locations within the general areas:
      a. Carefully coordinate with Owner.
      b. Subject to approval of Owner.
   3. Contractor shall not block access to the thickeners, treatment basins, or other areas designated by the Owner.

B. Protection and Restoration:
   1. Replace grass and other vegetation disturbed or damaged in the storage areas.
   2. Take reasonable means to prevent spillage of fuel, oil, chemicals and similar materials.
   3. Clean up spills and, if necessary, remove soil and replace with uncontaminated soil so as to allow vegetation to be quickly reestablished.

C. Cleaning: Keep storage areas clean in accordance with Division 01 Section “Cleaning and Waste Management.”

D. Storage: Maintain in accordance with Division 01 Section “Product Storage and Handling Requirements.”

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
   1. New or used.
   2. Adequate in capacity for the required usage.
   3. Provide safe conditions.
   4. Comply with requirements of applicable codes and standards.

2.2 UTILITIES

A. Temporary Utilities:
   1. Equipment Testing:
      a. Pay utility charges for all power, water, and other utilities.
      b. Furnish, install, remove, and pay for associated temporary equipment, piping, pumps, fuel, power distribution, and connections.
   2. Water: Provided by Owner
   3. Electricity: Provided by Contractor.

2.3 FIELD OFFICES

A. Contractor's Field Office:
   1. Contractor's field office shall have at least 1 outside door.
   2. Pay for all heat, electricity and telephone charges.

2.4 SANITARY FACILITIES

A. Furnish and install required sanitary facilities, including temporary toilet buildings with sanitary toilets and hand washing facilities or hand sanitizing stations, for use of workers; comply with minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

2.5 OTHER TEMPORARY CONSTRUCTION FACILITIES

A. Furnish, install, and maintain all other temporary construction facilities necessary for proper completion of the Work.

PART 3 - EXECUTION

3.1 GENERAL

A. Comply with applicable requirements specified in: Local Building Code.

B. Maintain and operate systems to ensure continuous service.

C. Modify and extend systems as Work progress requires.

3.2 TEMPORARY CONTROLS

A. Traffic Control:
   1. Provide adequate barricades and take all necessary precautions for the protection of the Work, and the safety of the WTP staff.
   2. Maintain access for all WTP operations, deliveries, and normal activity for the duration of the Work.

3.3 REMOVAL

A. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit.

END OF SECTION 01 50 00

SECTION 01 74 26 – DISINFECTION OF DRINKING WATER FACILITIES

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.

1.2 SUMMARY

A. This Section includes disinfection of drinking water facilities.

B. Disinfection of Other Components:
   1. Procedures for the disinfection of individual piping systems or of certain project components may be specified elsewhere in these specifications.
   2. Coordinate the work of this Section with the disinfection requirements specified elsewhere.

1.3 DELIVERY

A. Pipes:
   1. Clean inside when delivered to Site.
   2. Stored in a manner to maintain the interior of pipe in clean condition.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 BUILDING PIPES

A. Disinfection: In accordance with Division 40 Section “Process Piping Systems.”

3.2 TREATMENT FACILITIES

A. Cleaning:
   1. Remove debris from completed facilities which will be in contact with potable drinking water.
   2. Thoroughly clean interior walls of facilities which will contact potable drinking water of all dirt, grease, and other contaminants.

B. Disinfection and Sampling:
   1. In Accordance with AWWA C651 and C652.
   2. Thoroughly flush unit or facility until chlorine residual is at background level of water source used for flushing.
   3. Coordinate with City to sample and perform bacteriological analyses.
   4. Collect duplicate samples from the vessel being disinfected not less than 30 minutes apart.
   5. Place unit or facility in service upon receipt of satisfactory test results.

END OF SECTION 01 74 26

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the instructions for and the responsibilities of each party in contract closeout.

B. Related Section includes Certificate of Substantial Completion.

1.3 SUBSTANTIAL COMPLETION

A. Contractor: When Contractor considers that the Work or any portion of the Work is ready for its intended use, Contractor shall submit:
   1. Written certification to Engineer and Owner that the Work, or designated portion of the Work, is substantially complete.
   2. A list of major items to be completed or corrected.
   3. Request that Engineer issue a certificate of Substantial Completion.

B. Engineer's Inspection: Engineer will make an inspection:
   1. Within 10 days after receipt of certification.
   2. Together with Owner and Contractor.

C. Engineer's Determination of Substantial Completion:
   1. Should Engineer consider the Work or designated portion of the Work substantially complete, the following steps shall be taken:
      a. Contractor shall prepare and submit to Engineer, a list of items to be completed or corrected as determined by the inspection.
      b. Engineer will prepare and deliver to Owner:
         1) A tentative certificate of Substantial Completion.
         2) A tentative list of items to be completed or corrected before final payment.
      c. Owner shall have 7 days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list.
      d. Engineer will, within 14 days after delivery of tentative certificate to Owner, decide:
         1) Not Substantially Complete: Engineer will issue written notice to Contractor stating reasons.
         2) Substantially Complete: Engineer will issue definitive certificate of Substantial Completion and a revised list of items to be corrected or completed.
   2. Should Engineer consider that the Work or designated portion of the Work is not substantially complete, the following steps shall be taken:
      a. Engineer shall notify Contractor in writing stating Engineer's reasons.
      b. Contractor shall complete the Work and send a second written notice to Engineer certifying that the Project, or designated portion of the Project, is substantially complete.
      c. Engineer and Owner will reinspect the Work.

D. Division of Responsibilities:
   1. Engineer:
      a. At the time of delivery of tentative certificate of Substantial Completion.
      b. Deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment with respect to:
         1) Security.
         2) Operation.
         3) Safety.
         4) Protection of the Work.
         5) Maintenance.

6) Heat.
7) Utilities.
8) Insurance.
9) Warranties.

2. Engineer's written recommendation on division of responsibilities shall be binding on Owner and Contractor until final payment unless Owner and Contractor agree otherwise in writing and so notify Engineer prior to Engineer's issuance of a definitive certificate of Substantial Completion.

1.4 FINAL INSPECTION

A. Contractor Certification: Prior to final inspection, Contractor shall submit written certification that:
1. The Contract Documents have been reviewed.
2. The Project has been inspected in compliance with the Contract Documents.
3. Work has been completed in accordance with the Contract Documents.
4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. The Project is complete and ready for final inspection.

B. Engineer's Inspection: The Engineer will make final inspection:
1. Within 10 days after receipt of certification.
2. Together with Owner and Contractor.

C. Engineer's Determination of Final Completion:
1. Should Engineer consider the Work complete and ready for final payment in accordance with the requirements of the Contract Documents, Engineer shall request Contractor to make Project closeout submittals.
2. Should Engineer consider the Work not complete and ready for final payment:
a. Engineer shall notify Contractor in writing stating the reasons.
b. Contractor:
1) Take immediate steps to remedy the stated deficiencies.
2) Send a second written notice to Engineer certifying that the Work is complete.
c. Engineer and Owner will reinspect the Work.

1.5 REINSPECTION COSTS

A. Should Engineer be required to perform second inspections because of failure of the Work to comply with the original certifications of Contractor, Owner will compensate Engineer for additional services and deduct the amount paid from payment or payments to Contractor.

1.6 ADDITIONAL INSPECTION COSTS

A. Substantial Completion: Owner will compensate Engineer for inspection services rendered between the scheduled date of Substantial Completion and the actual date of Substantial Completion and deduct the amounts paid from payment or payments to Contractor.

B. Final Completion: Owner will compensate Engineer for inspection services rendered between the scheduled date of final completion and the actual date of final completion and deduct the amounts paid from payment or payments to Contractor.

1.7 CLOSEOUT SUBMITTALS

A. Contractor:
1. Provide closeout submittals as required in the Contract Documents.
2. These submittals shall include, but not necessarily be limited to:
a. Project record documents.
b. Operation and maintenance manuals.
c. Guarantees.
d. Spare parts and maintenance materials.
e. Instruction in operation of all systems.

1.8 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Affidavits:
   1. Submit with final Application for Payment an affidavit of payment of debts and release of claims.
   2. Affidavit shall include:
      a. Contractor's release or waiver of lien.
      b. Consent of surety of final payment.

B. Execution: All submittals shall be duly executed before delivery to Engineer.

1.9 FINAL ADJUSTMENT OF ACCOUNTS

A. Final Statement: Submit a final statement of accounting, which reflects all adjustments, to Engineer. This statement shall contain the following:
   1. Original Contract Price.
   2. Additions and deductions.
   3. Total Contract Price as adjusted.
   4. Previous payments.
   5. Sum remaining due.

B. Final Change Order: Engineer will prepare a final Change Order reflecting approved adjustments to the Contract Price not previously made by Change Orders.

1.10 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit a final Application for Payment in accordance with the requirements of the Contract Documents.

B. Disposition of Final Application for Payment:
   1. If the final Application for Payment and the Work are acceptable in accordance with the Contract Documents:
      a. Engineer will, within 10 days after receipt of the Application for Payment:
         1) Submit to Owner a written recommendation for payment.
         2) Submit to Owner and Contractor a written notice that the Work is acceptable subject to the provisions of the General Conditions.
      b. Owner will, within 30 days after receipt of the Application for Payment and Engineer's recommendation in accordance with the Contract Documents, pay to Contractor the amount recommended.
   2. If the Application for Payment, the Work or both are unacceptable:
      a. Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment.
      b. Contractor shall make the necessary corrections and resubmit the Application for Payment.
   3. Final Completion Delayed:
      a. Upon receipt of Contractor’s final Application for Payment and recommendation by Engineer, Owner shall make payment of the balance due for that portion of the Work fully completed and accepted if Engineer confirms that final completion of the Work is significantly delayed through no fault of Contractor.
      b. Payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
      c. Contractor shall submit with the Application for Payment written consent of surety if the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 77 00

SECTION 01 78 39 – PROJECT RECORD DOCUMENTS

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.

1.2 SUMMARY

A. This Section includes procedures for the maintenance, recording and submittal of Project record documents.

1.3 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Storage:
   1. Store documents and Samples in Contractor's field office apart from documents used for construction.
   2. Provide files and racks for storage of documents.
   3. Provide locked cabinet or secure storage space for storage of Samples.

B. Filing: File record documents in accordance with CSI Masterformat.

C. Maintenance:
   1. Maintain documents in a clean, dry, legible condition and in good order.
   2. Do not use record documents for construction purposes.

D. Availability: Make documents and Samples available at all times for inspection by Engineer.

1.4 RECORDING

A. Labeling: Label each document "PROJECT RECORD" in neat large printed letters.

B. Recording:
   1. Record actual revisions to the Work.
   2. Record information concurrently with construction progress.
   3. Do not conceal any work until required information is recorded.

C. Drawings:
   1. Legibly mark, with notes or graphic representations, to record actual construction.
      a. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
      b. Field changes of dimension and detail.
      c. Changes made by Field Order, Work Change Directive or Change Order.
      d. Details not on original Contract Drawings.
   2. After Engineer's review of the record drawings, transfer all marks to a set of electronic documents provided by Engineer.

1.5 SUBMITTAL

A. Delivery:
   1. At Contract closeout, deliver record documents to Engineer for Owner.
   2. Submit only Contract Documents marked up. Three dimensional models, shop drawings, or other representations of the Project created by the Contractor from the Contract Documents will not be accepted.

B. Transmittal Letter:
   1. Accompany submittal with transmittal letter in duplicate, containing:
      a. Date.
      b. Project title and number.
      c. Contractor's name and address.
      d. Title and number of each Record Document.
      e. Signature of Contractor or their authorized representative.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 78 39

SECTION 02 22 26 – PRECONSTRUCTION AUDIO-VISUAL DOCUMENTATION

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.

1.2 SUMMARY

A. This Section includes the furnishing of all labor, materials and equipment necessary for a complete color audio-video record of the existing surface features for the entire project to accurately document the pre-construction conditions within the proposed construction's zone of influence.

1.3 SUBMITTALS

A. Qualifications: Submit such information as requested by the Engineer to determine the ability to produce professional video in accordance with industry standards and these specifications.

1.4 QUALITY ASSURANCE

A. Audio-video documentation shall be by a responsible commercial firm regularly engaged in color audio-video construction documentation.

B. Owner reserves the right to reject any audio-video documentation not conforming to these Specifications. Such rejected documentation shall be redone at no additional cost to Owner.

1.5 PRODUCT DELIVERY

A. Deliver to Owner through Engineer premium quality DVD’s or Video CD’s with recorded documentation upon completion of the project or upon completion of segments, if requested.

B. DVD’s shall be compatible with playback on any Region I American TV standard DVD Player.

1.6 SEQUENCING AND SCHEDULING

A. Attend a meeting with Engineer to outline the coverage expected for the project, prior to the start of the video documentation.

PART 2 - PRODUCTS

2.1 Delivered product shall include all digital audio-video discs, disc storage cases, disc index labels, and runsheet logs.

A. Video to be mastered on high quality formats only:
1. CD
2. DVD
3. Flash Drive
4. Portable hard drive

B. High quality camcorders to be used:
1. With 1/4-inch, 1/3-inch or 1/2-inch charged coupled device imaging systems.
2. With optical stabilization; electronic stabilization is not acceptable.
3. With 20x minimum optical magnification.
4. Capable of producing NTSC 525 lines of resolution/60 fields/30 frames per second.
5. Capable of 3-luxillumination minimum.

C. Disc Index Labels:
   1. All discs shall be labeled with appropriate project information and be able to be cross referenced with runsheets.
   2. Label information to include:
      a. DVD/Video CD number.
      b. Project title.
      c. Location of project.
      d. Month and year of coverage.
      e. Set information, i.e., Engineer's set, Owner's set, Contractor's set.
      f. Quick reference list of contents of a particular DVD.

D. Runsheet Logs:
   1. Provide a runsheet log that accurately catalogs the contents of each video.
   2. Runsheet logs to include:
      a. Street name, easement or address.
      b. Sheet number or numbers relative to the line entry of a particular area of coverage.
      c. DVD/Video CD numbers.
      d. Real time code indexing for each segment of the project indicating hours minutes and seconds to cross reference with playback equipment to locate specific points of interest on the project.
      e. Direction of travel for each specific segment.
      f. Viewing side for each specific segment.
      g. Starting point for each specific segment.
      h. Ending point for each specific segment.
      i. Project information, i.e. project title, owner, date.

E. Vehicles used while performing documentation to be plainly marked with company name and telephone number with caution signs, flags and strobes to affect a safe and hazard free operation.

PART 3 - EXECUTION

3.1 RECORDING

A. General:
   1. Coverage:
      a. Recordings shall include coverage of all surface features located within the zone of influence of the proposed construction.
      b. The zone of influence is defined as the area within the road right-of-way, area within permanent and temporary easements and adjacent areas which may be affected by routine construction operations.
      c. The surface features include, but are not limited to, all roadways, pavements, curbs, driveways, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, and fences.
      d. Of particular concern shall be the existence or nonexistence of any faults, fractures, or defects.
      e. All recording shall be performed during times of good visibility.
      f. No recording shall take place when there is snow cover on the ground unless authorized by Engineer.
      g. The Engineer may designate areas to be omitted or added for audio-video documentation.
      h. Areas not accessible by conventional wheeled vehicles shall be accessed by walking or special conveyance.
   2. Time of Execution: Prior to placement of equipment and materials on the jobsite.
   3. Coverage Continuity:
      a. Accessible Areas: Coverage shall consist of a single, continuous, recording which begins at one end of a particular construction area and continues to the other end of that construction area.
      b. Non Accessible Areas (Across Easements, Etc.): Coverage shall consist of an organized, interrelated sequence of recordings at various positions along the proposed construction area.
   4. Video portion of the documentation shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection.

5. Audio Portion of the Documentation:
   a. Shall reproduce the commentary of the camera operator with proper volume, clarity, free from distortion and background noise.
   b. Assist in maintenance of viewer orientation and in identification, clarification, or objective description of the structures being shown in the video portion of the recording.
6. Video shall display through electronic means information germane to the current video display.
   a. Display continuously information as follows:
      1) Time and date of recording.
      2) Location of recording, i.e., street name, easement or address.
   b. When conventional wheeled vehicles are utilized, include engineering stationing to coincide with project plans, direction of travel and viewing side.
      1) The engineering stationing must be continuous and accurate and reflect the stationing within the field of view.
      2) The engineering stationing must coincide with stationing on project plans and utilize standard engineering symbols, i.e., 5+00.
      3) Global Positioning System satellites may be used with or in place of engineering stationing.
         a) Differential Global Positioning System is to be used where available, with updates 1/second at 5 meter or less spherical accuracy.
         b) Standard Global Positioning System accuracy is as dictated by the United States Department of Defense mandate.
         c) Global Positioning System display will be at 1 meter longitude and 1 meter latitude increments, i.e., 414N529 08317W302.

B. Procedural Requirements for Coverage Rates:
   1. The following table sets the maximum rate of travel for the following areas:

AREA	AVE RATE MAX
Work Areas	120 ft/min

   2. Camera Positioning and Techniques:
      a. Height and Stability: Camera to be mounted securely to produce steady viewing with lens not less than 8 feet above the ground of the area being viewed, or at a level to facilitate best perspective and line of site when using conventional wheeled vehicles.
      b. Control: All movements shall be at a rate that allows recorded objects to be viewed clearly during video playback.
      c. Viewer Orientation for Road Areas: Utilize overall establishing views and visual displays of all visible house and building addresses.
         1) Easement Areas: Highly visible yellow flags shall be used to clearly define proposed centerline of construction.
   3. Private Property:
      a. Contractor shall obtain permission of property owner before entering private property.
      b. If Contractor is refused entry to private property, Contractor shall notify Engineer and wait until permission is obtained before entering the property.

END OF SECTION 02 22 26

SECTION 02 41 19 – SELECTIVE DEMOLITION

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.

1.2 SUMMARY

A. This Section includes the modification, alteration, conversion, and renovation of existing structures:
   1. Be aware of the many incidental items which exist which must be demolished, relocated, or replaced in order to accomplish the remodeling work of trades.
   2. Include the price of such demolition, relocating, and replacement in the base Bid.
   3. These incidental items may or may not be indicated in the Contract Documents.
   4. Contractor and Subcontractors performing remodeling work are expected to be familiar with the unknown nature of existing utilities serving an area to be remodeled and shall calculate the base Bid to include the demolition, removal, relocation, and replacement of these utilities.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. American National Standards Institute: ANSI A10.6 - Safety Requirements for Demolition Operations.
   2. ASTM: D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort.
   3. EPA: Rule 406(b) of the Toxic Substances Control Act of 1992.
   4. NFPA: NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.4 DEFINITIONS

A. Terms:
   1. Abandon:
      a. Remove an item to the extent that it is not visible and does not interfere with new construction.
      b. Portions of the abandoned item may be left in place.
      c. No abandoned items shall be left below new footings.
   2. Demolish:
      a. Remove existing items from their present location in the Project area and haul to an area outside of the Project area.
      b. Remove utilities serving these items.
   3. Relocate:
      a. Move existing items from their present location to another location in the Project area.
      b. Extend utilities serving the present location to the new location.
   4. Remove:
      a. Except for items indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner’s property, demolished materials shall become Contractor’s property.
      b. Remove existing items from their present location in the Project area and haul to an area outside of the Project area.
      c. Remove utilities serving these items.
   5. Replace:
      a. Remove existing items from their present location in the Project area, haul them to an area outside of the Project area, and furnish and install new items in the same or another location.
      b. Extend utilities serving the present location to the new location.
   6. Reuse: Move existing items from their present location to another location in the Project area. Extend utilities serving the present location to the new location.

7. Historic Items:
    a. Historic items, relics, and similar object including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property.
    b. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 DIVISION OF WORK

A. Work: In accordance with the General Conditions, Contractor is responsible for dividing the Work among the Subcontractors and Suppliers and for delineating the work to be performed by specific trades. The following are suggestions as to how the Work may be divided. This is not a complete list of the work:
    1. Contractor:
        a. Cut and patch walls, floors, and ceilings to allow for recessed utilities and ductwork.
        b. Remove and reinstall existing suspended ceilings to allow for above ceiling construction.
        c. Replace damaged units.
        d. Install new ceilings as indicated on the Drawings.
        e. Place sleeves in new concrete structures.
        f. Patch roof at new penetration and curbs and where existing penetrations and curbs are removed.
        g. Furnish and install new structural steel where required for reinforcement at floor, wall, and roof openings.
        h. Install fire stop and smoke stop systems at penetrations for ratings indicated in accordance with local building codes.
    2. Mechanical, Electrical, and Fire Protection Subcontractors:
        a. Furnish sleeves for use in new concrete construction.
        b. Install fire stop and smoke stop systems at utility penetrations in accordance with local building codes.
        c. Furnish and install sleeves in gypsum board and masonry construction.
        d. Core drill existing concrete for new utilities and sleeves after obtaining Engineer's review of locations.
        e. Remove and reinstall existing fire protection heads to allow for ceiling removal and installation.
        f. Furnish new heads, piping, and connections as required for completion of the Work.
    3. Miscellaneous:
        a. Each trade shall be financially responsible for cutting and patching for sleeves, penetrations, and installation of isolated components as necessary for its work unless herein specifically stated to the contrary.
        b. On renovation projects, cut and patch walls, floors, and ceilings to allow for continuous runs of recessed utilities and ductwork.
        c. Patching shall be done by the trade whose work is damaged.
        d. Costs caused by defective or ill-timed work shall be borne by the party responsible.
        e. Each trade shall do fitting of its own work as required to make its several components fit together or to receive the work of other trades.

1.6 SUBMITTALS

A. Predemolition Audio-video:
    1. Submit showing existing conditions of construction to remain that could be misconstrued as damage caused by construction activities.
    2. Including building and Site, as well as interior and exterior finishes.
    3. Submit prior to commencing Work.

1.7 QUALITY ASSURANCE

A. Qualifications: Engage an experienced firm that has specialized in demolition work similar to material and extent indicated for this Project.

B. Regulatory Requirements:
   1. Comply with governing EPA notification regulations before beginning selective demolition.
   2. Comply with hauling and disposal regulations of authorities having jurisdiction.
   3. Comply with ANSI A10.6 and NFPA 241.
   4. Comply with 29 CFR 1926.62-(OSHA Paint Standard).

C. Pre-Demolition Conference:
   1. Conduct pre-demolition conference at Site in accordance with in Division 01 Section “Project Meetings.”
   2. Review methods and procedures related to selective demolition including, but not limited to, the following:
      a. Inspect and discuss condition of construction to be selectively demolished.
      b. Review structural load limitations of existing structure.
      c. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and to avoid delays.
      d. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.8 PROJECT CONDITIONS

A. Owner Occupancy:
   1. Owner will occupy portions of building immediately adjacent to selective demolition area.
   2. Conduct selective demolition so Owner’s operations will not be disrupted.
   3. Provide not less than 72 hours notice to Owner of activities that will affect Owner’s operations.

B. Access:
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
   2. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.

C. Conditions:
   1. Owner and Engineer assume no responsibility for condition of areas to be selectively demolished.
   2. Conditions existing at time of inspection for bidding purposes will be maintained by Owner as far as practicable.

D. Storage or sale of removed items or materials on Site will not be permitted.

E. Maintenance of Utilities: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

F. Unknown Hazardous Materials:
   1. It is not expected that hazardous materials will be encountered in the Work.
   2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer and Owner.
   3. Hazardous materials will be removed by Owner under a separate contract.

G. Lead Paint: Remove and remediate existing lead paint as required to comply with all codes and requirements while performing the requirements of the Work. Either remove lead paint completely or partially as required to achieve this.

1.9 WARRANTIES

A. Existing Warranties:
   1. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
   2. If possible, retain original installer or fabricator to patch exposed work that is damaged during selective demolition.
   3. If it is not possible to engage original installer or fabricator, engage another recognized, experienced, and specialized firm.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. Materials and workmanship shall conform to the requirements of other Sections of the Specifications.
2. Where no materials are specified in these specifications, use materials of an equivalent type, quality, and size to match those existing in other areas of the facility.
3. If none exist, use materials and workmanship recognized as of the highest quality in the industry.
4. Obtain Engineer's review of such material and workmanship.

B. Piping: Existing piping which is removed from its present location shall not be reused where new piping is required unless specifically noted on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled, and of items to be removed and salvaged.

D. Conflicts:
1. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict.
2. Promptly submit written report to Engineer.

E. Survey, or engage a competent person to survey condition of the building, in accordance with requirements of OSHA, to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during selective demolition operations.

F. Perform additional surveys as the work progresses to detect hazards resulting from operations to date.

3.2 UTILITY SERVICES

A. Maintain existing services indicated to remain and protect them against damage during selective demolition operations.

B. Interruptions:
1. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and other authorities having jurisdiction.
2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
3. Provide at least 72 hours notice to Owner if shutdown of service is required during changeover.

3.3 PREPARATION

A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

B. Site Access and Temporary Controls:
   1. Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   2. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and other authorities having jurisdiction.
   3. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
   4. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
   5. Protect existing Site improvements, appurtenances, and landscape features to remain.
   6. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line or groups of trees to remain.

C. Temporary Facilities:
   1. Protection:
      a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
      b. Provide protection to ensure safe passage of people around selective demolition area, and to and from occupied portion of building.
      c. Weather Protection:
         1) Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
         2) Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures.
         3) Coordinate enclosures with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
      d. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
      e. Cover and protect furniture, furnishings, and equipment that have not been removed.
   2. Enclosures:
      a. Provide temporary enclosures around areas to be recoated as required to isolate dust, fumes and odors from areas in use, to control temperature and humidity, and to protect surface to be coated from the weather.
      b. The enclosure shall be of such quality as to maintain optimal conditions for the work.
      c. The enclosure shall remain until the work is sufficiently cured.
   3. Heating Ventilation and Humidity Control:
      a. Ventilation is mandatory.
      b. Provide ventilation that exhausts fumes and odors to the exterior at a location where existing HVAC systems will not pick up these fumes and odors.
      c. Provide negative air pressure to temporary enclosure spaces without reducing air temperatures in those spaces.
      d. Ventilation is required during, but not limited to, demolition, surface preparation, application of coating systems, and the curing period for those systems.
      e. Provide additional equipment and fuel as required to condition the space for surface preparation, application of products, and curing of those products, in accordance with Manufacturer's requirements. This equipment may include, but is not limited to, heaters, dehumidifiers and fans for intake and exhaust air

3.4 POLLUTION CONTROLS

A. Dust Control:
   1. Use water mist, temporary closures, and other suitable methods to limit spread of dust and dirt.
   2. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
   3. Wet mop floors to eliminate trackable dirt and wipe down walls and doors of demolition enclosure.
   4. Vacuum carpeted areas.
   5. Comply with governing environmental protection regulations.

B. Disposal:
   1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   2. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

3.5 GENERAL

A. Demolish and remove existing construction only to the extent required by new construction and as indicated.

B. Methods:
   1. Use methods required to complete the work within limitations of governing regulations.
   2. Level by Level:
      a. Proceed with selective demolition systematically, from higher to lower level.
      b. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   3. Cutting Openings:
      a. Neatly cut openings and holes plumb, square, and true to dimensions required.
      b. Use cutting methods least likely to damage construction to remain or to adjoining construction.
      c. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
      d. Temporarily cover openings to remain.
   4. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   5. Flame Cutting:
      a. Do not use cutting torches until work area is cleared of flammable materials.
      b. At concealed spaces, such as duct and pipe chases, verify condition and contents of hidden space before starting flame-cutting operations.
      c. Maintain [fire watch and] portable fire suppression devices during flame-cutting operations.
      d. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials, and promptly and legally dispose of off Site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.
   10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

C. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, loading docks, building entries, and other building facilities during the selective demolition operations.

D. Removed and Salvaged Items:
   1. Items to be removed and salvaged include, but are not limited to:
      a. Flow meter heads.
      b. Loss of Head sensors and transmitters.
      c. Level sensors and transmitters.
      d. Valve actuator communication boards.
   2. Clean salvaged items.
   3. Pack or crate items after cleaning and identify contents of containers.
   4. Store items in a secure area until delivery to Owner.
   5. Transport items to Owner's storage area designated by Owner.
   6. Protect items from damage during transport and storage.

E. Removed and Reinstalled Items:
   1. Clean and repair items to functional condition adequate for intended reuse.
   2. Paint equipment to match new equipment.
   3. Pack or crate items after cleaning and repairing, and identify contents of containers.
   4. Protect items from damage during transport and storage.

5. Reinstall items in locations indicated.
6. Comply with requirements for new materials and equipment.
7. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

F. Existing Items to Remain:
1. Protect construction indicated to remain against damage and soiling during selective demolition.
2. When permitted by Engineer, items may be removed to a suitable, protected storage location and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 DEMOLITION

A. Structures:
1. Cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the Drawings, herein specified and necessary to permit completion of the Work.
2. Dispose of demolished materials in an approved manner.
3. Include necessary cutting, bending, and welding of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.
4. When removing materials or portions of existing structures, shore up, underpin, and protect adjacent structures.
5. Concrete:
   a. Demolish in small sections.
   b. Cut concrete to a depth of at least 3/4-inch at junctures with construction to remain, using a power driven saw.
   c. Dislodge concrete from reinforcement to remain at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated.
   d. Neatly trim openings to dimensions indicated.
6. Engineer's review of cutting: No existing structure, equipment or appurtenance shall be shifted, cut, removed or otherwise altered without obtaining review of Engineer.

B. Equipment:
1. Dismantle, remove, and relocate existing equipment, piping, and other appurtenances required for the completion of the Work.
2. Cut existing pipelines for the purpose of making connections thereto.
3. Cut off anchor bolts for equipment and structural steel indicated to be removed 1-inch below the concrete surface.
4. Patch remaining concrete surface to smooth even finish.
5. Remove air conditioning equipment without releasing refrigerants, if applicable.

C. Piping, Fire Protection, and Electrical Components:
1. When a new connection is made to an existing pipeline, install additional new piping, extending to and including the most convenient new valve.
2. Piping, conduit, and wiring indicated or required to be demolished shall be done so to the nearest reasonable connection outside of the Project area or as directed by Engineer.
3. Where necessary or required for the purpose of making connections, cut existing pipelines in a manner to provide an approved joint.
4. Weld beads, flanges, and provide Dresser couplings on existing and new piping.
5. Remove and reinstall existing fire protection heads to allow for new construction.
6. Comply with applicable fire protection codes.
7. Furnish new heads, piping, and connections as required for completion of the Work.
8. Remove junction boxes and electrical outlets which will no longer be in use.
9. At existing walls which are made thicker, extend piping and wiring to accommodate additional wall thickness.
10. Remove and reinstall fixtures and electrical outlets, switches, etc.

D. Floor Slabs:
   1. Where new utilities must be installed below the existing floor slab, saw cut the slab for at least 1-inch of depth.
   2. Break out the remaining depth with jack hammers or hand tools to provide a rough surface.
   3. Leave existing steel reinforcing so that it laps at least 6 inches into the new concrete slab over the trench.
   4. The exact width of the concrete removed shall depend upon the required depth and diameter of the new utility.
   5. Allow for sufficient working space in the trench.

E. Conceal Utilities: Recess new piping, conduit, and other utilities into floors, wires, and ceilings in finished areas.

F. Ownership of Salvaged Materials:
   1. Materials and equipment removed shall remain the property of Owner at Owner's option.
   2. Items not salvageable, as determined by Engineer and Owner, and items Owner elects not to keep shall become the property of Contractor to be properly disposed of off the Site.
   3. Salvaged equipment shall be thoroughly cleaned, lubricated, and greased for protection during prolonged storage.

G. Nonshrink Grout: Use nonshrink grout for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as indicated.

H. Protect Facility from Water Damage: Provide flumes, hoses, piping, suitable plugs, bulkheads, or other means to divert or hold back the flow of wastewater, water, or other liquids, as required for proper performance of the Work.

I. Blasting: Not permitted.

J. Sleeves:
   1. Subcontractors for mechanical, electrical, and other trades shall furnish sleeves and inserts for pipes, conduits, and similar items in forms, walls, partitions, and floors.
   2. Perform work in cooperation with Contractor.
   3. Place items in ample time so as not to delay operations.
   4. Do not place sleeves so they pass through beams, girders, and similar construction.

K. Firestopping and Smokestopping: Install firestop and smokestop systems at utility penetrations in accordance with local building codes.

L. Miscellaneous: At existing walls which are made thicker, reinstall fire extinguisher cabinets, clocks, thermostats, and other wall hung items in new wall to accommodate additional wall thickness.

3.7 PATCHING AND REFINISHING

A. Promptly repair damage to adjacent construction caused by selective demolition operations.

B. Patching:
   1. Patch and repair existing surfaces from which items have been removed leaving holes, fasteners, and surface blemishes exposed to view.
   2. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
   3. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to Manufacturer’s written recommendations.
   4. Comply with Division 01 Section “Cutting and Patching.”

C. Refinishing:
   1. Prepare existing surfaces for finishes by scraping, sanding, filling, acid etching, and sand blasting to ensure bonding and a smooth finish.
   2. Refinish entire surfaces as necessary to provide an even finish.

3. Refinish continuous surfaces to the nearest intersection and entirely finish assemblies.
4. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
5. Refinish entire surfaces if necessary to remediate existing lead painted surfaces.

D. Ceilings: Patch, repair, or rehang existing materials as necessary to provide even plane surface of uniform appearance.

3.8 CLEANING

A. Clean materials installed under this Section in accordance with Division 01 Section “Cleaning and Waste Management.”

B. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations.

C. Return adjacent areas to conditions existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 09 91 00 – PAINTING

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.

1.2 SUMMARY

A. This Section includes the furnishing and application of coating products, such as paints, stains and sealers, and labeling products.
   1. Surfaces to be painted or finished include, but are not necessarily limited to, the following interior and exterior surfaces for items furnished or installed under this Work, except as otherwise indicated on the Drawings or herein specified, and existing surfaces specifically identified herein or on the Drawings:
      a. Machinery and equipment.
      b. Ferrous metals, hangers, structural steel and joist framing.
      c. Galvanized steel.
      d. Exposed pipe and fittings including wall and floor sleeves (if pipe is insulated, insulation shall be painted).
      e. Exposed pipe, fittings, and pipe supports including surfaces between pipes and supports.
      f. Exposed conduit and appurtenances (except conduit mounted on unpainted surfaces).
      g. Existing pipe and fittings directly adjacent to new valves and equipment, including but not limited:
         1) Pipe Gallery: Filter effluent piping adjacent to new flow meters.
         2) Operating Gallery: Surface wash piping adjacent to new valves.
         3) Flow Meter Vaults: Finished water piping adjacent to new flow meters.
      h. All other surfaces not specifically excluded in the following paragraph. A completely finished project is required, regardless of whether every individual item is specified herein or indicated on the Drawings to be painted.
   2. Surfaces not to be painted or finished include the following unless otherwise indicated on the Drawings:
      a. Interior, below grade walls and ceilings.
      b. Manufacturer's name and identification plates.
      c. Galvanized, aluminum and fiberglass grating.
      d. Prefinished electrical and control panels with factory applied final finish.
      e. Aluminum (unless specifically indicated to be painted).
      f. Stainless steel (unless specifically indicated to be painted).
      g. Items indicated on the Drawings as not to be painted.

1.3 REFERENCES

A. Except as herein specified or as indicated on Drawings, the work of this Section shall comply with the pertinent provisions of the following:
   1. ASME/ANSI: A13.1 - Scheme for the Identification of Piping Systems.
   2. ASTM:
      a. A780 - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
      b. D16 - Terminology for Paint, Related Coatings, Materials, and Applications.
      c. D520 - Zinc Dust Pigment.
      d. D523 - Test Method for Specular Gloss.
      e. D7234 - Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
      f. F1869 - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride.
   3. Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers:
      a. Ten States Standards 2.14 - Recommended Standards for Water Works.
      b. Ten States Standards 54.5 - Recommended Standards for Wastewater Facilities.
      c. International Concrete Repair Institute: Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

4. Michigan Administrative Code: R 325.51992 Part 603 - Lead Exposure in Construction.
5. National Association of Pipe Fabricators (NAPF):
   a. NAPF 500-03-01 - Solvent Cleaning for Ductile Iron.
   b. NAPF 500-03-02 - Hand Tool Cleaning for Ductile Iron.
   c. NAPF 500-03-03 - Power Tool Cleaning for Ductile Iron.
   d. NAPF 500-03-04 - Abrasive Blast Cleaning for Ductile Iron Pipe.
   e. NAPF 500-03-05 - Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
6. NSF/ANSI/CAN Standards:
   a. 61 – Drinking Water System Components – Health Effects.
   b. 600 – Health Effects Evaluation and Criteria for Chemicals in Drinking Water.
7. Steel Structures Painting Council (SSPC):
   a. AB-1 - Mineral and Slag Abrasives.
   b. PA-1 - Shop, Field, and Maintenance Painting of Steel.
   c. PA-2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements.
   d. PA-3 - A Guide to Safety in Paint Application.
   e. SP-1 - Solvent Cleaning.
   f. SP-2 - Hand Tool Cleaning (SSI-St2).
   g. SP-3 - Power Tool Cleaning (SSI-St3).
   h. SP-5 - White Metal Blasting (SSI-Sa3) (NACE #1).
   i. SP-6 - Commercial Blast Cleaning (SSI-Sa2) (NACE #3).
   j. SP-7 - Brush-off Blast (SSI-Sa1) (NACE #4).
   k. SP-8 - Pickling.
   l. SP-10 - Near-White Blast Cleaning (SSI-Sa2-1/2) (NACE #2).
   m. SP-11 - Power Tool Cleaning to Bare Metal.
   n. SP-16 - Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
   o. VIS-1 - Visual Standard for Abrasive Blast Cleaned Steel.
8. United States Department of Labor, Occupational Safety and Health Administration (OSHA): 29 CFR 1926.62.

1.4 DEFINITIONS

A. Terms:
   1. Coating: Paint, stain, sealer or other product specified.
   2. Environment:
      a. Severe: Highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation, frequent cleaning using strong chemicals, heavy concentrations of strong chemical fumes, and frequent splashing and spilling of harsh chemical products.
      b. Moderate: Corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, regular cleaning with strong chemicals, and occasional splashing and spilling of chemical products.
      c. Mild: Industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, infrequent cleaning with strong chemicals, low levels of mild chemical fumes, occasional splashing and spilling of chemical products, and normal outdoor weathering.
   3. Exposure:
      a. Environmental conditions to which different surfaces may be exposed as follows:
         1) Concealed: Surfaces within the confines of a building or other enclosure not constantly exposed to weather, trapped moisture, high heat or other deteriorating conditions, and normally concealed from view.
         2) Immersed:
            a) Surfaces below a liquid surface or exposed to spray.
            b) Surfaces exposed to spray include areas to 8 inches above maximum liquid surface in quiescent structures and to 18 inches above maximum liquid surface in mixed or agitated structures.
            c) Immersed surfaces also include the interior surfaces of the floors, walls, and tops of fully or partially enclosed liquid containing structures, regardless of the liquid level.
         3) Interior: Surfaces within the confines of a building or other enclosure not immersed or constantly exposed to weather, trapped moisture, high heat or other deteriorating conditions, and exposed to view.

4) Exterior:
a) Above Grade: Surfaces above finished grade and not included in 1), 2), or 3) above.
b) Below Grade: Surfaces below finished grade and not included in 1), 2), or 3) above.

4. Gloss Range (as determined by ASTM D523):
   a. High Gloss: A high sheen finish of more than 70 when measured at a 60 degree meter.
   b. Semi Gloss: A medium sheen finish of 35 - 70 when measured at a 60 degree meter.
   c. Satin: A low-to-medium sheen finish of 15 - 35 when measured at a 60 degree meter.
   d. Eggshell: A low sheen finish of 20 - 35 when measured at a 60 degree meter.
   e. Flat: A lusterless or matte finish of less than 5 when measured at an 60 degree meter.

1.5 SUBMITTALS

A. Manufacturer's Literature: Specification data sheets and color charts for materials proposed for use on the Work. Provide Safety Data Sheets (SDS) as requested by Engineer.

B. Schedules:
   1. Submit a finish schedule indicating rooms and other structures and systems to be coated, items or areas to be coated, the proposed coating system, including surface preparation, primer, intermediate/finish coats, application methods and color charts.
   2. Schedule shall be submitted as a complete package.
   3. No coatings may be applied until Engineer has made a complete review of the entire submittal.

C. Manufacturer's Certificates: Submit signed affidavit from coatings Manufacturer that submitted coatings are of same or better quality than those specified, and Manufacturer’s approval of applicator.

D. NSF/ANSI/CAN Certifications: Coating systems in contact with potable water, including water that is a part of a treatment process that will ultimately become potable water, require NSF/ANSI/CAN 61 and 600 certifications Submit evidence of current product certifications with the requirements of these standards. Certification from Testing Laboratories must demonstrate acceptable credentials to allow them to certify product conformance with the NSF/ANSI/CAN 61 and 600 standards.

E. Applicator's Experience: Submit written verification of experience required herein.

F. Product and Maintenance Schedules:
   1. At or before the completion of the Work, submit complete lists, in a finish schedule, of the actual products used. Include item covered, coating Manufacturer's name, type of coating and color.
   2. Provide pipe coding schedules listing pipe name, coating Manufacturer's name, type of coating and color.
   3. Provide maintenance manuals detailing the proper procedures and materials to be used for maintenance and repainting of the various coatings.

1.6 QUALITY ASSURANCE

A. General:
   1. Acceptability of materials and performance shall be determined by Engineer.
   2. Testing or certifications may be required to aid Engineer's determination.
      a. Expense of testing and certifications when required and, unless noted otherwise in the Contract Documents, shall be borne by Contractor.
      b. If destructive testing is required, Contractor shall repair damaged area. Expense of repair shall be borne by Contractor.
      c. If initial testing results are unsatisfactory or yield failing results, additional testing will be required. Cost of additional testing shall be borne by Contractor.
   3. Coating Reviews:
      a. Request, in writing, a review of each coat by Engineer of first finished surface of each type for color, texture and workmanship.
      b. First accepted surface of each type and color shall be visibly labeled by Engineer with removable label as Project standard for that type and color of item.
      c. Labels shall remain in place until painting is finished and accepted.
      d. For spray application, paint a surface of 100 square feet as a Project standard.

4. Work may be inspected as to proper surface preparation, pretreatment, priming, dry film thickness, curing, color, and workmanship.
5. Applicable standards, test methods, and inspection equipment includes, but is not necessarily limited to the following:
    a. SSPC-VIS-1 photographic blast cleaning standards (latest revision).
    b. Inspector's wet film and dry film thickness gages.
    c. Zorelco 369/PHD pin hole detector.
    d. Mark II Tooke Gage.

B. Coating Subcontractors:
1. Applicators shall have experience with the coating systems specified.
2. Experience shall be substantiated by previous project experience, certifications, seminar attendance, Manufacturer validation, or similar means.

C. Pre-Application Meeting:
1. Convene a pre-application meeting before the start of work and prior to ordering materials.
2. Require attendance of parties directly affecting work of this Section, including Engineer, applicator and coating Manufacturer’s technical representative.
3. Review the following as a minimum:
    a. Access and safety requirements.
    b. Heating, ventilation and humidity control measures to be utilized.
    c. How application information will be monitored and recorded, including responsible personnel, monitoring equipment, forms, and timely reporting of information recorded.
    d. Protection of surfaces not scheduled to be coated.
    e. Schedule of work.
    f. Surface preparation.
    g. Coating application.
    h. Daily log to be used.
    i. Repairs anticipated.
    j. Applicator’s field quality control.
    k. Cleaning procedures.
    l. Testing procedures.
    m. Protection of coating systems.
    n. Coordination with Owner’s activities.

D. Manufacturer’s Services:
1. Arrange for Manufacturer's technical representative to provide the services indicated below.
2. Site Visits by the Manufacturer's Technical Representative:
    a. The pre-application meeting.
    b. A visit to observe surface preparation and review application techniques of components of the system.
    c. A visit to review the completed installation.
3. Generally provide assurance and guidance for the entire coating system installation.
4. Written documentation required from the coating system Manufacturer:
    a. A letter of acknowledgement that the coating system materials are specified to be used in a location and for a purpose that meets with the approval of the coating system Manufacturer and the intent of the Contract Documents. The signed letter shall certify that the Manufacturer's technical representative:
        1) Is familiar with the Project, has attended meetings and is aware of the Project conditions and aware of associated products (i.e. filler resurfacers, primers, coatings and other products proposed for the Project).
        2) Agrees with the intended application of their products as specified.
        3) Agrees with the surface preparation specified, as completed.
        4) Agrees with the specifications. If necessary, submit revisions to specifications.
        5) Agrees that their products are compatible with associated products (i.e. concrete repair materials, existing coating systems, and other products proposed for the Project).
        6) Agrees with the type and quantity of testing to be performed, to ensure their product is adequately installed.
        7) Approval of surface preparation prior to proceeding with subsequent work.
        8) Approval of filler resurfacing, if applicable.

9) Approval of primer.
10) Approval of DFT tests.

E. Installation Subcontractor's Supervising Site Representative:
1. On Site during work being performed.
2. Knowledgeable of all aspects of the work.
3. Review each day's agenda with crew, and with Contractor's and Engineer's Site representatives.
4. If a portion of the work becomes unclear as to the most appropriate direction, work shall stop until a consensus is reached by all parties, including the Engineer's representative and the Manufacturer's technical representative, as required.

F. Applicator's Project Record:
1. Applicator shall maintain a record for each day work is performed, and shall include a record of application process information. At a minimum, applicator's record shall include:
a. Material Manufacturer's batch numbers.
b. Surfaces to which material is applied.
c. Time of application.
d. Ambient temperature.
e. Substrate temperature.
f. Substrate moisture.
g. Relative humidity.
h. Dew point temperature.
i. Use of heating, dehumidification and ventilation equipment.
j. Unusual or important conditions, features, or events that occur before, during or after work is performed that day. Such information shall be referred to on previous or subsequent daily reports, when appropriate.
2. Submit for Project record.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original sealed containers of the Manufacturer with labels legible and intact. Include the following on labels on each container:
1. Manufacturer's name.
2. Type of coating.
3. Manufacturer's stock number.
4. Manufacturer's batch identification.
5. Color name and number.
6. Instructions for mixing and reducing, where applicable.
7. Percent total solids by volume.
8. Identification of toxic substances and special instructions.
9. VOC content.

B. Storage:
1. Store materials in tightly covered containers at a minimum ambient temperature of 45 degrees F.
2. Store materials in a well ventilated area and in such a manner as to comply with safety requirements including applicable federal, state, and local rules and requirements.
3. Storage shall also be in accordance with instructions of the paint Manufacturer and requirements of insurance underwriters.
4. Maintain storage containers in a clean condition, free from foreign materials and residue:
a. Protect from freezing.
b. Keep storage area neat and orderly.
c. Remove oily rags and waste daily and dispose of legally.

C. Handle volatile products carefully and use caution so as not to puncture containers. Keep open flame away from areas while handling containers and be aware of material flash points.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Waterborne Paints:
      a. Apply only when temperature of surface to be painted and surrounding air are between 50 and 90 degrees F.
      b. Maintain temperature range throughout the minimum cure time recommended by the Manufacturer.
   2. Solvent-Thinned Paints:
      a. Apply only when temperature of surface to be painted and surrounding air are between 45 and 95 degrees F.
      b. Maintain temperature range throughout the minimum cure time recommended by the Manufacturer.
   3. Inclement Weather:
      a. Do not apply paint:
         1) In snow, rain, fog, or mist.
         2) When relative humidity exceeds 85%.
         3) When steel temperature is less than 5 degrees F above the dew point.
         4) To damp or wet surfaces.
      b. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the Manufacturer during application and drying periods. Refer to Article 1.7 for further restrictions.

B. Existing Painted Surfaces:
   1. When painting is specified over existing painted surfaces and existing coating types are not known, analyze samples of existing coatings using a laboratory approved by Engineer to determine generic type of coating present and the presence of lead.
   2. Submit written report from the lab to Engineer before coating is applied.
   3. Required modifications to painting schedule caused by existing paint shall not be justification for extra payment.
   4. Existing Coat Bonding Failure:
      a. Remove existing coating by abrasive blasting or other means, obtaining surface cleanliness and profile required for coating specified without damaging the substrate to the point of affecting its appearance.
      b. Paint as new surface.
      c. Unforeseen failure conditions may be justification for extra payment.

C. Epoxy Coatings:
   1. Do not expose epoxies during application and cure to sunlight and heaters that emit carbon dioxide and carbon monoxide.
   2. Use caution when applying and curing epoxy coatings to ensure that surrounding areas are not occupied and that adequate ventilation and fresh air are present.

D. Contractor shall demonstrate acceptability of environmental conditions as required by Engineer.

1.9 LEAD PAINT REMOVAL

A. Comply with applicable rules and regulations for lead based paint removal.

B. Personnel assigned to perform demolition activities in areas containing lead based paint shall be properly trained as outlined in 29 CFR 1926.62 (OSHA Lead Standard). In addition, task specific exposure monitoring shall be conducted to establish either a positive or negative initial determination.

C. Remove and remediate existing lead paint as required to comply with codes and regulations while performing the requirements of the Work. Either remove lead paint completely or partially as required to achieve this.

D. Notify Engineer when lead paint removal is complete.

E. Dispose of lead paint in a manner that complies with laws and regulations.

1.10 EXTRA MATERIALS

A. Leave with Owner at least 1 gallon of each type and color of paint used for finish coats and 1 gallon of each type of thinner required.

B. Containers shall be tightly sealed and clearly labeled.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Coatings:
      a. Tnemec.
      b. Carboline.
      c. International Paint.
      d. Sherwin Williams.

B. Single Manufacturer:
   1. Materials selected for coating systems for each type of surface shall be the product of a single Manufacturer.
   2. Provide primers and undercoats produced by the same Manufacturer as the finish coats.

2.2 MATERIALS

A. Material Types:
   1. NSF/ANSI/CAN Standards Certification:
      a. Coating systems in contact with potable water, including water that is a part of a treatment process that will ultimately become potable water, require NSF/ANSI/CAN 61 and 600 certifications.
      b. Products represented by manufacturers to have NSF/ANSI/CAN 61 and 600 have been included in the painting schedule, where the intended use requires products to meet the requirements of those standards. However the listing of a product is not a representation by the Engineer that the product has the current certifications. Submittal of current certifications is a requirement.
      c. Proposed substitutions shall also carry NSF/ANSI/CAN certifications for specific applications.
      d. Verify that coating systems utilized carry NSF/ANSI/CAN certifications, where such certifications are required. Provide product currently certified at no extra cost to Owner.
   2. Paint, primer and related materials are included in the painting schedule in this Section.
   3. Paint used for repair of galvanizing shall have minimum 95% zinc dust in accordance with ASTM D520.

B. Colors: Colors of finish coats shall be as selected by Engineer.

C. Blast Abrasives:
   1. Level of ionic contaminants shall be in accordance with SSPC-AB 1.
   2. Products and Manufacturers:
      a. Magnum Blast by Dust Net, Wedron, Illinois.
      b. Black Magnum by Dust Net, Wedron, Illinois.
      c. Black Beauty by Reed Minerals, Highland, Indiana.

D. VOC Compliance:
   1. Individual coatings and coating systems shall have VOC levels at or below the EPA recommendations identified in 40 CFR Part 59.
   2. VOC content shall be tested in accordance with EPA Method 24.

2.3 MIXES

A. Mixing:
1. Deliver paints to the Site ready-mixed, when possible.
2. Mix two-component paints at the Site and observe pot life as recommended by Manufacturer.
3. Proceed with mixing until paint becomes smooth, homogeneous, and free of surface swirls or pigment lumps.
4. When mixing multi-component paints, remix each component individually, then blend the components, as recommended by the Manufacturer, until the mixture is completely uniform in color.

B. Thinning:
1. No thinning will be permitted unless absolutely necessary.
2. Paint shall be spray-applied in as-received condition to demonstrate necessity for thinning.
3. Use only thinners as recommended by paint Manufacturer for specific use.
4. Amount of thinner used shall be reported to Engineer.
5. Measure viscosity to ensure proper thinning ratios have been used.

C. Tinting:
1. Onsite tinting will be permitted only when accepted in writing by Engineer.
2. Use only tinting colors recommended by the Manufacturer for the specific type of coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspection:
1. Prior to the commencement of surface preparation or other coating activities, thoroughly inspect the surfaces to determine if the Work is ready to be prepared and painted.
2. Report in writing to Engineer conditions that may potentially affect proper application.
3. Do not commence surface preparation or other coating activities until such defects have been corrected.

B. Correction of Defects:
1. Correct defects and deficiencies in surfaces which may adversely affect work of this Section.
2. Apply filler resurfacers, patching materials and the like that are required to provide the surface recommended by the coating Manufacturer.
3. Start of painting will be construed as the applicator’s acceptance of surfaces and conditions within a particular area.

3.2 TEMPORARY HEATING, VENTILATION AND HUMIDITY CONTROL REQUIREMENTS

A. General:
1. Ventilation is mandatory.
2. Provide ventilation that exhausts fumes and odors to the exterior at a location where existing HVAC systems will not pick up these fumes and odors.
3. Provide negative air pressure to those spaces receiving coatings without reducing air temperatures in those spaces which may impede the curing process of those coating systems.
4. Ventilation is required during surface preparation, application of coating systems, and the curing period for those systems.
5. Provide additional equipment and fuel as required to condition the space for surface preparation, application of products, and curing of those products, in accordance with Manufacturer’s requirements. This equipment may include, but is not limited to, heaters, dehumidifiers and fans for intake and exhaust air.

B. Enclosures:
1. Provide temporary enclosures as required to isolate dust, fumes and odors from areas in use, to control temperature and humidity, and to protect surface to be coated from the weather.
2. The enclosure shall be of such quality as to maintain optimal conditions for the work of this Section.
3. The enclosure shall remain until the work is sufficiently cured.

3.3 PREPARATION

A. General:
1. Prepare surfaces in accordance with this Article, the paint Manufacturer's recommendations and as specified in the painting schedule of this Section.
2. Cleanliness of Abrasive Blast-Cleaned Steel:
   a. Determined by Engineer using Steel Structures Painting Council Manual SSPC-VIS-1.
   b. Small steel panels which have been abrasive blast-cleaned and approved for a specific cleanliness may be used for comparative purposes to facilitate inspection and approval.
   c. Securely wrap these panels in clear plastic, seal to protect them from deterioration and mark with appropriate SSPC-SP6 cleaning specification.
3. Cleanliness of Compressed Airs:
   a. Do not use contaminated air for blast cleaning.
   b. Periodically check compressed air used for blasting to verify that it is clean, dry and oil-free by directing its flow toward a sheet of clean white paper.
4. Place oil and water separators in the air line as close as possible to blast-cleaning equipment. Make measurements of surface profile of abrasive blast-cleaned steel with a Keane-Tator Surface Profile Comparator or Testex Press-O-Film and Micrometer.
5. Abrasive Media:
   a. Select abrasive media to provide the type of profile required by the Manufacturer of the coating product.
   b. Abrasive media shall contain less than 5% free silica sand.
6. Protective Covers:
   a. Protect motors, bearings, chain drives, and other moving parts by wrapping with plastic and sealing with tape.
   b. Maintain protective covers in dust tight condition.
7. Correct steel and fabrication defects revealed by surface preparation, such as weld imperfections, delamination, scabs, and slivers, by appropriate trade before proceeding further with surface preparation.
8. Clean Up of Blast Cleaned Areas:
   a. Remove dust and blast products from the abrasive blast-cleaned surfaces by high pressure air or vacuum cleaning.
   b. Completely clean up residue from blasting operations within the entire space to be painted prior to applying coatings.
9. Inspect surfaces after surface preparation is complete and prior to application of coatings.
10. Remove hardware, accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or provide surface applied protection prior to surface preparation and painting, and then replace items after paint has dried.
11. When acid etching is the approved means of preparing surfaces for coating systems, protect the surrounding areas. Neutralize dispensed solutions and dispose of properly.

B. Ferrous Metals:
1. Non-Immersed Ferrous Metals:
   a. Surface Preparation - Shop:
      1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
      2) Abrasive blast clean surfaces to specification required for coating to be applied.
      3) Perform abrasive blast cleaning only when the relative humidity is no higher than 75% and the surface temperature of the steel is at least 5 degrees F above the dew point.
      4) Coat cleaned surfaces before visible rust forms on the surface. Do not leave cleaned surfaces uncoated for more than 24 hours.
      5) Apply coating as specified under this Section.
   b. Surface Preparation - Field:
      1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
      2) Prepare field welds by grinding to remove sharp edges, undercuts, recesses and pin holes.
      3) Completely remove weld slag and spatter.
      4) Thoroughly clean damages, scratches and abraded areas of shop primers. Thoroughly clean field welds and areas within 4 inches of field welds before painting using surface preparation methods at least as effective as those specified for the structure itself.
      5) Feather out edges to make touch-up patches inconspicuous.
      6) Clean surfaces with solvent.

7) Contractor may, at Contractor's option, clean and apply one overall coat of primer for each specified shop coat in place of touch-up or spot priming.
8) Contractor shall meet applicable surface preparation and application specifications.

2. Immersed Ferrous Metals:
   a. Surface Preparation - Field:
      1) Remove dirt, oil, grease and other foreign matter in accordance with SSPC-SP1.
      2) Prepare field welds by grinding to remove sharp edges, undercuts, recesses, and pin holes.
      3) Completely remove weld slag and spatter.
      4) Abrasive blast clean surfaces to specification required for coating to be applied.
      5) Perform abrasive blast cleaning only when the relative humidity is no higher than 75% and the surface temperature of the steel is at least 5 degrees F above the dew point.
      6) Coat cleaned surfaces before any visible rust forms on the surface.
      7) Do not leave cleaned surfaces uncoated for more than 24 hours.
      8) Apply coating as specified under this Section.

C. Ductile Iron Pipe and Fittings:
   1. Do not follow preparation procedures typically used for other ferrous metals as these may result in damage to the ductile pipe surface and subsequent reduced coating effectiveness and life expectancy.
   2. Perform surface preparation in accordance with NAPF 500-03-01 through 05 and the painting schedule.

D. Stainless Steel:
   1. Prepare welds by grinding to remove sharp edges, undercuts, recesses and pin holes.
   2. Remove dirt, oil, grease, and other foreign matter in accordance with SSPC-SP1.
   3. Use only solvents and cleaning solutions containing less than 200 ppm of halogens to prevent stress corrosion cracking.

E. Nonferrous Metals and Galvanized Steel:
   1. Remove dirt, oil, grease, and other foreign matter in accordance with SSPC-SP1. For Solvent Cleaning, test surface with copper sulfate solution. If galvanizing turns black, then surface is clean and ready for paint application. Otherwise abrade surface or brush blast in accordance with SSPC-SP7.
   2. Remove white rust by hand or power brushing being careful not to damage or remove the galvanizing.
   3. Remove rust in accordance with SSPC-SP2 or SSPC-SP3.
   4. On surfaces potentially exposed to the touch, such as railings, grind runs and drips of galvanizing material smooth and repair using zinc-rich primer.
   5. On galvanized steel, touch-up exposed metal areas using zinc-rich primer.
   6. Repairs and touch up of galvanized coatings shall comply with ASTM A780. Zinc-rich primers shall be compatible with finish coats.

3.4 APPLICATION

A. General:
   1. Take necessary safety precautions in accordance with this Article, SSPC-PA Guide 3, Manufacturer's recommendations, federal, state, and local rules and requirements, and insurance underwriter's guidelines.
   2. Apply coatings in accordance with this Article, SSPC-PA1, and the Manufacturer's recommendations.
   3. Moisture Content:
      a. Do not apply initial coating until moisture content of surface is within limitations recommended by paint Manufacturer.
      b. Determine moisture content by one of the following methods:
         1) As specified herein.
         2) By use of a moisture meter approved by Engineer.
   4. Mil Thickness:
      a. Apply coats in a uniform manner and of the minimum dry film thickness as indicated in the painting schedule.
      b. Maximum mil thickness shall be as recommended by coating Manufacturer.
      c. Where the mil thickness is not indicated in the painting schedule, it shall be as recommended by coating Manufacturer.
   5. Sand and dust between each coat to remove defects visible from a distance of 5 feet.

6. Additional Coats:
   a. Apply within recoat recommendation of the Manufacturer based on temperature and humidity variations.
   b. Schedule inspections so as to not interfere with recoat time.
7. Each coat shall be smooth, free of brush marks, streaks, laps or pile-up of paint, and skipped or missed areas.
8. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
9. Spray apply coatings on hollow metal units.
10. Finish door tops, edges, and bottoms the same as exposed surfaces.
11. Except for contact surfaces, surfaces of fabricated assemblies that are inaccessible after erection shall receive field coats of paint before erection.
12. Ensure that concrete cracks and defects have been repaired prior to applying coating, then fill remaining depressions and crevices with paint if practical.
13. Protect wet paint against damage from dust or other detrimental foreign matter as much as is practicable.
14. Remove grills, covers, and access panels of mechanical and electrical systems and tanks from location and paint separately.
15. Paint the interior surface of ducts flat black in the immediate area of supply and exhaust grilles.
16. Omit application of masonry filler on acoustical masonry.
17. Coat concrete and masonry walls prior to mounting equipment.
18. Where equipment, piping, conduit or the like are removed from an existing painted surface, patch and paint the newly exposed surface as required so the newly exposed surface matches surrounding surfaces in coating and appearance.
19. Where epoxy coatings are scheduled over existing paint:
   a. Test existing paint and substrate for lifting or alligatoring.
   b. If existing paint lifts or alligators, remove it down to bare substrate.
20. Where a portion of a surface is to be coated, carry the coating to the nearest break point in the surface plane beyond the portion specified.

B. Valves, Fittings, and Supports:
1. Paint valves and fittings the same base color as the pipe they adjoin.
2. Paint floor stands the same base color as the pipe they adjoin.
3. Wall Brackets and Pipe Hangers:
   a. Paint the same base color as the wall or ceiling they adjoin.
   b. Use gray color if wall or ceiling is not painted.

3.5 PIPE AND EQUIPMENT IDENTIFICATION

A. General:
1. Identify non-buried piping installed as part of the Work in accordance with ASME/ANSI A13.1, this Section, as required in the pipe identification schedule, and as indicated on the Drawings.
2. Painting or banding of concealed piping above suspended ceilings is not required, but labels as specified following are required.
3. Identify pumps, tanks, and equipment.

B. Color Bands:
1. Where color bands are indicated for piping identification, use colored vinyl tape spaced every 6 feet, before and after each valve and where pipe enters and leaves each wall.
2. Band Widths:
   a. Pipe up to and including 2-inch diameter: 3/4-inch wide.
   b. Pipe 2-1/2-inch to 6-inch diameter: 2 inches wide.
   c. Pipe 8-inch to 12-inch diameter: 4 inches wide.
   d. Pipe 14-inch diameter and over: 6 inches wide.

C. Labels and Arrows:
1. Label pipes at intervals not to exceed 20 feet and where pipe enters and leaves each wall, to identify the contents of the pipe as determined by Engineer.
2. Place an arrow adjacent to every pipe label to indicate direction(s) of flow.
3. Use preprinted labels and arrows manufactured by a company which normally manufactures pipe identification systems.
4. Supply pipe labels, arrows, and color bands by a single Manufacturer.

5. Labels and Arrow Heights:
   a. Pipe or Covering Over 3-inch Diameter: 2-1/4 inches.
   b. Pipe or Covering 1-inch to 3-inch Diameter: 1-1/8 inches.
   c. Pipe or Covering Under 1-inch Diameter: 1/2-inch.
6. Materials shall be suitable for the use intended.
7. Label pumps, tanks, and equipment items, including description and tag number, with lettering size coordinated with Engineer depending on equipment size.

3.6 FIELD QUALITY CONTROL

A. Inspection:
   1. To facilitate painting and inspection, each coat of paint shall be of a different color or tint.
   2. Finished metal surfaces shall be free of skips, voids or pinholes in each coat when tested with a low voltage detector.
   3. Do not apply additional coats until previous coat has been inspected and acknowledged in writing by Engineer.
   4. Only coats of paint acknowledged in writing will be considered in determining number of coats applied.

B. Final Touch-Up:
   1. Surface damage shall be repaired with touch-up paint matching material used for original coating.
   2. Repaired areas shall be rubbed out and polished to match surrounding finish.
   3. Finish repair shall be of the quality typically found within the auto body industry.

3.7 CLEANING

A. Remove spilled, splashed, or spattered paint from surfaces.

B. Do not mar surface finish of item being cleaned.

C. Prior to acceptance of the work of this Section, thoroughly clean painted surfaces and related areas in accordance with Division 01 Section “Cleaning and Waste Management.”

3.8 PROTECTION

A. General:
   1. Adequately protect other surfaces from paint and damage.
   2. Repair damage as a result of inadequate or unsuitable protection.

B. Protective Materials: Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or droppings from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

C. Fire Hazards: Place cotton waste, cloths, and materials which may constitute a fire hazard in closed metal containers and remove daily from Site.

D. Electrical Plates and Hardware:
   1. Remove electrical plates, surface hardware, fittings and fastenings prior to painting operations.
   2. These items are to be carefully stored, cleaned and replaced upon completion of work in each area.
   3. Do not use solvent to clean hardware that may remove permanent lacquer finish.

E. Equipment with Factory-Applied Final Finishes:
   1. Certain equipment with factory-applied finishes may be accepted by Engineer at Engineer‘s discretion.
   2. Protect finishes of equipment with approved factory-applied final finishes from scratches and abrasions by all practical means.
   3. Repair surface damage with touch-up paint furnished by equipment Manufacturer by workmen skilled in this type of work.
   4. Rub out and polish repaired areas to match surrounding finish.

5. Finish repair shall be of the quality typically found within the auto body industry.
6. If damage to item is severe in the judgment of Engineer, the equipment will be rejected or a new finish coat shall be applied after proper surface preparation at the discretion of Engineer, at no additional cost to Owner.

3.9 PAINTING SCHEDULE

A. All mil thicknesses indicated are dry film thicknesses (DFT).

1. Interior Ferrous Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat	Third Coat
Tnemec	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): 90-97 Tneme-Zinc 2.5-3.5 Mils	(Field): 69-Hi-Build Epoxoline 4.0-6.0 Mils	(Field): 1094 Endura-Shield 3.0-5.0 Mils
Carboline	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Carbozinc 859 2.5-3.5 Mils	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HG 3.0-5.0 Mils
International Paint	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): CATHCOAT 302 H Reinforced Inorganic Zinc (78%) 2.5-3.5 Mils	(Field): BAR-RUST 235 Epoxy Mastic 4.0-6.0 Mils	(Field): DEVTHANE 379/H Aliphatic Urethane Gloss 3.0-5.0 Mils
Sherwin Williams	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Corothane | Galvapac 1K 2.5-3.5 Mils	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 3.0-5.0 Mils

2. Interior Non-Ferrous and Galvanized Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field) 69 Hi-Build Epoxoline II 4.0-6.0 Mils	(Field): 1094 Endura-Shield 2.0-3.0 Mils
Carboline	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HG 2.0-3.0 Mils
International Paint	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): DEVRAN 201H or 203 Universal Epoxy Primer 2.0-4.0 Mils	(Field): DEVTHANE 379/H Aliphatic Urethane Gloss 2.0-3.0 Mils
Sherwin Williams	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 2.0-3.0 Mils

3. Exterior Ferrous Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat	Third Coat
Tnemec	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): 90-97 Tneme-Zinc 2.5-3.5 Mils	(Field): 69-Hi-Build Epoxoline 4.0-6.0 Mils	(Field): 1094 Endura-Shield 2.0-3.0 Mils
Carboline	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Carbozinc 859 2.5-3.5 Mils	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HG 2.0-3.0 Mils
International Paint	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): CATHCOAT 302 H Reinforced Inorganic Zinc 2.5-3.5 Mils	(Field): BAR-RUST 235 Epoxy Mastic 4.0-6.0 Mils	(Field): DEVTHANE 379/H Aliphatic Urethane Gloss 2.0-3.0 Mils
Sherwin Williams	(Shop): SSPC-SP6 commercial blast cleaning	(Shop) and (Field Touch-up, Prime): Corothane | Galvapac 1K 2.5-3.5 Mils	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 2.0-3.0 Mils

4. Exterior Non-Ferrous and Galvanized Metals – Non-Immersed: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): 69 Hi-Build Epoxoline II 4.0-6.0 Mils	(Field): 1094 Endura-Shield 4.0-6.0 Mils
Carboline	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Carboguard 890 4.0-6.0 Mils	(Field): Carbothane 134HG 4.0-6.0 Mils
International Paint	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): DEVRAN 201H or 203 Universal Epoxy Primer 2.0-4.0 Mils	(Field): DEVTHANE 379/H Aliphatic Urethane Gloss 4.0-6.0 Mils
Sherwin Williams	(Field): SSPC-SP1 solvent cleaning and SSPC-SP3 or SSPC-SP7 (abrade to create a 1.0 - 1.5 mil profile)	(Field): Macropoxy 646 FC 4.0-6.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 4.0-6.0 Mils

5. Metals – Immersed (Potable Water Systems): Satin Polyamidoamine Epoxy System

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): SSPC-SP10 near-white blast cleaning	(Field): 21 Epoxyoline 3.0-5.0 Mils	(Field): 21 Epoxoline 4.0-6.0 Mils
Carboline	(Field): SSPC-SP10 near-white blast cleaning	(Field): Carboguard 891 VOC 3.0-5.0 Mils	(Field): Carboguard 891 VOC 4.0-6.0 Mils
International Paint	(Field): SSPC-SP10 near-white blast cleaning	(Field): BAR-RUST 233H Multi-Purpose Epoxy 5.0-6.0 Mils	(Field): BAR-RUST 233H Multi-Purpose Epoxy 5.0-6.0 Mils
Sherwin Williams	(Field): SSPC-SP10 near-white blast cleaning	(Field): Sherplate 600 3.0-5.0 Mils	(Field): Sherplate 600 4.0-6.0 Mils

6. Metals – Immersed (interior of potable water system pipe): Modified Polyamine or Satin Polyamidoamine Epoxy System

System Manufacturer	Pipe and Fitting Size Limitations	Surface Preparation	First Coat	Second Coat
Tnemec	Pipes 4” to 8” diameter	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): 22 Epoxoline 16.0-18.0 Mils	
	Pipes 10” to 12” diameter	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): 22 Epoxoline 16.0-18.0 Mils	
	Pipes 14” diameter and greater; valves and fittings 4” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): 22 Epoxoline16.0-18.0 Mils	
Carboline	Pipes 4” to 8” diameter; fittings		No NSF/ANSI/CAN certified equivalent	
	Valves 4” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Carboguard 891 VOC 4.0-10.0 Mils	(Shop): Carboguard 891 VOC4.0 – 10.0 Mils (16.0 mils min, 20.0 mils max total)
	Pipes 10” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Phenoline Tankshield 16.0-20.0 Mils	
International Paint	Pipes 4” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Interline 975P 16.0-18.0 Mils	
	Valves and fittings 4” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Bar Rust 233 H 12.0-16.0 Mils	
Sherwin Williams	Valves and fittings	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Duraplate 6000 20.0-50.0 Mils	
	Pipes 4” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop): Duraplate 6000 20-50 Mils >=4” 20-125 Mils >=6””	
	Pipes 6” diameter and greater	(Shop): SSPC-SP10 near-white blast cleaning	(Shop) Sherplate PW Epoxy 16.0-30.0 Mils >=6” 16.0-50.0 Mils >=12”	

7. Existing Ferrous Metals in Wet Environment:

System Manufacturer	Surface Preparation	First Coat	Second Coat	Third Coat
Tnemec	(Field): SSPC-SP6 commercial blast cleaning	(Field): Series 1 Omnithane 2.5-3.5 Mils	(Field): 69 Hi-Build Epoxoline II 3.0-5.0 Mils	(Field): 69 Hi-Build Epoxoline II 2.0-3.0 Mils
Carboline	(Field): SSPC-SP6 commercial blast cleaning	(Field): Carbomastic 615 2.5-3.5 Mils	(Field): Carbomastic 615 3.0-5.0 Mils	(Field): Carbothane 134 HG 2.0-3.0 Mils
International Paint	(Field): SSPC-SP6 commercial blast cleaning	(Field): CATHCOAT 302 H Reinforced Inorganic Zinc 2.5-3.5 Mils	(Field): BAR-RUST 233H Multi-Purpose Epoxy 5.0-6.0 Mils	(Field): BAR-RUST 233H Multi-Purpose Epoxy 5.0-6.0 Mils
Sherwin Williams	(Field): SSPC-SP6 commercial blast cleaning	(Field): Corothane | Galvapac 1K 2.5-3.5 Mils	(Field): Macropoxy 646 FC 3.0-5.0 Mils	(Field): Macropoxy 646 FC 2.0-3.0 Mils

8. Interior Polyvinyl Chloride (PVC) and Fiberglass Reinforced Plastic (FRP) Surfaces: Satin Polyamidoamine Epoxy System:

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): Clean and dry	(Field): 69 Hi-Build Epoxoline II 2.0-3.0 Mils	(Field): 69 Hi-Build Epoxoline II 2.0-3.0 Mils
Carboline	(Field): SSPC-SP1 – Solvent cleaning	(Field): Carboguard 890 2.0-3.0 Mils	(Field): Carboguard 890 2.0-3.0 Mils
International Paint	(Field): Clean and dry. Sand surface to create a profile.	(Field): DEVRAN 201H or 203 Universal Epoxy Primer 2.0-4.0 Mils	(Field): DEVRAN 224V Hi-Solids Epoxy 2.0-3.0 Mils
Sherwin Williams	(Field): Clean and dry	(Field): Macropoxy 646 FC 2.0-3.0 Mils	(Field): Macropoxy 646 FC 2.0-3.0 Mils

9. Exterior Polyvinyl Chloride (PVC) and Fiberglass Reinforced Plastic (FRP) Surfaces: Gloss Zinc/Aliphatic Acrylic Polyurethane System:

System Manufacturer	Surface Preparation	First Coat	Second Coat
Tnemec	(Field): Clean and dry	(Field): 69-Hi-Build Epoxoline 2.0-3.0 Mils	(Field): 1094 Endura-Shield 2.0-3.0 Mils
Carboline	(Field): SSPC-SP1 – Solvent cleaning	(Field): Carboguard 890 2.0-3.0 Mils	(Field): Carbothane 134HB 3.0-3.0 Mils
International Paint	(Field): Clean and dry. Sand surface to create a profile.	(Field): DEVRAN 201H or 203 Universal Epoxy Primer 2.0-4.0 Mils	(Field): DEVTHANE 379/H Aliphatic Urethane Gloss 2.0-3.0 Mils
Sherwin Williams	(Field): Clean and dry	(Field): Macropoxy 646 FC 2.0-3.0 Mils	(Field): Acrolon 218HS/HS Polyurethane 2.0-3.0 Mils

3.10 PIPE IDENTIFICATION COLOR SCHEDULE

A. Identify exposed pipes with the following colors.
   1. Colors are from the Tnemec Colorbook color card.
   2. Equivalent colors of other Manufacturers indicated in Part 2 of this Section may be used.

B. Where a facility has an existing identification system already in use, coordinate with the system in use.

C. In situations where 2 colors do not have sufficient contrast to easily differentiate between them, paint a 6-inch band of contrasting color at 30-inch intervals.

Water Plant Piping	Color Description	Tnemec Colorbook ID
Settled/Clarified Water	Olive Green	Frosted Mint GB48
Filtered Water	Olive Green	Frosted Mint GB48
Potable/Finished/High Service Water/Wash Water	Dark Blue	Clear Sky EN17
Wash Water Waste	Grey	Light Gay IN01
Sodium Hypochlorite/Chlorine	Yellow	Safety Yellow 02SF

END OF SECTION 09 91 00

SECTION 10 14 25 – PROCESS EQUIPMENT IDENTIFICATION

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of proper identification for process equipment components, and major items requiring identification or labeling as follows:
   1. Instrumentation equipment.
   2. Valves.
   3. Enclosures.
   4. Piping.

1.3 REQUIREMENTS

A. General:
   1. Identification shall include equipment name or function (i.e., Sodium Hypochlorite Tank, Transfer Pump, etc.), and shall include equipment tag number if one is indicated on the Drawings (i.e., P-1, NaOCl-3, etc.).
   2. Coordinate with requirements of related sections to avoid duplication.
   3. Lettering:
      a. Height to width ratio shall be no greater than 2:1.
      b. Typeface: Sans serif gothic bold, or as approved by Engineer.

1.4 SUBMITTALS

A. Shop Drawings to include:
   1. Text and location for each nameplate, label, and tag.
   2. Product data for nameplates and tags.

B. Samples: Submit 1 sample of each type of identification media to be supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Engraved Nameplate:
   1. Plastic laminate with engraved lettering.
   2. Minimum 3/8-inch white letters on a black background.

B. Engraved Tag:
   1. Brass round tags.
   2. Engraved lettering on one side.
   3. Fill letters with high contrast paint.
   4. Tag diameter: 2-inch.

C. Vinyl Label:
   1. Vinyl lettering with high tack adhesive backing.
   2. Custom manufactured labels. Individual letters not allowed.
   3. Label color shall be black typically, but white where mounting location is black.

D. Stenciled Label:
   1. Custom cut stencil board for each label. Individual letter stencils not allowed.
   2. Paint label using coating compatible with equipment finish and in accordance with Division 09 Section "Painting."
   3. Label color shall be black typically, but white where mounting location is black.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Locate identification media where highly visible.
   2. Location shall not interfere with operation of equipment or create a safety hazard.
   3. Firmly attach all media.
   4. Nameplates shall be affixed to a flat, smooth surface.
   5. Clean mounting location in accordance with Manufacturer's instructions prior to applying adhesives.

B. Enclosure, Instruments, Sensors, Transmitters, Etc.:
   1. For enclosures not specified in Division 21 - Fire Suppression, Division 22 - Plumbing, Division 23 - Heating, Ventilating, and Air Conditioning, Division 25 - Integrated Automation, Division 26 - Electrical, Division 27 - Communications.
   2. Engraved nameplate.

C. Valves:
   1. Engraved tag.
   2. Required only for process valves identified with a number on the Drawings.
   3. Valves require tag number only. Number on tag shall be the same as indicated on the Drawings.
   4. Attach with brass jack chain or nylon tie below or behind operator. Do not attach chain or tie to handwheels, chainwheels, or valve chains. Use adhesive to attach tags where no operator is provided, or where hanging the tag could interfere with valve operation or cause a safety hazard.

D. Piping Covered Under this Section:
   1. Vinyl label.
   2. Letter height in accordance with ANSI A131 or the pipe identification paragraph in Division 09 Section "Painting."

END OF SECTION 10 14 25

SECTION 23 07 00.01 – PROCESS PIPE INSULATION

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.

1.2 SUMMARY

A. Section Includes:
   1. Insulation Materials:
      a. Cellular glass.
   2. Adhesives.
   3. Lagging adhesives.
   4. Sealants.
   5. Field-applied jackets.
   6. Tapes.
   7. Securements.
   8. Corner angles.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Qualification Data: For qualified Installer.

C. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation.

1.5 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 40 Section "Process Piping Systems."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Pittsburgh Corning Corporation; Foamglas Super K.
2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
6. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
7. Factory fabricated shapes according to ASTM C 450 and ASTM C 585.

G. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

H. PVC Jacket Adhesive: Compatible with PVC jacket.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dow Chemical Company (The); 739, Dow Silicone.
   b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

2.2 SEALANTS

A. Joint Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
4. Color: White or gray.

2.3 FIELD-APPLIED JACKETS

A. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Products: Subject to compliance with requirements, provide one of the following:
   a. Johns Manville; Zeston.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
5. Factory-fabricated tank heads and tank side panels.

2.4 TAPES

A. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
   1. Width: 2 inches (50 mm).
   2. Thickness: 6 mils (0.15 mm).
   3. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
   4. Elongation: 500 percent.
   5. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

2.5 CORNER ANGLES

A. PVC Corner Angles: 30 mils (0.8 mm) thick, minimum 1 by 1 inch (25 by 25 mm), PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
   1. Verify that systems and equipment to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.
      a. For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Manholes.
   5. Handholes.
   6. Cleanouts.

Q. Continue insulation vapor barrier through penetrations except where prohibited by code. It is essential that the integrity of the vapor barrier is maintained. Fasteners or other securing devices that may unintentionally penetrate or otherwise damage the vapor barrier are prohibited. Where fasteners must penetrate the vapor barrier, the vapor barrier shall be repaired with a patch or tape of the same materials.

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
   6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
   7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
   8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
   9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
   1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
   2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
   3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
   4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

E. All sectional pipe covering shall be neatly and tightly applied with unbroken lengths and with the ends of the sections firmly butted together. Longitudinal joints shall be on the least conspicuous side of the pipe and slightly staggered. Fiberglass cloth or other coating shall be lapped over all joints and well pasted or cemented down in a neat and inconspicuous manner.

F. Extend insulation through all sleeves in order to produce a continuous application.

G. Insulation for piping shall be continuous through hangers and supports.

H. Provide insulation inserts and insulation protection shields at hanger or support locations.

I. Where a vapor barrier is not required on insulated piping in size less than 4" inch, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Do not use ring hangers on cold piping.

J. Where riser clamps are required to be attached directly to piping requiring vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamps.

K. Insulate all drip pockets, end caps, etc. on all lines, except where otherwise noted. Thickness of insulation, vapor barriers, jackets and finishes shall match adjacent piping.

L. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

M. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. Finish fittings insulation same as pipe insulation.

N. Insulation Installation on Valves and Pipe Specialties:
1. Install insulation to flanges as specified for flange insulation application.
2. Finish valve and specialty insulation same as pipe insulation.

3.5 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
   2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of cellular-glass insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.

3.6 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of pipes. Seal with manufacturer's recommended adhesive.
   1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
   1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.

B. Insulate cold process pipes conveying fluids with vapor retardant jackets with self sealing laps.
   1. Process Piping including Raw Water, Filtered Water, Filter to Waste, Finished Water, Backwash Supply, Sample Lines.

C. PVC jackets shall be installed on insulated piping in conjunction with fitting covers to provide a total sealed system as required by USDA and FDA for applications in food and pharmaceutical facilities.

3.9 INDOOR PROCESS PIPING INSULATION SCHEDULE

A. Process Piping:
   1. NPS 4 (DN 100) to NPS 12 (DN 300): Insulation shall be one of the following:
      a. Cellular Glass: 1-1/2 inches (38 mm) thick.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material.

B. Vertical and horizontal piping above the finished floor in the Process Area shall be completely provided with a jacket.
   1. PVC: 20 mils (0.5 mm) thick.

END OF SECTION 23 07 00.01

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

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. Excess Quantities and Sizes: Where quantities, sizes or other requirements on Drawings or Specifications are in excess of code requirements, Drawings or Specifications govern.

C. Conflicts: When conflicts exist between referenced Specifications or standards, more stringent requirements govern. No extra compensation for such compliance allowed.

1.2 SUMMARY

A. This Section includes the following:
1. Electrical equipment coordination and installation.
2. Penetrations for raceways and cables.
3. Penetration seals.
4. Grout.
5. Duct seal.
6. Duct sealing plugs.
7. Duct sealing foam.
8. Common electrical installation requirements.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with
1. NECA 1 - Standards Practices for Good Workmanship in Electrical Construction.
2. NEC – National Electrical Code (NFPA 70).

1.4 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.5 SUBMITTALS

A. Product Data: For penetration seals and duct sealing products.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and according to Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, weather tight wrapping.

D. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

1.7 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To ensure that mounting heights and locations of electrical equipment do not interfere with all other building appurtenances such as, but not limited to, containment areas, special coatings, and other equipment.
   3. To allow easy access and disconnection of electrical equipment while ensuring the least amount of interference with other installations.
   4. To allow right-of-way for piping and conduit installed at required slopes.
   5. To ensure that connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and outside of the dedicated working and access space of other equipment.

B. Surface repair:
   1. Coordinate the filling in or repair of surfaces around penetrations with other trades.
   2. Coordinate the filling in or repair of surfaces or structures for installation of supporting devices with other trades.
   3. Unused support penetrations/holes created as a part of new construction shall be filled in.
   4. Surfaces shall be filled in or repaired with the same materials that matches the construction and properties of the surface penetrated.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
      b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 PENETRATION SEAL SYSTEMS

A. Description: Mechanical modular sealing device, designed for field assembly, to fill annular space between penetration and raceway or cable.
   1. Manufacturers:
      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Metraflex Co.
      d. Pipeline Seal and Insulator, Inc.
      e. Proco Products, Inc.
      f. Or equal.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   3. Pressure Plates: Glass reinforced plastic.
   4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Coordinate the selection and application of grout with other trades in order to match the color and properties of the surface being repaired, where applicable. In existing construction, grout shall match existing color and material properties.

B. At a minimum grout shall be:
   1. Nonshrink; recommended for interior and exterior for sealing openings in non-fired-rated walls or floors.
   2. Standard: ASTM C1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
   3. Design Mix: 5,000 psi, 28 day compressive strength.
   4. Packaging: Premix and factory packaged.

2.4 DUCT SEAL

A. Description: UL listed, pliable, non-hardening, non-corrosive, weather-proof putty material, designed as a moisture barrier for weather-sealing service entries, electrical cables, and conduit ducts.
   1. Manufacturers:
      a. Arnco Corp. - Hydra-Seal.
      b. Ilsco Corp. – DS Duct Seal.
      c. JM Clipper – Duxseal.
      d. OZ/Gedney Co. – DUX.
      e. RectorSeal - Duct Seal Compound.
      f. Thomas & Betts Corp. - DX.
      g. Or equal.

2.5 DUCT SEALING PLUGS

A. Cable duct sealing plugs shall be designed to effectively seal conduits, reducing the cost of cable placement and maintenance in underground construction projects and routine work.
   1. All plastic construction – corrosion proof.
   2. Pull ‘Rope Eye’ attachment (can be supplied with security hex nut).
   3. Watertight.
   4. Simple to install.
   5. Removable and reusable.
   6. Full range of sizes.
   7. Full range of forms (round, square).
   8. Full range of supported cable count (simplex, duplex, triples, quadplex, and specials).

B. Manufacturers:
   1. Roxtec.
   2. TE Connectivity.
   3. Cal Am Manufacturing.
   4. Innderduct.
   5. Or equal.

2.6 DUCT SEALING FOAM

A. Closed-cell sealant shall be designed to create a watertight and gastight seal in conduits, reducing the cost of cable placement and maintenance in construction projects and routine work.
   1. Properties:
      a. Closed-cell Percentage: 98%.
      b. Density: 6lbs/ft^3.
      c. Moisture Absorption: <4%.
      d. Compressive Strength: 145 psi.
      e. Tensile Strength: 120 psi.
      f. Seal Strength – Water: 90ft intermittent, 22ft continuous.
      g. Seal Strength – Air: >5 psi.
   2. Reusable, re-enterable, and capable of sealing up to 12” conduits.
   3. Sealant shall be compatible with common conductor/cable jacket materials. Cured foam shall not affect physical or electrical properties of conductors/cables.
   4. Suitable for us in temperatures ranging from -20 degrees to 200 degrees Fahrenheit.
   5. Chemically resistant to gasoline, oils, dilute acids and bases, ad most unsaturated hydrocarbon.
   6. UL recognized. Complies with NEC and TIA.

B. Provide all accessories required for a complete installation.

C. Manufacturers:
   1. Polywater #FST.
   2. Or equal.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1 and NEC.

B. Measure indicated mounting heights to bottom of suspended items and the top of wall mounted items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in a manner as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

F. Verify final rough-in locations using field measurements and the specific requirements of the equipment to be connected.

3.2 INSTALLATIONS FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate:
   1. Exterior walls or slabs.
   2. Fire-rated floor and wall assemblies.
   3. Interior non-rated floor and wall assemblies.

B. Use core drilled holes, formed openings, or pipe sleeves for all penetrations unless penetration arrangement requires a rectangular sleeved opening or otherwise indicated herein or on the Drawings.
   1. When using a pipe sleeve:
      a. Use cast-iron pipe sleeves with integral water stop in new construction only. Coordinate installation of pipe sleeve with wall/slab construction.
      b. Use steel pipe sleeve in existing construction or new above grade interior construction.
   2. Obtain approval from Engineer before using rectangular sleeved openings not indicated on the Drawings.

C. Pipe Sleeve Installation:
   1. In walls, cut sleeves to length for mounting flush with both surfaces of walls.
   2. In floors, extend sleeves installed in floors 2 inches above finished floor level.
   3. Size sleeve to provide a minimum 1/4-inch annular clear space between sleeve and raceway or cable, unless otherwise indicated herein or on the Drawings. When using a modular mechanical seal, provide annular space between sleeve, raceway, or cable as required by seal Manufacture.
   4. Seal space outside of sleeves. Seal shall match existing surface construction and properties. When grout or similar compound is used promptly pack solidly between sleeve and wall so no void remains. Tool exposed surfaces smooth; protect while curing.

D. Penetration Types:
   1. Fire-Rated Assembly Penetrations:
      a. Apply firestopping to penetrations to maintain fire rating of walls, partitions, ceilings, and floors at penetrations. Seal penetration with firestop materials.
      b. Reference Architectural Drawings and Owner Record Drawings for fire ratings of walls and floors.

2. Interior Penetrations of Non-Fire-Rated Walls and Floors:
   a. Seal annular space between penetration and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
   b. Repair surface to match finish and properties of penetrated surfaces.
3. Varied Temperature Penetrations:
   a. Penetrations where raceways will be simultaneously exposed to different temperatures on each side of the penetration such as freezers, coolers, or room to room where the temperature variation is greater than 10 degrees Fahrenheit and one side of the room will be 60 degrees or less.
   b. Seal penetrations using mechanical modular seals where penetrated material permits. Size penetrations as required to install mechanical modular seal. Where modular mechanical seals cannot be utilized use clear silicone caulk or grout as applicable.
   c. Inside of the raceway shall be sealed with duct sealing plug or foam. Duct sealing foam shall be used when duct sealing plugs are not available in the size of configuration required.
   d. A conduit body or junction box shall be installed on the higher temperature side of penetration for installation of, and future access to, plug or foam.
   e. Repair surface to match finish and properties of penetrated surfaces.

3.3 PENETRATION SEAL SYSTEM INSTALLATION

A. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of penetration. Assemble modular mechanical seals and install in annular space between raceway or cable and penetration. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 DUCT SEAL INSTALLATION

A. Obtain approval from Engineer prior to installing duct seal.

B. Duct sealing plugs or duct sealing foam to be utilized in lieu of duct seal unless noted otherwise.

C. Install duct seal materials in strict accordance with the Manufacturer’s instructions.

3.5 DUCT SEALING PLUG INSTALLATION

A. Where required as indicated under 3.2 above, seal duct openings to prevent migration of water and gases into a space or enclosure.

B. Duct sealing plugs shall be applied after all cables have been installed.

C. Install duct sealing plug materials in strict accordance with the Manufacturer’s instructions.

D. All open-ended riser conduits shall require duct sealing plugs to be installed.

3.6 DUCT SEALING FOAM INSTALLATION

A. Where required as indicated under 3.2 above, seal duct openings to prevent migration of water and gases into a space or enclosure.

B. Duct sealing foam to be installed after all cables have been installed.

C. Install foam sealant in strict accordance with Manufacturer’s installation instructions.

D. Install conduit body or junction box at interior side of penetration where foam sealant is to be installed.

E. Abrade interior surface of duct with sandpaper or steel wool. Clean cables/conductors and interior of duct. Install foam strips/foam backer inside raceway around cables to fill annular space. Foam to be pushed back into raceway to a depth as specified by manufacturer. Install foam strips/foam backer inside raceway at front of raceway. Fill annual space between both foam backers with foam sealant product. Trim cured foam as required. Check for voids in cured foam and fill voids as required.

END OF SECTION 26 05 00

SECTION 26 05 20 – CONDUCTORS AND CABLES – 600V AND BELOW

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of all electrical conductors, cables, splices, and connectors.

B. Major Systems Include:
   1. 600V and below service entrance, feeders and electrical distribution.
   2. Branch circuit wiring.
   3. System wiring.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the standards of the following organizations as applicable to materials, construction and testing of wire cables:
   1. NEMA - National Electrical Manufacturer Association Standards.
   2. IEEE Standards.
   3. Insulated Cable Engineers Association - Standards.
   4. ASTM Standards.
   5. NEC - National Electrical Code (NFPA 70).
   6. UL508A - Standard for Industrial Control Panels.
   7. NFPA 79 – Electrical Standard for Industrial Machinery.

1.4 SUBMITTALS

A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Manufacturers: Firms regularly engaged in the manufacture of electrical conductor and cable products of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Except as otherwise indicated, provide conductors, cables, and connectors of Manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by the Manufacturer and as required for the installation.

B. Power Wire:
1. All conductors and cables shall be new with a minimum wire size of No. 12 AWG. Manufacturer's name, type, and size shall be permanently marked on the outer covering at regular intervals and delivered in complete coils or reels.
2. Provide factory fabricated conductors of size, rating, material, and type as indicated for each service. Where not indicated, provide proper selection as determined by installer to comply with installation requirements and with NEC standards, from only the following types and conductors:
   a. Type THHN/THWN-2 dual rated, 600-Volt, 90 degrees C rated.: Stranded copper for all sizes.
   b. Bare Conductors: Stranded copper for all sizes.

C. Metal Clad (Type MC) Cables: Not permitted.

D. Control Cable: No. 14 AWG minimum, type THHN/THWN-2.

E. Instrumentation Signal Cable:
1. One pair of No. 16 AWG stranded, tinned copper conductors, 600V polyethylene insulation, twisted pair, 100% coverage aluminum polyester shield, No. 18 AWG stranded, tinned copper drain wire with vinyl outer jacket, UL listed.
2. For use outdoors, below grade, above grade, and inside control panels.
3. Where more than 2 conductors are required for an instrument, provide multiple cables.
4. Manufacturers: Belden; or equal.

F. Unshielded Twisted Pair (UTP) Cabling (Ethernet Cable):
1. Multi-conductor, Enhanced Category 6, nonbonded-pair cable consisting of 4 pairs of 23 AWG solid bare copper conductors with flame retardant polyolefin/fluorinated ethylene propylene (FRPO/FEP) insulation, tape separator, and low smoke polyvinyl chloride (LS PVC) outer jacket with ripcord. Outer jacket shall be blue.
2. Suitable for Gigabit Ethernet and 100BaseTX applications.
3. UL CMP (plenum) rated.
4. Manufacturer: Belden 2413; or equal.

G. Power Wiring Cable Accessories: For Connectors:
1. Wing nuts by Ideal.
2. Sta-Kon by Thomas & Betts.
3. Scotchlox Spring by Minnesota Mining & Manufacturing Company.
4. Compression Type 53200 by Thomas & Betts.
5. Hydent by Burndy.
6. Insulated multi-cable mechanical connector blocks by Polaris, or Ilsco.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Install electrical conductors, cables, and connectors as indicated on the Drawings, in accordance with the Manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation," and in accordance with recognized industry practices to ensure that products serve the intended functions.

2. Conductors and cables shall be sized in accordance with the Drawings or, in the absence thereof, in accordance with NEC requirements. Except where indicated herein, conductor sizes greater than No. 12 AWG are indicated on the Drawings.
3. Provide a dedicated grounded conductor (neutral) for each circuit that requires a neutral for proper operation. Unless indicated otherwise on the Drawings, shared neutrals are not allowed.
4. Provide an equipment grounding conductor in all raceways. Conductor shall be sized in accordance with the National Electrical Code.

B. Voltage Drop Compensation:
1. Provide No. 10 AWG conductors in lieu of No. 12 AWG conductors to compensate for voltage drop as follows:
   a. For each 277V, 20 ampere branch circuit that exceeds 200 feet in length between the branch circuit panelboard and the last outlet.
   b. For each 120V, 20 ampere branch circuit that exceeds 100 feet in length between the branch circuit panelboard and the last outlet.
2. When conductor size is increased to compensate for voltage drop, provide equipment grounding conductor increased in size in accordance with NEC.

C. Installation Procedures:
1. Install interior conductors after building is enclosed and water tight.
2. Each conduit shall be free of moisture and debris before conductors are installed.
3. Remove moisture from conduits by swabbing.
4. Install conductors so insulation is not damaged. Replace all conductors that are damaged.
5. Install conductors and cables only in code conforming raceway.
6. Pull conductors together where more than one conductor is being installed in a raceway.
7. Use heat shrink tubing for all instrument signal cable terminations.
8. Use manufacturer-approved pulling compound or lubricant, where necessary. Compound shall not deteriorate conductor and insulation. Compounds shall be UL listed.
9. Use a pulling means, including fish tape, cable or rope, and basket-weave wire/cable grips that will not damage the raceway or the wire.
10. Keep conductor splices to a minimum.
11. Install splices and taps which have equivalent or better mechanical strength and insulation as the conductor.
12. Use splice and tap connectors which are compatible with the conductor material.
13. Make all joints, splices, and connections only at accessible junction or outlet boxes, never inside conduit or fitting. Make splices in No. 10 AWG and smaller wire with insulated spiral mechanical connectors.
14. Make splices in No. 8 AWG and larger copper wire with compression type mechanical connectors.
15. All splices located in handholes and wet locations shall be rated for wet locations.
16. Low voltage and signal cable splices located in handholes and wet locations shall be sealed in 2-part epoxy sealing pack, 3M Scotchcast connector sealing pack 3570G.
17. Make conductor length for parallel feeds identical.
18. Where exposed cables are installed, cables shall be installed parallel and perpendicular to exposed structural members and building lines.
19. Do not lace, strap or tie feeder or branch circuit conductors together in panels, switchboards, variable speed drives, motor control centers, automatic transfer switches, boxes, and wireways.
20. All conductors and cables shall be identified in accordance with Division 26 Section “Identification for Electrical Systems.”
21. Use color coded conductors as follows:
   a. For Power Distribution:
      1) Phases: Black-red-blue (under 150V to ground).
      2) Phases: Brown-orange-yellow (over 150V to ground).
      3) Neutral: White (under 150V to ground).
      4) Neutral: Grey (over 150V to ground).
      5) Ground: Green identified (feeders); Green (branch circuits).
   b. For Controls:
      1) Follow industry standards (UL508A and NFPA 79) for coloring associated with control circuits and control panels:
         a) AC Ungrounded (Hot) Circuits: Red.
         b) DC Ungrounded (Hot) Circuits: Blue.
         c) AC Grounded (Neutral): White or Gray.

d) DC Grounded (Neutral): White with Blue Stripes.
e) Ungrounded (Hot) Circuits which remain energized when main switch is off: Orange or Yellow.
f) Grounded (Neutral) Control Circuits which remain energized when main switch is off: White with Yellow or Orange Stripes.
g) Equipment Grounding Conductors: Green.

22. Support conductors in vertical raceways in accordance Division 26 Section “Hangers and Supports for Electrical Systems.”
23. Conductor ampacity derating shall be adhered to for all conductors in accordance with the National Electrical Code.

3.2 FIELD QUALITY CONTROL

A. General:
1. Prior to energization, check conductors and cables for continuity of circuitry and for short circuits. Correct malfunctions when detected.
2. Subsequent to conductor and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements.

END OF SECTION 26 05 20

SECTION 26 05 27 – GROUNDING AND BONDING

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of a complete and continuous grounding system.

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

A. All equipment, raceway systems, interior wiring systems with neutrals, receptacles, and power outlets, motors and motorized equipment shall be grounded.

1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design.

B. Grounding system shall be in accordance with the current National Electrical Code (NEC).

C. Grounding system rods, connectors and clamps shall be UL labeled.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 DISTRIBUTION SYSTEM GROUNDING

A. Provide a green, insulated, equipment grounding conductor in each raceway (metallic and non-metallic; rigid and flexible). Equipment grounding conductors shall be sized in accordance with Article 250 of the NEC.

B. Circuit Grounding: Install grounding bushings, grounding studs, and grounding jumpers at distribution centers, pull boxes, motor control centers, panelboards, load centers, and all like equipment.

C. Bonding Jumpers:
   1. Provide green insulation, size correlated with overcurrent device protecting the wire, attached to grounding bushings on conduits, to lugs on boxes, and other enclosures.
   2. Bond to neutral only at service neutral bar.

D. Receptacles and Power Outlets: Ground receptacles and power outlets to the conduit system with a green grounding conductor sized in accordance with Article 250 of the NEC and connected between the device grounding screw and outlet box.

E. Metallic Conduit: When bare grounding electrode conductors are enclosed in metallic conduit, the conduit shall be bonded to the grounding electrode conductor(s) at both ends utilizing equipment UL listed for this purpose.

F. Ground motor bases and frames by pulling a separate equipment grounding conductor in with the motor branch circuit.

G. Expansion Joints: Provide a bonding jumper around expansion fittings in metallic conduit to maintain ground continuity. Expansion fittings may include an internal bonding jumper constructed of a tinned copper braid, sized to meet UL fault current test requirements and complying with the bonding requirements of Article 250 of the NEC.

END OF SECTION 26 05 27

SECTION 26 05 29 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of the following:
   1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. Electrical Supports: Angles, channels, brackets, and mounting accessories for supporting all conduit, luminaires, switches, and other electrical equipment which are hung or mounted above floor.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. This Section defines general criteria for the selection and installation of supporting devices, but does not cover all types specifically required for the Project.

B. Choose or design supporting devices in accordance with these general criteria.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Regulatory Agencies Requirements:
   1. Provide supporting devices listed by Underwriters' Laboratory for their application as installed.
   2. Comply with National Electrical Code (NFPA 70) as applicable to construction, installation, and requirements for supporting devices.
   3. Comply with Metal Framing Manufacturers Association Standard Publication (MFMA-4); factory-fabricated components for field installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer’s directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Conduit Supports:
1. Where information indicated on Drawings conflicts with information herein, the more stringent requirements shall take precedence and the better quality or greater quantity of work shall be provided.
2. Single Runs: Galvanized conduit straps or ring bolt type hangers with spring clips. Do not use plumber's perforated straps.
3. All supports, such as, but not limited to, metal channel (strut) framing systems, angles, straps, hangers, etc. shall match the raceway type that is being supported. For example, galvanized conduit requires galvanized metal channel (strut) framing systems and straps, PVC coated conduit requires PVC coated metal channel (strut) framing systems and straps, PVC conduit requires PVC channel (strut) framing systems and straps.
4. In general, all hardware, such as anchors, nuts, bolts, washers, threaded rod, etc. shall match the conduit type: Galvanized steel hardware shall be used with galvanized steel rigid metal conduit; 316 stainless steel hardware shall be used with PVC and PVC coated rigid metal conduit.
5. Multiple Runs: Conduit rack with 25% spare capacity.
6. Vertical Runs: Channel support with conduit fittings.
7. Manufacturers:
   a. Cooper B-Line; a division of Eaton Corporation.
   b. ERICO International Corporation.
   c. Power-Strut; Power Engineering Co., Inc.
   d. GS Metals Corp.
   e. Michigan Hanger Co., Inc.; O-Strut Div.
   f. National Pipe Hanger Corp.
   g. Thomas & Betts Corporation.
   h. Unistrut; a brand of Atkore International, Inc.
   i. Wesanco Channel Systems; ZSi-Foster, Inc.
   j. Or equal.

B. Mounting, Anchoring, and Attachment Components
1. Mechanical-Expansion Anchors: Insert-wedge-type, 316 stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials where used. See item 2.1 A 5 above for clarification.
2. Manufacturers:
   a. Hilti, Inc.
   b. ITW Construction Products.
   c. MKT Fastening, LLC.
   d. Or equal.

C. Supports for Conductors in Vertical Conduit:
1. Install in compliance with NEC article 300.19.
2. Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads.
2. Secure Engineer's approval before welding or bolting to steel framing or anchoring to concrete structure.
3. Where equipment is to be suspended from cast-in-place concrete construction, set approved concrete inserts in formwork to receive hanger rods. Where equipment is to be suspended from metal deck and beam or joist construction, support equipment from beams or joists only.
4. Do not use existing supports without approval from Engineer and Owner.

END OF SECTION 26 05 29

SECTION 26 05 34 – RACEWAYS FOR ELECTRICAL SYSTEMS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of conduits and fittings for electrical wiring.

1.3 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design.

B. Regulatory Agencies Requirements:
   1. ACI – American Concrete Institute: Standards pertaining to conduits embedded in concrete (Section 6.3 in ACI 318 – Building Code Requirements for Structural Concrete and Section 6.3 in ACI 350R – Environmental Engineering Concrete Structures.)
   2. NEMA – National Electrical Manufacturer's Association – Standards pertaining to raceways.
   3. NEC – National Electric Code – As applicable to construction and installation of conduit system.
   4. Provide conduit which is listed and labeled by Underwriters' Laboratories.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner that will prevent deterioration or damage (e.g., bending, end damage, finish scoring), contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping. Provide color coded end cap thread protectors on exposed threads of threaded metal conduit.

D. Reject damaged, deteriorated, or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Rigid Metal Conduit (RMC):
   1. Galvanized Steel RMC: Galvanized steel, heavy wall conduit with threaded fittings, 3/4-inch trade size minimum, insulated bushings.

B. Rigid Nonmetallic Conduit (RNMC):
   1. Schedule 40, rigid polyvinylchloride, rated for 90 degrees C conductors, 3/4-inch trade size minimum, solvent cement connectors and couplings.
   2. Nonmetallic strap hangers allowing thermal expansion movement.
   3. Conduit to meet NEMA TC-2; fittings to meet NEMA TC-3.
   4. Expansion Coupling: Nonmetallic to compensate for thermal expansion.

C. Liquid Tight Flexible Metal Conduit (LTFMC): 3/4-inch trade size minimum. Flexible conduit with flexible, moisture-proof PVC jacket and liquid tight connectors.

D. Joint Compound for RMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

E. Conduit Hubs for RMC:
   1. Suitable for environment served.
   2. Grounding screw.
   3. O-ring gasket.
   4. Material: Stainless steel Type 316.
   5. Manufacturer:
      a. Cooper Myers Hubs.
      b. Thomas & Betts.
      c. Killark.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Unless otherwise specified or indicated on the Drawings, conduit to be surface mounted.

B. Install conduit products in accordance with:
   1. The Drawings.
   2. The Manufacturer's written instructions.
   3. Applicable requirements of NEC and National Electrical Contractors Association's "Standard of Installation."
   4. Recognized industry practices to ensure that products serve intended function.

C. Conduit Joints: Cut square, reamed smooth and drawn up tight.

D. Threaded Conduit Joints: Apply listed anti-corrosion/anti-seize compound to threads of raceway and fittings before making up joint. Follow compound manufacturer’s written instructions.

E. Bends:
   1. Number per run for conduit that support feeder and branch circuits: Do not exceed the equivalent of 4 quarter bends (360 degrees) between pull points.
   2. Number per run for conduit that supports data/communications cabling: Do not exceed the equivalent of 2 quarter bends (180 degrees) between pull points.
   3. Make bends and offsets so as not to reduce the inner diameter of the conduit.
   4. To the extent possible, avoid using large junction boxes as 90 degree junctions.

F. Routing:
   1. Concealed Conduits: Run in a direct line with long sweep bends and offsets.
   2. Exposed Conduits: Run parallel to, and at right angles to, building lines.
   3. Run continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
   4. Secure to boxes and cabinets with locknuts and bushings in such a manner that each system is electrically continuous throughout.

G. Cap conduit ends to prevent entrance of foreign materials during construction.

H. Provide insulated bushings on threaded conduit run terminations. Where entering the bottom of open-bottom switchboards, motor control centers, transformers, primary switches, and similar equipment provide bonding bushings and bonding jumpers.

I. Where entering the bottom of open-bottom equipment (i.e., switchboards, panelboards, motor control centers, transformers, and similar equipment) conduit shall not be installed flush with the floor/equipment pad and shall not rise more than 3 inches above the bottom of the enclosure.

J. Conduit entering control panels shall not obstruct internal components and shall allow for neat and workmanlike wire management.

K. Completely install conduit systems before installing conductors.

L. Refer to Division 26 Section “Common Work Results for Electrical” for sealing underground and above grade conduit that is exposed to temperature differences to prevent the passage of air and condensation.

M. Support:
1. Where information on Drawings conflicts with information herein, the more stringent requirements shall take precedence and the better quality or greater quantity of work shall be provided.
2. Adequately support conduit from structural elements of the building.
3. Do not drill or tap structural building steel without approval from Engineer.
4. Do not rest raceways or wiring systems on, nor support it from, ceiling suspension systems, ceiling tiles or mechanical equipment including, but not necessarily limited to ductwork and fans.
5. Conduit shall be supported in accordance with the NEC and Division 26 Section “Hangers and Supports for Electrical Systems.”

N. Provide conduit expansion couplings where conduits cross building or structure expansion joints.

O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200 pound tensile strength. Label and leave at least 12 inches of slack at each end of pull wire.

P. LTFMC Installation:
1. Provide separate grounding conductor in accordance with Division 26 Section “Grounding and Bonding.”
2. Connection to light fixtures shall not exceed 6 feet in length within an accessible ceiling and 3 feet in length where exposed. Connection to solenoids, pressure switches, motors, fans, HVAC equipment, and similar equipment shall not exceed 3 feet in length.

Q. Rigid Nonmetallic Conduit Installation:
1. Provide separate grounding conductor in accordance with Division 26 Section “Grounding and Bonding.”
2. Support conduit in accordance with the NEC.
3. Provide expansion couplings where length change due to temperature variation exceeds 1/4-inch.
4. When penetrating concrete surfaces or grade, make a transition to rigid steel conduit 6 inches (minimum) below the surface. Provide corrosion protection by coating the RMC with a bituminous coating from inside the encasing material to 4 inches of exposed conduit; vinyl corrosion protection tape may be installed, but must be reviewed with the Engineer prior to installation.
5. Provide rigid steel elbows in all conduit that is underground or encased in concrete.
6. In areas of assembly, where RNMC is installed, conduits shall be encased in a minimum of 2 inches of concrete.
7. Where RNMC is embedded in concrete, conduit shall be securely fastened and supported in accordance with the NEC to prevent damage during concrete pours.

R. Firestopping: Firestop all conduit penetrations of fire rated barriers to ensure integrity of the rating.

3.2 CONDUIT SCHEDULE

A. Where information on Drawings conflict with information herein, the more stringent requirements take precedence and the better quality or greater quantity of work shall be provided.

B. Feeders, Branch Circuits and System Conduits:
1. In Pipe Gallery: RNMC.
2. In Filter Gallery: RMC, painted to match wall color.

C. Data/communications conduits in dry locations not subject to physical damage and not installed underground nor in or below concrete: See schedule above.
   1. Data/communication conduits shall be bonded.
   2. Data/communication sleeves, provide plastic bushings.
   3. Data/communication conduits shall be 3/4-inch minimum.

D. Connection To Equipment:
   1. Control Devices (including, but not necessarily limited to solenoids, pressure switches, and field instruments):
      a. Dry Locations: LTFMC.
      b. Wet or Damp Locations: LTFMC.
   2. Vibrating Equipment (including, but not necessarily limited to motors and transformers):
      a. Motors/Actuators:
         1) Dry Locations: LTFMC.
         2) Wet or Damp Locations: LTFMC.

E. Provide separate raceway systems for:
   1. Normal power wiring.
   2. Data/communication wiring.
   3. A.C. signal and control wiring.
   4. Low voltage signal and control wiring.
   5. Analog instrumentation wiring.

F. Do not utilize panelboards, motor control centers, distribution equipment or like devices as raceways.

G. For conduits that enter NEMA Type 2, 3, 3R, 4, 4X, and 12 enclosures, provide conduit hubs with o-ring gaskets. Hubs shall be suitable for the environment served and shall match the conduit type. Grounding hubs shall be used with nonmetallic enclosures.

END OF SECTION 26 05 34

SECTION 26 05 35 – BOXES FOR ELECTRICAL SYSTEMS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of all electrical boxes and the major items listed below:
   1. Outlet boxes.
   2. Junction boxes.
   3. Pull boxes.

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. NEMA - National Electrical Manufacturer's Association: Standards as applicable to nonmetallic fittings for underground installation.
   2. NECA - National Electrical Contractor's Association's: Applicable portions of "Standard of Installation".

1.4 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed submittals.

B. Regulatory Agencies Requirements:
   1. Provide boxes which are listed and labeled by Underwriters' Laboratories.
   2. NEC - National Electrical Code (NFPA 70) - As applicable to construction and installation of electrical boxes.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors and protect from weather. When necessary to store outdoors, elevate materials above grade and enclose with durable, watertight wrapping.

D. Reject damaged, deteriorated, or contaminated materials and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Interior Outlet Boxes:
   1. Galvanized steel outlet boxes of the type, shape, and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.

2. In areas requiring exposed RNMC, provide nonmetallic outlet boxes of type, shape and size to suit each location. Each box is to have conduit hubs with removable plugs and a non-metallic cover. Each box shall be compatible with RNMC.

B. Interior Outlet Box Accessories:
   1. As required for each installation, including mounting brackets, wallboard hangers, extension rings, fixture studs, cable clamps, and metal straps for supporting outlet boxes. Accessories shall be compatible with outlet boxes being used and meet the requirements of individual wiring situations.
   2. Choice of accessories is installer's option.

C. Weatherproof Outlet Boxes:
   1. Corrosion-resistant cast metal, weatherproof outlet boxes, of the type, shape, and size, including depth of box, suitable for each application, with threaded conduit ends.

D. Surface Mounted: 4-inch square.

E. Junction and Pull Boxes:
   1. Sheet steel junction and pull boxes, with screw-on covers; of the type and shape and size to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers. Dry interior location boxes shall have baked enamel finish. Damp location and exterior boxes shall have galvanized finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install electrical boxes as indicated, in compliance with NEC requirements and in accordance with the Manufacturer's written instructions and recognized industry practices to ensure that the boxes and fittings serve the intended purposes.
   2. Provide weatherproof outlet boxes for interior and exterior locations exposed to weather or moisture.
   3. Provide knockout closures to cap unused knockout holes where blanks have been removed.
   4. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
   5. Surface mount all boxes and secure boxes rigidly to the substrate upon which they are being mounted.
   6. Do not use sectional or handy boxes.
   7. All boxes shall have covers installed at completion of construction.

END OF SECTION 26 05 35

SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of proper identification for electrical system components.

PART 2 - PRODUCTS

2.1 ELECTRICAL LABELS

A. Provide engraved laminated plastic nameplate to identify each piece of electrical equipment:
   1. Nameplate shall have 3/8-inch minimum black letters on a white background.
   2. Punched or drilled for mechanical fasteners.

B. Provide printed labels by Brady or T&B to identify conductors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Attach nameplates directly to each piece of electrical equipment. In finished areas of building, install nameplates behind enclosure door where possible.
   2. Where several conductors pass through a pull box, junction box, or enclosure, provide wire labels. Group wires before labeling.

B. Cables and Conductors:
   1. Cables and conductors shall be color-coded in accordance with Division 26 Section “Conductors and Cables – 600V and Below.”
   2. All conductors and cables for power, lighting, control, supervision, low voltage systems, etc. shall be labeled with the source and circuit number and/or match the identification provided in the manufacturer’s submittals and O&M manuals. If none of the identifiers are suitable or available, the Contractor shall devise a clear and understandable identification labeling system. Without exception, all cables and conductors shall be clearly labeled.
   3. Labeling shall occur everywhere cables and conductors are terminated or spliced.

C. Conduit Systems:
   1. Provide label inside each junction and pull box identifying circuit numbers for all conductors contained inside the box. Labeling shall be printed neatly with permanent, waterproof, black ink marker.

END OF SECTION 26 05 53

SECTION 40 05 13 – PROCESS PIPING SYSTEMS

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of process piping.

B. Work included under this Section:
   1. Non-buried process piping indicated on the Process Drawings.

C. Work not included under this Section:
   1. Piping indicated on plumbing and mechanical Drawings, including natural gas piping, building drain waste and vent systems, potable water plumbing systems, and piping systems to support HVAC systems.

D. Related Section includes Division 40 Section “Process Valves.”

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ANSI B 16.5 - Pipe Flanges and Flange Fittings.
   2. ASTM Standards:
      a. A36 - Structural Steel.
      b. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
      c. A193 - Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
      d. A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
      e. A234 - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
      f. A283 - Low and Intermediate Tensile Strength Carbon Steel Plates.
      g. A312 - Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
      h. A403 - Wrought Austenitic Stainless Steel Piping Fittings.
      i. D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
      j. D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
      k. D2464 - Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
      l. D2467 - Socket Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
      m. D2992 - Obtaining Hydrostatic Design Basis for Reinforced Thermosetting Resin Pipe and Fittings.
      n. D2996 - Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
      o. E8 - Low and Intermediate Tensile Strength Carbon Steel Plates.
      p. E23 - Notched Bar Impact Testing of Metallic Materials.
   3. AWWA Standards:
      a. C 104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fitting for Water.
      b. C 110 - Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In., for Water and Other Liquids.
      c. C 115 - Flanged Ductile-Iron Pipe with Threaded Flanges.
      d. C 151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
      e. C 200 - Steel Water Pipe 6 In. and Larger.
      f. C 207 - Steel Pipe Flanges for Waterworks Service - Sizes 4 In. through 144 In.
      g. C 208 - Dimensions for Fabricated Steel Water Pipe Fittings.
      h. C 210 - Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
      i. C 219 - Bolted Sleeve-Type Couplings for Plain-End Pipe.

j. C 220 - Stainless Steel Pipe, 4-Inch and Larger.
k. C 600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
l. C 606 - Grooved and Shouldered Joints.
m. C 651 - Disinfecting Water Mains.
n. Design Manual M-11 - Steel Pipe – A Guide for Design and Installation.

4. NSF Standards:
   a. 14 - Plastic Piping Components and Related Materials.
   b. 61 - Drinking Water System Components.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Pipe:
1. Design, fabricate and install according to the references and standards specified herein.
2. The Drawings indicate general pipe layout only. Details of joints, couplings, tie rods, supports and make-up pieces are not necessarily indicated. Submit proposed details for these components for Engineer's review.
3. Provide makeup pipe spools, supports and suitable couplings so that piping may be easily separated for removing valves and inline flanged device.

B. Supports and Hangers:
1. The detailed design, layout and spacing of process pipe supports shall be the responsibility of the Contractor. The required locations of some supports may be indicated on the Drawings.
2. Design to prevent pipe sway and movement.
3. Adequate to prevent sagging of plastic pipe.
4. Utilize supporting members as indicated on the structural Drawings for the design, layout and spacing of the process piping supports systems.
5. Design process piping support systems to allow process valves and meters to be removed from the piping system without adding temporary pipe supports to the pipe upstream or downstream of the valve or meter.

1.5 SUBMITTALS

A. Itemized Listings:
1. Equipment to be provided.
2. Deviations from the requirements of this Section.

B. Shop Drawings: For equipment assemblies in this Section to include:
1. Details of construction and installation, including taps, weld-on outlets, water collars, specials, and similar features.
2. Pipe diameter, wall thickness, length, centerline elevations, and locations and dimensions of valves fittings, taps, and in-line equipment and instruments, and similar features.
3. Location and centerline elevation of wall sleeves and wall pipes.
4. Type and location of pipe supports on 8-inch pipe and larger.
5. Details for concrete pipe supports including dimensions, reinforcement, pipe straps and locations proposed for use.
6. Type and location of pipe couplings.
7. Schedule of wall sleeves and pipes indicating proposed sizes, lengths, and connection details.
8. Preliminary testing schedule showing pipe sections to be tested, bulkheads, drains, and chlorine injection locations.
9. Schedule of coatings.

C. Product/Catalogue Data: For all products in this Section to include:
1. Manufacturer.
2. Manufacturer's engineering and specification data.
3. Dimensions, thicknesses, cross-sections, materials of construction.
4. Coatings.

D. Installation Instructions:
   1. Submit complete Manufacturer's installation instructions for all products.
   2. Submit pipe Manufacturer's recommended span lengths between hangers or supports for each pipe size and type.

E. Certifications: Submit Manufacturer's certification that products and materials conform to these Specifications.

1.6 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Shop Drawings.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration, damage, contamination with foreign matter, and damage by weather or elements, and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. General:
   1. In-Plant Process Piping 3-Inch and Larger:
      a. Ductile iron or carbon steel.
      b. Unless otherwise specified below or indicated on the Drawings.
   2. Provide taps at locations indicated on the Drawings.

B. Ductile Iron Pipe Systems:
   1. Ductile Iron Pipe: Conform to AWWA C 151, Class 53.
   2. Minimum Tests and Test Results of the Physical Characteristics of the Pipe:
      a. Tensile Test:
         1) ASTM E8.
         2) Minimum Tensile Strength: 60,000 psi.
         3) Minimum Yield Strength: 42,000 psi.
         4) Minimum Elongation: 10%.
      b. Notched Charpy Impact Test:
         1) ASTM E23 with 0.500-inch specimen.
         2) Minimum 7 ft-lbs at 70 degree F ± 10.
      c. Hydrostatic Pressure Test: Test pipe at 500 psi for at least a 10-second duration.
   3. Ductile Iron Pipe: Cement mortar lined according to AWWA C 104.
   4. Pipe Joints: Pressure rated at least as great as the pipe or fittings of which it is a part.
   5. Flanges:
      a. Conform to AWWA C 115.
      b. Flange bolts and Hardware: Galvanized or zinc-plated.
   6. Flange Gaskets: Full face, bulb-style, rubber, NSF listed for potable water service.
      a. Manufacturer: US Pipe, Tyton Flange-Tyte.
   7. Fittings: Conform to AWWA C 110 with cement mortar lining as specified above.
   8. Provide factory fabricated weld-on outlets meeting AWWA C111 and C115 where indicated on Drawings. Coat and line piping after welding.
   9. Paint outside of pipe, fittings, flanges and couplings in accordance with Division 09 Section "Painting."

C. Carbon Steel Pipe Systems:
   1. Use: As indicated on the Drawings.
   2. Steel Pipe 6-Inch Diameter and Larger:
      a. In accordance with AWWA C 200.
      b. Spirally welded steel pipe will not be allowed.
   3. Steel Pipe 4-inch Diameter and Smaller: Schedule 40, ASTM A53, Type E or S, Grade A.
   4. Fabricate and hydrostatically test steel pipe in accordance with AWWA C 200.
   5. Fabricate steel pipe fittings in accordance with AWWA C 208.
   6. Forged Fittings: Conform to ASTM A234.
   7. Drawings indicate flanges at fittings and forged fittings. Welded connections and forged or fabricated fittings are acceptable subject to the proper placement of pipe couplings (flanged, grooved type, or mechanical type) necessary for a proper installation:
      a. Mechanical Couplings: Dresser Style 38; or equal. Provide coupling middle ring at least 7 inches long, with a thickness at least as great as the pipeline of which it is a part. Harness joints in accordance with the Drawings, Specifications, and AWWA Design Manual M-11 for the maximum pressures indicated below:
         1) 150 psi.
      b. Steel Pipe Flanges**:**
         1) In accordance with AWWA C 207.
         2) Class D standard steel ring flanges.
         3) Flange Gaskets: Full face, rubber NSF listed for potable water service.
   8. Steel Pipe: Lined with NSF Standard 61 liquid epoxy protective coatings in accordance with AWWA C 210 and as specified in Division 09 Section “Painting.”.
   9. Minimum Steel Pipe Wall Thicknesses:
      a. 20-Inch Diameter and Larger Lines: 0.375 inches.
      b. Other Lines: 0.25 inches.
   10. Paint outside of pipe, fittings and flanges in accordance with Division 09 Section “Painting.”

D. Stainless Steel Pipe Systems:
   1. Use: Instrumentation piping, as indicated on Drawings.
   2. Materials shall be in accordance with AWWA C 220.
   3. Piping: Schedule 10S seamless Type 316L, bevel ends, in accordance with ASTM A312.
   4. Finish: 180 grit polish.
   5. Taps: Welded Type 316L stainless steel thredolets.
   6. Fittings:
      a. Schedule 10S, butt-weld.
      b. Factory made tees and long radius elbows in accordance with ASTM A403, mitered elbows in accordance with ANSI B16.9 dimensions where space allows.
      c. Reinforce fabricated fittings/headers for design pressure of 150 psig.
   7. Wall Thicknesses: In accordance with ANSI B36.19.
   8. Flanges: Butt-weld, full face.
   9. Flange Hardware: 315L stainless steel.
   10. Gasket Material: Full face, NSF listed for potable water service, Viton.
   11. Grooved Couplings: Victaulic epoxy-coated, 316L stainless steel hardware, Viton gasket, roll-grooved pipe.
   12. Stainless steel piping for liquid service, including welds, shall be pickled and passivated by the Manufacturer. Field welds, if required, shall be pickled and passivated in the field by a Manufacturer recommended method, subject to Engineer’s approval.

E. Polyvinyl Chloride (PVC) Pipe Systems:
   1. Use: Instrumentation piping.
   2. Materials:
      a. Manufacture pipe, valves, and fittings from material which meets the requirements of Type 1, Grade 1 polyvinyl chloride as outlined in ASTM D1784.
      b. PVC shall have a design stress rating of 2,000 psi at 73 degrees F and 440 psi at 140 degrees F for water service.
      c. Test and approve materials from which pipe, valves and fittings are manufactured for conveying potable water.

d. Joint Primer:
   1) ASTM F656.
   2) IPS P-70 Purple Primer; or equal.
e. Solvent Cement:
   1) ASTM D2564.
   2) IPS Weld-on 724 chemical-resistant cement; or equal.
f. Pipe and Fittings: NSF listed for potable water service and labeled as such.

3. Pipe: Schedule 80 PVC conforming to ASTM D1785.
4. Fittings:
   a. Schedule 80.
   b. Socket Type Fittings: Conform to ASTM D2467.
   c. Threaded Type Fittings: Conform to ASTM D2464. Used only where necessary to connect to threaded appurtenances. Use MIL Spec P-27730A Teflon tape when threaded connections are required.
5. Flange Gaskets: Viton.
6. Flange Hardware: Galvanized or zinc-plated.

2.2 SUPPORTS AND HANGERS

A. General:
   1. Design Layout and Spacing of the Pipe Supports: Responsibility of Contractor.
   2. Furnish factory fabricated hangers and supports complete with necessary inserts, clamps, bolts, nuts, washers, and accessories.
   3. On pipes 12-inch diameter and larger, generally use pipe stand type supports extending to the floor below. Coordinate proposed use of hangers from floors above the pipe with Engineer to ensure that the floors are capable of supporting pipe weight.

B. Manufacturers and Types:
   1. Pipe Hangers: Clevis or split ring type with adjustable threaded hanger rods.
   2. Hangers and Supports: Grinnell, Unistrut, Crane; or equal.

C. Materials (Supports and Hardware):
   1. Chemical Feed Rooms In and Above Process Tanks: Type 316L stainless steel.
   2. General Process Service: Hot-dip galvanized or zinc-plated.
   3. Isolate dissimilar pipe and support materials with 1/8-inch thick EPDM rubber sheet stock.

2.3 PIPE JOINT HARNESSES

A. Tie Rod Bolt: Conform to ASTM A193, Grade B7.

B. Tie Rod Lugs: Conform to ASTM A283, Grade C or ASTM A36.

C. Tie Rod Nuts: Conform to ASTM A194, Grade 2H.

2.4 PRESSURE GAGES

A. Provide pressure gages for CO_2 Carrier Water.

B. Gages shall be liquid filled and 4-1/2-inch diameter.

C. Pressure Range: 0 to 150 psi.

D. Manufacturer: Ashcroft, Model 1279; or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Install process piping and accessories in conformance with:
   a. The Manufacturer's recommendations.
   b. The Shop Drawings as reviewed by Engineer.
2. Install items to be embedded before concrete is placed.
3. Fasten embedded items securely to prevent movement when concrete is placed.
4. Install items plumb, square, true to lines, grades, elevations, and locations as indicated on the Drawings and herein specified.
5. Do not install chemical piping within finished rooms, regardless of size.
6. Valves, regardless of size and contents, shall be readily accessible. Chemical feed piping valves shall be accessible from operating floor.
7. Do not install chemical feed piping over equipment.

B. Hangers and Supports:
1. Install hangers and supports at less than maximum spacing as recommended by pipe Manufacturer.
2. Adjust hangers and supports to bring pipe lines to proper elevations.
3. Install inserts in concrete flush with the surface and capable of developing the full strength of the bolt.
4. Provide 1/8-inch thick rubber wrap around stainless steel piping where contacting pipe supports.

C. Insulate the following piping (see Division 23 Section “Process Piping Insulation”:
1. Plant Service Water used for CO_2 feed system.

D. PVC Piping: Installation procedures, including support spacing, solvent welding and allowance for expansion and contraction shall be in accordance with the Manufacturer's recommendations.

E. Stainless Steel Piping: Tools used for cleaning welds on stainless steel pipe shall be designated for and be suitable for use with stainless steel, and shall not leave carbon residue in the welds.

3.2 PAINTING

A. Paint pipe, fittings, supports, hangers, sleeves and accessories in accordance with Division 09 Section “Painting.” Do not paint stainless steel pipe.

3.3 TESTING

A. General:
1. Hydrostatically test the following process pressure piping lines:
   a. Plant Service Water
2. Tests shall be witnessed by Engineer.
3. Provide necessary equipment to perform tests including, but not necessarily limited to pumps, plugs, hoses and gages.

B. Procedure:
1. Pressure test procedure shall be in conformance with AWWA C 600, Section 4.
2. Duration: 2 hours.
3. Pressure: Maintain 150 pounds per square inch.
4. No visible leaks.

C. Repairs: In case of leakage under test, locate and repair leaks in an approved manner and test section again until a satisfactory test is secured.

3.4 DISINFECTION

A. Disinfect new process piping in conformance with AWWA C 651.

B. After disinfection, flush new process piping until the chlorine residual in the new section of piping is equal to that of the adjoining system, or less than 2 mg/l.

C. Use adequate quantities of flushing water so that the chlorine residual of the combined flushing and disinfection water is similar to the water of the adjoining system and is suitable for disposal.

3.5 CLEANING

A. Thoroughly clean installed materials and Products and related areas:
   1. Prior to acceptance of the work of this Section.
   2. In accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 40 05 13

SECTION 40 05 23 – PROCESS VALVES

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.

1.2 SUMMARY

A. This Section includes the furnishing and installation of all valves and valve operators in the process piping system as indicated on the process Drawings and defined in Division 40 Section “Process Piping Systems.”

B. This Section does not include the valves and operators for the piping systems indicated on the plumbing and mechanical Drawings.

C. Related Section includes Division 40 Section “Process Piping Systems.”

1.3 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the valves and operators of this Section shall comply with the following as applicable:
   1. ASTM Specification:
      a. A48 - Gray Iron Castings.
      b. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
      c. A148 - Aluminum Bronze Castings.
      d. A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware
      e. A240 - Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
      f. A351 - Steel Castings, Austenitic, for High Temperature.
      g. A436 - Austenitic Gray Iron Castings.
      h. A536 - Ductile Iron Castings.
      i. B21 - Naval Brass Rod, Bar, and Shapes.
   2. AWWA Standards:
      a. C 111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron.
      b. C 500 - Metal-Seated Gate Valves for Water Supply Service.
      c. C 504 - Rubber-Seated Butterfly Valves.
      d. C 507 - Ball Valves 6 In. Through 60 In.
      e. C 508 - Swing Check Valves for Waterworks Service. 2 In. Through 24 In.
      f. C 509 - Resilient-Seated Gate Valves for Water Supply Service.
      g. C 511 - Reduced Pressure Principle Backflow Prevention Assembly.
      h. C 512 - Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
      i. C 517 - Resilient-Seater Cast-iron Eccentric Plug Valves.
      j. C 519 - High Performance Waterworks Butterfly Valves 3 In. Through 60 In.
      k. C 520 - Knife Gate Valves, Sizes 2 In. Through 96 In.
      l. C 530 - Pilot-Operated Control Valves.
      m. C 541 - Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.
      n. C 542 - Electric Motor Actuators for Valves and Slide Gates.
      o. C 550 - Protective Epoxy Interior Coatings for Valves and Hydrants.
   3. NSF/ANSI Standards:
      a. 14 – Plastic Piping System Components and Related Materials.
      b. 61 – Drinking Water System Components - Health Effects.

1.4 SUBMITTALS

A. Shop Drawings:
   1. For equipment assemblies in this Section to include:
      a. Manufacturer.
      b. Model.
      c. Details of construction.
      d. Dimensions, including actuator dimensions and clearances.
      e. Materials of construction.
      f. Listing of components.
      g. Project specific wiring diagrams.
      h. Coatings.
      i. Weight of assemblies.
   2. For each type of equipment installed to include:
      a. Itemized listings.
      b. Deviations from the requirements of this Section.

B. Product Data: For equipment in this Section to include:
   1. Manufacturer.
   2. Model.
   3. Materials of construction.
   4. Manufacturer’s engineering and specification data.
   5. Electrical specifications and requirements.
   6. Torque specifications for actuators.

C. Torque calculations for actuators.

D. Installation instructions for equipment in this Section.

E. Operation and Maintenance Manuals: For equipment in this Section to include:
   1. Copy of reviewed Shop drawings and product/catalog data.
   2. Equipment function, normal operating characteristics and limiting conditions.
   3. Assembly, installation, alignment, adjustment and checking instructions.
   4. Operating instructions for start-up, routine and normal operating, regulation and control, and shutdown and emergency conditions.
   5. Lubrication and maintenance instructions.
   6. Guide to “troubleshooting.”
   7. Parts lists and predicted life of parts subject to wear.
   8. Outline, cross-sections, assembly drawings, engineering data, and wiring diagrams.

F. Certifications/Affidavits:
   1. Submit Manufacturer’s certification that products and materials conform to these specifications.
   2. Submit an affidavit from the valve manufacturer which certifies that actuators used were furnished and installed by the valve manufacturer.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in the fabrication and installation of the materials and equipment.
   2. Knowledgeable of the design and the reviewed Submittals.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, and damage by weather or elements and in accordance with Manufacturer's directions.

C. Reject damaged, deteriorated or contaminated material and immediately remove from the Site. Replace rejected materials with new materials at no additional cost to Owner.

D. Ship and handle valves in conformance with Section 18 of AWWA C 504.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND TYPES

A. Provide valves of the size and type as indicated on the Drawings and these Specifications.

B. All valves of each type shall be the Product of one Manufacturer.

2.2 MATERIALS AND FABRICATION

A. Butterfly Valves (new):
1. Conform with the latest edition of AWWA C 504 - Resilient-Seated Gate Valves for Water Supply Service.
   a. 20-inch diameter and smaller: Class 150B.
   b. 24-inch and larger: Class 75A.
2. Tight closing, rubber seated and bubble tight at rated pressures in either direction for applications involving throttling service or valve operation after long periods of inactivity.
3. Valve Body:
   a. Cast iron or ductile iron with flanged short body design.
4. Valve Disc:
   a. Cast iron or ductile iron with stainless steel, nickel-copper or nickel chrome seating edge.
   b. Disc and shaft connection made with stainless steel pins.
5. Valve Shaft:
   a. Turned, ground and polished; constructed of stainless steel.
6. Valve Seat:
   a. Natural or synthetic rubber compound suitable for potable water service, applied to either the valve body or disc.
   b. Full 360 degrees, retained in the valve body or disc without hardware of any kind in the flow stream.
7. Coating:
   a. Interior surfaces and exterior immersed surfaces: Coat in accordance with AWWA C550 using an NSF/ANSI Standard 61 - Potable Water (NSF-pw) listed epoxy; Tnemec; or equal.
   b. Exterior Surfaces (non-immersed): Shop prime coat in accordance with Division 09 Section “Painting” for interior ferrous metals – non-immersed (epoxy system).
   c. Flange Faces: Not coated except for protection from atmospheric corrosion.
8. Testing: Conduct hydrostatic and leakage tests in accordance with AWWA C 504 Sections 5.1.2 and 5.1.3.
9. Manufacturers:
   a. Dezurik.
   b. Pratt.
   c. Crispin
10. Valve Actuators:
   a. The type as indicated in the Valve Schedule.
   b. Designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.
   c. In accordance with AWWA C 504.
   d. Installed, adjusted, tested, and certified by the valve manufacturer prior to shipping.
   e. Electric Motor (See Valve Schedule in Drawings):
      1) Open/close. Refer to Division 40 Section “Instrumentation and Control for Process Systems” for additional requirements.
      2) Factory wired complete with control power transformer, fused control wiring, torque and limit switch shutoffs, motor overload protection, space heater, limit switches for opened and closed indication (local and remote).

3) Identification Plate: Provide permanent Type 316 stainless steel engraved plate on each actuator. Include the following information on each:
   a) Manufacturer.
   b) Complete model number.
   c) Tag designation.
   d) Electrical requirements, including voltage, phase, and amperage.
4) Operating Conditions, not including 150% service factor:
   a) Closed Position: Differential pressure – 120 psi.
   b) Open Position: Pressure – 120 psi; Flow – 250 gpm maximum.
5) Manual, padlockable handwheel override by means of a de-clutch mechanism.
   a) Include position indicator.
   b) Indicate direction to open valve on handwheel.
6) Motor switching and adjustable speed control. Solid state motor switching incorporating 25% to 100% motor speed control.
7) Non-intrusive limit setting, commissioning and control configuration using infra-red/Bluetoot setting tool.
8) Position feedback: Integral illumidated digital position indicator showing 0.1% increments in valve position with closed and open valve limit symbol, torque, or other status data.
9) LED indicator light color coding (CAN BE REVERSED):
   a) Red: Open.
   b) Yellow: Intermediate.
   c) Green: Closed.
   d) Blinker configurable.
10) Open/Close Actuators:
   a) Integral electrically and mechanically interlocked reversing contactors suitable for up to 60 starts per hour.
   b) Drive incorporating lost motion, for releasing sticking valves.
   c) Adjustable electronic torque switches 40% to 100% of rated.
11) Provide padlockable local/off/remote selector switch.
12) Power: 480 VAC, 60 Hz, 3 phase.
13) Discrete Inputs and Outputs:
   a) In remote status.
   b) Open control.
   c) Close control.
   d) Open status.
   e) Closed status.
   f) Fault status.
14) Provide remote hand station as indicated on Drawings.
   a) Display:
      1. Replicate the actuator display and controls interface.
      2. Digital valve position indicating 0.1% increments in valve position.
   b) LED indicator light color coding (CAN BE REVERSED):
      1. Red: Open.
      2. Yellow: Intermediate.
      3. Green: Closed.
      4. Blinker configurable.
   c) Wall mountable, designed to operate, interrogate, and configure actuator within 100m distance.
   d) RHS shall provide access to viewing and downloading dataloggers.
   e) Black/red padlockable local control/stop/remove control selector. Black open/close selector.
   f) Enclosure internally and externally sealed to IP68, with one threaded cable entry. NEMA 6.
   g) Powered via the attached actuators (24 VDC).
   h) Coating:
      1. Polyester powder.
      2. 75 micron nominal thickness.
15) Manufacturer:
   a) Rotork.

B. Butterfly Valves (existing):
   1. Valve Actuators:
      a. The type as indicated in the Valve Schedule.
      b. Designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.
      c. In accordance with AWWA C 504.
      d. Installed, adjusted, tested, and certified by the valve manufacturer prior to shipping.
      e. New Electric Motor (See Valve Schedule in Drawings):
         1) Open/close or Modulating control to control filter operations. Refer to Division 40 Section "Instrumentation and Control for Process Systems" for additional requirements.
         2) Factory wired complete with control power transformer, fused control wiring, torque and limit switch shutoffs, motor overload protection, space heater, limit switches for opened and closed indication (local and remote).
         3) Identification Plate: Provide permanent Type 316 stainless steel engraved plate on each actuator. Include the following information on each:
            a) Manufacturer.
            b) Complete model number.
            c) Tag designation.
            d) Electrical requirements, including voltage, phase, and amperage.
         4) Operating Conditions, not including 150% service factor:
            a) Filter Influent, Effluent:
               (1) Closed Position: Differential pressure – 5 psi.
               (2) Open Position: Pressure – 5 psi; Flow – 1,380 gpm maximum.
            b) Filter Drain:
               (1) Closed Position: Differential pressure – 5 psi.
               (2) Open Position: Pressure – 5 psi; Flow – 8,260 gpm maximum.
            c) Wash Water:
               (1) Closed Position: Differential Pressure – 60 psi.
               (2) Open Position: Pressure – 25 psi; Flow – 8260 gpm maximum.
         5) Manual, padlockable handwheel override by means of a de-clutch mechanism.
            a) Include position indicator.
            b) Indicate direction to open valve on handwheel.
         6) Motor switching and adjustable speed control. Solid state motor switching incorporating 25% to 100% motor speed control.
         7) Non-intrusive limit setting, commissioning and control configuration using infra-red/Bluetoot setting tool.
         8) Position feedback: Integral illumidated digital position indicator showing 0.1% increments in valve position with closed and open valve limit symbol, torque, or other status data.
         9) LED indicator light color coding (CAN BE REVERSED):
            a) Red: Open.
            b) Yellow: Intermediate.
            c) Green: Closed.
            d) Blinker configurable.
         10) Open/Close actuators:
            a) Integral electrically and mechanically interlocked reversing contactors suitable for up to 60 starts per hour.
            b) Drive incorporating lost motion, for releasing sticking valves.
            c) Adjustable electronic torque switches 40% to 100% of rated.
         11) Modulating actuators rated for minimum 1,800 starts per hour, 50% duty cycled based on a modulating torque of 50% of rated torque.
         12) Provide padlockable local/off/remote selector switch.
         13) Power: 480 VAC, 60 Hz, 3 phase.
         14) Discrete inputs and outputs:
            a) In remote status.
            b) Open status.
            c) Closed status.
            d) Fault status.
            e) Open/close actuators:
               (1) Open control.
               (2) Close control.

15) Analog inputs and outputs, modulating actuators only:
    a) Position control.
    b) Position feedback.
16) Provide remote hand station as indicated on Drawings.
    a) Display:
        (1) Replicate the actuator display and controls interface.
        (2) Digital valve position indicating 0.1% increments in valve position.
    b) LED indicator light color coding (CAN BE REVERSED):
        (1) Red: Open.
        (2) Yellow: Intermediate.
        (3) Green: Closed.
        (4) Blinker configurable.
    c) Wall mountable, designed to operate, interrogate, and configure actuator within 100m distance.
    d) RHS shall provide access to viewing and downloading dataloggers.
    e) Black/red padlockable local control/stop/remove control selector. Black open/close selector.
    f) Enclosure internally and externally sealed to IP68, with one threaded cable entry. NEMA 6.
    g) Powered via the attached actuators (24 VDC)
    h) Coating:
        (1) Polyester powder.
        (2) 75 micron nominal thickness.
17) Manufacturer:
    a) Rotork.

f. Existing Electric Motor (Valves FE-1631 through FE-1646).
    1) Furnish new analog I/O card for remote position control and feedback.

C. Hydraulic Control Valves:
1. Conform with the latest edition of AWWA C 530 - Pilot-Operated Control Valves.
2. Main Valve:
    a. Globe style valve rated for 150 psig minimum.
    b. 150 pound flat faced flange drilling.
    c. Independent, adjustable opening and closing speeds.
    d. Materials of Construction:
        1) Body and Cover: Ductile iron.
        2) Renewable resilient valve seats and replacement seals.
        3) Disc Retainer and Diaphragm Washer: Cast iron.
        4) Trim: Stainless steel.
        5) Disc: Buna N.
        6) Diaphragm: Nylon reinforced Buna N.
        7) Stem, Nut and Spring: Stainless steel.
3. Additional Pilots:
    a. Pressure Reducing Valve (Valve 2600):
        1) Function: Opens and regulates downstream pressure when an operator-adjustable low pressure occurs downstream of the valve.
        2) Outlet pressure adjustable over a range of 60 to 100 psig using an external adjusting screw. Coordinate set pressure with Engineer and Owner.
4. Valve Mounted Controls and Piping: Copper, brass, or bronze.
5. Coordinate valve settings with operating conditions and Division 40 Section “Instrumentation and Control for Process Systems.” Field adjust as required for proper operation.
6. Coating:
    a. Interior surfaces and exterior immersed surfaces: Coat in accordance with AWWA C 550 using an NSF/ANSI Standard 61 - Potable Water (NSF-pw) listed epoxy; Tnemec; or equal.
    b. Exterior Surfaces (non-immersed): Shop prime coat in accordance with Division 09 Section “Painting” for interior ferrous metals – non-immersed (epoxy system).

7. Manufacturers:
   a. Cla-Val.
   b. OCV
   c. Singer.
   d. Watts.
   e. Or equal.

D. Solenoid Valves:
   1. General:
      a. Furnish 3-way solenoid valve.
      b. Quantity:
         1) 16 in total, 2 per Particle Counter.
      c. 1/4-inch port.
      d. Universal pressure at any port.
      e. Complete with mounting brackets and conduit hubs as required.
      f. Manual override.
   2. Material and Fabrication:
      a. Manufacturer: ASCO 8327; or equal.
      b. Valve Bodies: Stainless steel.
      c. Seals and Discs: Buna N.
      d. Wetted Parts: Stainless steel.
      e. Power: 120 volt, 60 Hz.

E. Backflow Preventer:
   1. Description:
      a. Furnish and install approved backflow preventer(s) in accordance with the following table and as indicated on Drawings. Include a safewaste drain for drip from preventer valves piped to floor drain and install strainers ahead of first gate valve:

Service	Size	Rating	Description
Non-Potable and Process Water Services	4"	150#	Reduced pressure zone backflow preventer.
NOTE: Requirements of Codes having jurisdiction, that vary from the table requirements, shall be complied with for all services.			

   2. Manufacturer: Watts, Hersey, Beeco, Febco, Conbraco.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in conformance with:
   1. The Shop Drawings reviewed by Engineer.
   2. The Manufacturer's recommendations.

B. Check and adjust valves, operators and accessories for smooth operation.

C. Paint all valves and accessories in accordance with Division 09 Section “Painting.”

D. Labeling: Provide an engraved stainless steel tag securely fastened to each valve with the valve size, pressure rating, and tag number clearly indicated.

E. Provide valve actuator Manufacturer’s field service as required to start-up, adjust, participate in control loop tuning, and calibrate all valve equipment.

F. Pipe air and hydraulic actuated valve discharges to drain with an air gap.

3.2 CLEANING

A. Thoroughly clean all installed materials and products and related areas:
   1. Prior to acceptance of the work of this Section.
   2. In accordance with Division 01 Section “Cleaning and Waste Management.”

END OF SECTION 40 05 23

SECTION 40 90 00 – INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS

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.

1.2 SUMMARY

A. This Section includes, but is not necessarily limited to, the furnishing and installation of process control and instrumentation systems comprised of the major items listed below, as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work:
   1. Control panels.
   2. Field instruments.

1.3 GENERAL REQUIREMENTS

A. System Overview:
   1. Owner will self-perform programming of any PLCs or SCADA elements required to integrate new systems. Contractor to furnish and install all equipment and devices identified herein and on the Drawings and coordinate with Owner when items are ready for integration.
   2. The existing SCADA system shall be modified to control and monitor the valve actuators and instrumentation installed as part of the Ann Arbor Instrumentation and Controls Improvements project.
   3. Existing control panels (FILTER-CP, PLC-HS, PLC-C2, PLC-P2) will be reused with new signals (analog, discrete, etc.) to control and monitor control valves and instrumentation.
   4. One new remote I/O control panel (FILTER-CP2) shall be installed to control and monitor filter control valves and instrumentation.
   5. Contractor shall conduct field investigations as required to determine existing conditions, all wiring details, additional I/O requirements, signal ranges, units and calibration requirements.

B. Provide all components and labor necessary, as indicated on Drawings, to achieve functional intent as described in this Section. Some components (i.e., power supplies, terminal strips, etc.) may not be specifically itemized.

C. Provide components which are compatible with process equipment.

D. Functionally similar components shall be products of a single Manufacturer.

E. Installation of new systems and equipment shall be sequenced and coordinated to minimize disruptions to Owner’s normal operations.

F. Coordinate with the Owner to determine the number of filters that can be taken offline at a single time. Work shall be sequenced such that filters are taken offline, new equipment and devices are installed, and filters are brought back online and tested to Owner’s satisfaction before moving onto the next set of filters. Coordinate sequencing with Owner so that they are able to perform required PLC and SCADA programming.

1.4 SUBMITTALS

A. Itemized Listings:
   1. Description of deviations from the requirements of this Section.
   2. Re-submittals shall contain response(s) to each comment made by Engineer. Re-submittals that do not contain response(s) will be returned and will be subject to re-review compensation.

B. Shop Drawings:
   1. Shop Drawing submittal schedule listing Shop Drawings to be submitted with estimated time frame of submittal relative to other project milestones (e.g. programming development, factory test, performance demonstration, project closeout).
   2. General: Shop Drawing submittal material shall be project specific.
   3. For all process control and instrumentation equipment, to include:
      a. Manufacturer's name and model number.
      b. Equipment descriptions.
      c. Product data sheet(s).
      d. Standard drawings and illustrations.
      e. Dimensions.
      f. Materials of construction.
      g. Details of construction and installation.
      h. Detailed system schematic.
      i. Project specific wiring diagrams, clearly indicating all field wiring requirements.
      j. Spare parts list.
   4. For all systems with control panels, to include:
      a. Control panel layout drawing(s).
      b. Control panel conduit entrance locations and limitations.
      c. Control panel elevation drawing(s).
      d. Control panel wiring diagrams:
         1) Shall clearly differentiate between internal and field wiring.
         2) Shall indicate loop wiring numbers for all devices.
         3) Analog loop diagrams shall indicate instrument range in engineering units.
      e. Ambient temperature range design considerations, design assumptions and specifications.
      f. Detailed patch panel schematic indicating each port and field connection.
      g. Where modifications are required to existing control panels, existing control panel wiring shall be field verified and existing wiring shall be depicted in Shop Drawings to the extent required to fully indicate the extent of the modifications and to indicate the integration of the existing and new equipment. Where existing control panel drawings exist, they shall be "scanned in" to create an electronic version of the drawing. The electronic version of the existing panel drawing shall be used to indicate panel modifications for submittal and as-built purposes.

C. Operation and Maintenance Manuals:
   1. General:
      a. Table of contents.
      b. Subdivided (tabbed) into separate sections that cover separate equipment or grouping of equipment.
      c. Provide 1 electronic copy (thumb drive) per hard copy, of the overall O&M Manual. Owner shall be permitted to make copies without restriction.
   2. For all process control equipment, to include:
      a. Equipment function, normal operating characteristics and limiting conditions.
      b. Assembly, installation, alignment, adjustment and checking instructions.
      c. Operating instructions for start-up, routine and normal operating, regulation and control, and shutdown and emergency conditions.
      d. Lubrication and maintenance instructions.
      e. Guide to "troubleshooting."
      f. Parts lists and predicated life of parts subject to maintenance replacement.
      g. Outline, cross-sections, assembly drawings, engineering data and wiring diagrams.
      h. Test data and performance curves.

1.5 QUALITY ASSURANCE

A. Fabrication and Installation Personnel Qualifications:
   1. Trained and experienced in fabrication and installation of materials and equipment.
   2. Knowledgeable of the design and reviewed Shop Drawings.

B. All materials, installation and testing shall be in accordance with ISA Standards and Recommended Practice.

C. Contractor shall conduct field investigations as required to verify existing conditions, I/O, programming, wiring requirements, instrument ranges/calibration and signal types.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials in original, unbroken, brand marked containers or wrapping as applicable.

B. Handle and store materials in a manner which will prevent deterioration or damage, contamination with foreign matter, damage by weather or elements, and in accordance with Manufacturer's directions.

C. Store materials indoors in a controlled environment with low moisture content. Do not store outdoors.

D. Reject damaged, deteriorated or contaminated materials and immediately remove from Site. Replace rejected materials with new materials at no additional cost to Owner.

1.7 FUNCTIONAL INTENT

A. General:
1. Owner will self-perform all PLC and SCADA system programming. Functional intent herein is provided as an aid to the Owner for how the Engineer recommends the system operates.
2. Contractor shall provide all devices, controls, panels, wiring and miscellaneous items required to achieve the specified functional intent whether specifically itemized on the Drawings or not.
3. Contractor shall inspect existing conditions to determine exact materials and work required to interface new control system components with existing equipment.
4. Coordinate with Owner to incorporate equipment specific parameters in programming as necessary to meet specified performance.
5. Coordinate calibration and tuning of all equipment (including pumps, valves and existing equipment being incorporated into the control system), and control components with Owner to provide a complete system and achieve specified system performance.

B. Typical Equipment Control: Minimum functionality for equipment.
1. Typical OPEN/CLOSE Valve Control:
a. Each valve shall have:
1) LOCAL-OFF-REMOTE (LOR) selector switch for local control mode selection.
2) OPEN and CLOSE selection for local control.
3) OPENED and CLOSED pilot light for local indication.
b. The following signals shall be sent to SCADA:
1) IN REMOTE; for indication and alarm.
2) OPENED and CLOSED; for indication, alarm, and event logging.
c. Operation of equipment shall be as follows:
1) Local Mode (LOCAL):
a) The equipment shall be controlled manually from its respective valve actuator when the LOR switch is placed in the LOCAL and OFF positions. Refer to the actuator wiring diagram for operation in LOCAL mode.
b) When equipment is not in REMOTE, "LOCAL" shall be displayed adjacent to the appropriate equipment symbol on the computer screen.
2) Remote Mode (REMOTE):
a) The valve shall be controlled by the SCADA system when the LOR switch is placed in the REMOTE position.
b) When valve is in REMOTE, "REMOTE" shall be displayed adjacent to the appropriate symbol on the computer screen.
c) Operation in REMOTE mode shall be as follows:
(1) In REMOTE MANUAL mode under SCADA control, it shall be possible to open and close the valve from a SCADA screen.
(a) An OPEN-CLOSE control faceplate shall be available on the computer screen only when the selected valve is in REMOTE MANUAL.
(b) When equipment is in REMOTE MANUAL, "MANUAL" shall be displayed adjacent to the appropriate symbol on the computer screen.

(2) In REMOTE AUTO mode under SCADA control, valve shall be opened and closed automatically by SCADA.
(a) AUTO control shall be based on Functional Intent description.
(b) When equipment is in REMOTE AUTO, “AUTO” shall be displayed adjacent to the appropriate symbol on the computer screen.

2. Typical Positioning/Flow Control/Modulating Valve Control:
   a. Each valve shall have:
      1) LOCAL-OFF-REMOTE (LOR) selector switch for local control mode selection.
      2) Positioning selection for local control.
      3) Local position indication.
   b. The following signals shall be sent to SCADA:
      1) IN REMOTE; for indication and alarm.
      2) Position (0-100%); for indication, and logging/trending.
   c. Operation of equipment shall be as follows:
      1) Local Mode (LOCAL):
         a) The equipment shall be controlled manually from its respective valve actuator when the LOR switch is placed in the LOCAL and OFF positions. Refer to the actuator wiring diagram for operation in LOCAL mode.
         b) When equipment is not in REMOTE, “LOCAL” shall be displayed adjacent to the appropriate equipment symbol on the computer screen.
      2) Remote Mode (REMOTE):
         a) The valve shall be controlled by the SCADA system when the LOR switch is placed in the REMOTE position.
         b) When valve is in REMOTE, “REMOTE” shall be displayed adjacent to the appropriate symbol on the computer screen.
         c) Operation in REMOTE mode shall be as follows:
            (1) In REMOTE MANUAL mode under SCADA control, it shall be possible to position the valve from a SCADA screen by inputting valve position (0-100%).
               (a) A position control faceplate shall be available on the computer screen only when the selected valve is in REMOTE MANUAL.
               (b) When equipment is in REMOTE MANUAL, “MANUAL” shall be displayed adjacent to the appropriate symbol on the computer screen.
            (2) In REMOTE AUTO mode under SCADA control, valve shall be positioned automatically by SCADA.
               (a) AUTO control shall be based on Functional Intent description.
               (b) When equipment is in REMOTE AUTO, “AUTO” shall be displayed adjacent to the appropriate symbol on the computer screen.

C. Filter Control and Monitoring:
   1. Filter effluent valves shall have control and monitoring typical of modulating control valves.
      a. New actuators for Filters 2, 3, and 5 through 10:
         1) Valve FE-1622 (202).
         2) Valve FE-1623 (203).
         3) Valves FE-1625 through FE-1630 (205 through 210).
      b. Existing actuators for Filters 1 and 4.
         1) Valve FE-1621 (201).
         2) Valve FE-1624 (204).
      c. Existing actuators to be equipped with newly furnished and installed remote I/O cards, for Filters 11 through 26.
         1) Valves FE-1631 through FE-1646 (211 through 226).
   2. Filter influent, wash water supply, drain, and surface wash valves shall have control and monitoring typical of open/close valves.
      a. New actuators for Filters 1 through 26:
         1) Valves WIP-1621 through WIP-1626 (101 through 126).
         2) Valves FV-17-5-1 through FV-17-5-26 (401 through 426).
      b. New actuators for Filters 2, 3, 5 through 26.
         1) Valve CIS-1622 (502).
         2) Valve CIS-1623 (503).
         3) Valves CIS-1625 through CIS-1646 (505 through 526).

c. New actuators for Filters 1 through 10, 12 through 21, and 23 through 26.
    1) Valves FV-17-5-1 through FV-17-5-10 (401 through 410).
    2) Valves FV-17-5-12 through FV-17-5-21 (412 through 421).
    3) Valves FV-17-5-23 through FV-17-5-26 (423 through 426).
d. New actuators for Filters 1 through 21:
    1) Valves WW-1621 through WW-1641 (301 through 321).
e. Existing actuators for Filters 1 and 4.
    1) Valves CIS-1621 (501) and CIS-1624 (504).
f. Existing actuators for Filters 11 and 22.
    1) Valves FV-17-5-11 and FV-17-5-22 (411 and 422).
g. Existing actuators equipped with newly furnished and installed remote I/O cards, for Filters 22 through 26
    1) Valves WW-1642 through WW-1646 (322 through 326).

3. A new flow meter shall continuously monitor filter effluent flow. A new transmitter shall transmit a 4-20 mAdc signal proportional to flow to SCADA for indication, control, logging, and totalization.
    a. Filters 1 through 10 Effluent Flow:
        1) 1621-FE/FI through 1630-FE/FI.
4. A new integral loss of head transmitter shall continuously monitor loss of head through the filter media. A 4-20 mAdc signal proportional to loss of head shall be transmitted to SCADA for indication, control, and logging.
    a. Filters 1 through 10:
        1) 1621-LH through 1630-LH.
5. A new particle counter shall continuously monitor filter effluent particle count.
    a. Incorporate new particle counter into existing Modbus Network.
    b. Each particle counter shall be shared between pairs of adjacent filters.
        1) Filters 1 and 3: 1621-AIPC
        2) Filters 2 and 4: 1622-AIPC
        3) Filters 5 and 7: 1625-AIPC
        4) Filters 6 and 8: 1626-AIPC
6. New turbidity sensors shall continuously monitor filter backwash turbidity. A turbidity controller shall transmit a 4-20 mAdc signal proportional to turbidity to SCADA for indication, control, and logging. Each controller shall be shared between pairs of adjacent filters
    a. Filters 1 and 3: 2621-AE & 2623-AE/2621-AINTU
    b. Filters 2 and 4: 2622-AE & 2624-AE/2624-AINTU
    c. Filters 5 and 7: 2625-AE & 2627-AE/2625-AINTU
    d. Filters 6 and 8: 2626-AE & 2628-AE/2628-AINTU
    e. Filters 9 and 11: 2629-AE & 2631-AE/2631-AINTU
    f. Filters 10 and 12: 2630-AE & 2632-AE/2632-AINTU
    g. Filters 13 and 15: 2633-AE & 2635-AE/2635-AINTU
    h. Filters 14 and 16: 2634-AE & 2636-AE/2636-AINTU
    i. Filters 17 and 19: 2637-AE & 2639-AE/2639-AINTU
    j. Filters 18 and 20: 2638-AE & 2640-AE/2638-AINTU
    k. Filters 21 and 22: 2641-AE & 2642-AE/2642-AINTU
    l. Filters 23 and 24: 2643-AE & 2644-AE/2644-AINTU
    m. Filters 25 and 26: 2645-AE & 2646-AE/2646-AINTU
7. New level sensors shall continuously monitor water level. New transmitters shall transmit a 4-20 mAdc signal proportional to level to SCADA for indication, control, and logging.
    a. Filter 8: 2628-LE/LI
    b. Filter 13: 2633-LE/LI
    c. Filter 22: 2642-LE/LI
8. New high and low level switches shall signal to audio and visual indicators upon high and low filter level.
    a. Filter 1: 2621-LSH, 2621-LSL
    b. Filter 19: 2639-LSH, 2639-LSL
    c. Filter 26: 2646-LSH, 2646;LSL

D. Finished Water Monitoring:
   1. A new flow meter shall continuously monitor finished flow. A new transmitter shall transmit a 4-20 mAdc signal proportional to flow to SCADA for indication, control, logging, and totalization.
      a. Gravity 1: HS623-FE/FI
      b. Gravity 2: HS624-FE/FI
      c. East High Service: HS1216-FE/FI
      d. West High Service: HS0327-FE/FI

E. Miscellaneous Monitoring and Control:
   1. A new level sensor shall continuously monitor level. A new transmitter shall transmit a 4-20 mAdc signal proportional to level to SCADA for indication, control, and logging.
      a. Clearwell 2: HS0310-LE/LI
      b. Cistern 1: C21610-LE/LI
      c. Cistern 2A: P21701-LE/LI
      d. Cistern 2B: P21708-LE/LI

1.8 GUARANTEE AND WARRANTY

A. Process control and instrumentation system Supplier shall guarantee the entire system for a period of 1 year. This guarantee shall cover all parts, labor, troubleshooting, telephone consulting, travel, and equipment recalibration.

B. The 1-year guarantee period shall begin at Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Acceptable Manufacturers for major system components are specified herein.

B. Not all components are specified. It is the Contractor's responsibility to furnish and install components necessary to achieve the functional intent and to meet or exceed the governing local, state or national standards and/or codes.

C. Coordination of all field mounted instrumentation device installation shall be system Supplier's responsibility:
   1. Mounting of each device shall be designed with consideration to:
      a. Manufacturer's installation recommendations.
      b. Ease of removal for maintenance.
      c. Safety.
   2. Provide all mounting hardware required.
   3. All mounting hardware shall be of the following corrosion resistant material. Coordinate mounting material with surrounding environment:
      a. PVC.
      b. Stainless steel.
      c. FRP.

   Provide sufficient length of sensor to transmitter cable for each field device.
   4. Provide unions, bulkhead fittings, isolation valves, etc.

D. Pre-Approved Acceptable System Suppliers:
   1. UIS.
   2. Perceptive.
   3. Engineer approved equal.

2.2 CONTROL PANELS AND COMMUNICATION PANELS

A. General:
1. Install all wiring in a workmanlike manner. Group, bundle, label, support, and route horizontally and vertically to provide a neat and organized appearance.
2. Provide circuit breakers and surge protection on all panel power sources.
3. All field 4-20mAdc signals shall be powered from panels, unless indicated otherwise on the Drawings.
4. All field contact closures shall be powered from UPS, when available, within control panels.
5. All wiring shall be sized, labeled and color coded in accordance with Division 26 Section “Conductors and Cables - 600V and Below.” All panel wiring shall be type MTW unless indicated otherwise on the Drawings.
6. When required, shunt resistors shall be 250 Ohm ± 0.01%.
7. Provide labeled terminal strips for all wiring entering and leaving panels.
8. Provide patch panels for all network wiring entering and leaving panels.
9. Provide Sub-plate Identification Tags:
    a. Tags shall be made from engraved plastic, white with 3/8-inch minimum black letters, for all internal enclosure components.
    b. Punched or drilled for mechanical fasteners.
    c. Stainless steel machine screw fasteners.
10. Label addressable devices with IP or node addresses.
11. Coordinate and provide all necessary mounting hardware.
12. Provide ground bar (Ilsco D-167; or equal) for each control panel. Ground “lugs” shall not be used. Remove (scrape) paint from sub-panel prior to ground bar installation to provide an effective electrical connection.
13. Conduit shall not enter into panels from top. Side, rear and bottom entry permitted only. Cast metal, O-ring type sealing conduit hubs shall be used on NEMA rated enclosures.
14. Corrosion Inhibitor Emitter: Provide an industrial corrosion inhibitor emitter to protect internal components of control panel from corrosion for panels located outdoor or in NEMA 4/4X areas. Corrosion inhibitor shall protect for up to one year, and shall be replaceable. Provide one spare for each provided.
15. Factory assemble and test all panels before shipment to Project Site.
16. A minimum of 25% spare points of each type (digital inputs, digital outputs, analog inputs, and analog outputs) shall be provided within each panel and I/O rack, wired to terminal blocks.
17. Provide minimum 25% spare terminals, unwired.
18. Provide space and DIN rail for an additional 10% for future terminals.
19. Fuse all outputs which control highly inductive loads. Provide 10 spare fuses of every size and type used per panel.
20. Cabling, connectors and accessories shall be provided for all equipment as required.
21. Contractor shall provide all mounting hardware, shelves, support brackets, patch panels, etc., as required to install equipment.

B. Modification to Existing Control Panels:
1. Provide all field modification, wiring changes, and wiring additions as indicated on Drawings or as required to achieve function as described in this section.
2. Control panels field modifications shall be performed by UL listed fabrication facility personnel to UL standards and meet the requirements of NEC and UL508/698.

C. Control Panels:
1. Furnish control panel(s) of the design and type as indicated on the Drawings and in these Specifications. Contractor is responsible for verifying panel size requirements.
2. Control panels shall contain all components listed in Paragraph 1.7 - Functional Intent, specified herein, and as indicated on the Drawings, plus any additional items (24-volt power supplies, panduit, terminal strips, etc.) necessary for completion of the Work.
3. Control panels shall be assembled by a UL listed fabrication facility. Panels shall be UL approved and meet the requirements of NEC and UL508/698. Available fault current is 10,000 amps. Each panel shall have a serialized UL label.
4. New control panels shall have a “Power On” white pilot light on the door of the control panel.

D. Enclosures:
   1. General:
      a. Size Enclosures:
         1) To adequately space necessary components in accordance with NEC.
         2) Such that UPS does not block access to terminal strips or other internal components.
      b. Data pocket.
      c. LED light fixture with lens or shatterproof coated lamp, and door activated switch. Fixture mounting shall not invalidate NEMA rating.
      d. DIN-rail mounted, 20A convenience receptacle.
      e. Provide shelf so that UPS does not set on bottom of enclosure.
      f. NEMA rated for environment.
      g. UL listed.
      h. White painted steel back panel, unless indicated otherwise on the Drawings.
      i. Provide all necessary interior supports to ensure panel structural integrity and prevent "oil canning" of side walls.
   2. Panel Enclosure Schedule:
      a. FILTER-CP2: NEMA 12.
   3. Metallic:
      a. General:
         1) Seams continuously welded and ground smooth: no holes or knockouts.
         2) Painted enclosures shall be ANSI 61 Grey exterior finish.
         3) White interior finish.
         4) Bonding provisions on door.
         5) Two-door if over 36 inches wide, with removable center post.
         6) Collar studs for mounting sub-panels.
         7) Body flange trough collar with oil resistant door gasket.
         8) Front hinged access door with heavy duty 3-point latching mechanism with latch rod rollers, 316 stainless steel pad-lockable handle all keyed alike.
         9) Heavy duty continuous door hinges.
      b. Freestanding:
         1) Material: 12 gage sheet metal, minimum.
         2) Heavy duty lifting eyes.
         3) 84-inch (minimum) height.
      c. Manufacturer:
         1) Hoffman.
         2) Copper B-Line.
         3) Saginaw Control and Engineering.

E. Panel Devices:
   1. General:
      a. Pilot lights, selector switches and push buttons shall be from same Manufacturer. NEMA ratings shall match that of control panel.
      b. Indicators and totalizers shall be from same Manufacturer.
   2. Pilot Lights:
      a. Heavy duty, oil tight, LED-type, 30.5 mm with full voltage, push-to-test feature, nameplate and replaceable color lens and replaceable light unit.
      b. Manufacturer:
         1) Allen-Bradley, 800T/H.
         2) Square D, Type K/SK.
         3) Eaton\Cutler-Hammer 10250T, E34.
   3. Control Relays:
      a. Heavy duty, 15 amp minimum, 3-pole double throw (minimum).
      b. Pin or blade terminals.
      c. DIN mount sockets IP20, finger safe.
      d. Indicating light and check button.
      e. UL listed.
      f. Provide hold down clips for all relays.
      g. Provide 2 spare of each type provided, per panel. Installed in panel, un-wired.
      h. Provide interposing relay for all solenoids and motor loads.

i. Manufacturer:
   1) Allen-Bradley.
   2) Square D.
   3) Magnecraft.
   4) Potter & Brumfield.

4. DIN Rail Mounted Miniature Circuit Breakers and Supplementary Protection:
   a. Rated for 250 VAC, 50/60 Hz, 65 Vdc.
   b. Rated cross section for wire sizes #22 to #10 AWG.
   c. Operating life of 6,000 cycles at rated current.
   d. UL listed.
   e. Short-Circuit Current Rating: 10 kA at 125 VAC (minimum).
   f. Provide bus bar where more than 4 circuit breakers are provided in the same panel. Cap unused connectors.
   g. Finger safe terminals.
   h. Amperage ratings of 0.2A to 15.0A, system Supplier shall calculate required ratings, unless otherwise noted.
   i. Manufacturer:
      1) Allen-Bradley.
      2) Square D/Merlin-Gerin.
      3) Moeller Electric.
5. Terminal Blocks:
   a. General: 6mm (nominal), screw type, single tier terminal blocks.
   b. Mounting: Standard TS 35 DIN rail.
   c. Wire Range: 22-2 AWG.
   d. Removable/replaceable marking system (labels).
   e. Manufacturer:
      1) Wieland, WKI series.
      2) Phoenix Contact, UT series.
      3) Weidmuller.
   f. Spare Parts: 25% spare terminal blocks, mounted and unwired.
6. Surge Protection Device (SPD):
   a. General: Device shall not interfere with normal operation of circuit being protected.
   b. 120 VAC 1-Phase:
      1) General: High speed, high current, solid state device designed to protect electronic equipment and systems from transient over-voltages.
      2) Mounting: DIN-rail, 2-piece design with removable suppressor module/relay.
      3) “Operational/Non-operational” visual indication.
      4) Remote indicator contact.
      5) Protection Method/Type: Silicon Avalanche Suppressor diodes.
      6) Automatic Reset: After each suppression function with no degradation to protection capabilities.
      7) Compliance: UL 1449 Edition 3.
      8) Rating: 1.5 kA 8x20µs (minimum) surge current capacity.
      9) Provide overcurrent protection.
      10) Manufacturer:
         a) Bussmann.
         b) Phoenix Contact.
         c) Transtector.
         d) DEHN\Pepperl + Fuchs.

F. Remote I/O:
   1. Remote I/O (Allen-Bradley ControlLogix):
      a. General: Equipment shall be sized to perform functions as listed. Equipment specifications shall be verified and adjusted as required to ensure proper performance and functionality. Model numbers shall be adjusted as required where compatibility and interaction with other specified components are limited or are not supported by the manufacturer.
      b. Power Supplies: Power supplies shall operate on 120 VAC and shall supply 24 Vdc and 5 Vdc to the I/O chassis backplane as required. Power supplies shall be Allen-Bradley Model 1756-PA75.

c. I/O Chassis:
   1) All I/O and required communication modules shall be mounted in a modular style chassis. I/O chassis shall provide power to modules through the backplane. I/O chassis shall also provide a communication link to installed modules through the backplane. I/O chassis shall be sized as required to provide slots for required modules, as well as 25% spare slots. Chassis shall be a minimum of 4 slots.
   2) Manufacturer: Allen-Bradley 1756-A7 (7 slot), 1756-A10 (10 slot), 1756-A13 (13 slot) or 1756-17 (17 slot) as required for I/O and communication modules.
d. Discrete Input Modules:
   1) 120 VAC discrete input modules shall operate on voltage provided through the I/O chassis backplane. Modules shall include LED status indicators. Modules shall contain 16 inputs, individually isolated for use with multiple power sources.
   2) Modules shall be provided with 36 pin, screw clamp, removable terminal blocks Allen-Bradley 1756-TBNH, and extended wiring housing Allen-Bradley 1756-TBE.
   3) Manufacturer: Allen-Bradley 1756-IA16I.
e. Discrete Output Modules:
   1) Discrete output modules shall operate on voltage provided through the I/O chassis backplane. Modules shall include 16 normally open, individually isolated relay contact outputs capable of 2A at 125 VAC or 5-30 Vdc continuous. Modules shall include LED status indicators.
   2) Modules shall be provided with 36 pin, screw clamp, removable terminal blocks Allen-Bradley 1756-TBNH, and extended wiring housing Allen-Bradley 1756-TBE.
   3) Manufacturer: Allen-Bradley 1756-OW16I.
f. Analog Input Modules:
   1) Analog input modules shall be 16-bit resolution and shall operate on voltage provided through the I/O chassis backplane. Modules shall have 6 individually isolated channels. Modules shall be user configurable to either accept a voltage input of ±10.5 Vdc (typically 1-5 Vdc) or 0-22 mAdc (typically 4-20 mAdc). Modules shall be capable of scaling to engineering units through the software.
   2) Modules shall be provided with 20 pin, screw clamp, removable terminal blocks Allen-Bradley 1756-TBNH, and extended wiring housing Allen-Bradley 1756-TBE.
   3) Manufacturer: Allen-Bradley 1756-IF6I.
g. HART Enabled Analog Input Modules:
   1) Analog input modules shall be 16-bit resolution and shall operate on voltage provided through the backplane. Modules shall be capable to 8 differential voltage or current inputs. Modules shall be user configurable to either accept a voltage input of ±10 Vdc (typically 1-5 Vdc) or 0-20 mAdc (typically 4-20 mAdc). Modules shall be capable of scaling to engineering units through the software.
   2) Manufacturer: Allen-Bradley 1756-IF8H.
h. Analog Output Modules:
   1) Analog output modules shall be 16-bit resolution and shall operate on voltage provided through the I/O chassis backplane. Modules shall have 6 individually isolated outputs of ±10.5 Vdc (typically 1-5 Vdc) or 0-21 mAdc (typically 4-20 mAdc). Modules shall be capable of scaling to engineering units through the software.
   2) Modules shall be provided with 20 pin, screw clamp, removable terminal blocks Allen-Bradley 1756-TBNH, and extended wiring housing Allen-Bradley 1756-TBE.
   3) Manufacturer: Allen-Bradley 1756-OF6VI or 1756-OF6CI.
i. Communication Modules:
   1) General: Provide compatible modules. Verify with manufacturer. Adjust module model numbers where required for inner-operability.
   2) Ethernet:
      a) Shall be used as the “backbone” for Plant-wide control network.
      b) Modules shall be powered from the I/O chassis backplane and communicate at a rate of 10/100 Mbps via an RJ-45 connector.
      c) Ethernet modules shall be able to control I/O over an Ethernet/IP network.
      d) Ethernet modules shall act as an adapter for distributed I/O on remote Ethernet/IP links.
      e) Modules used for I/O control shall be dedicated to I/O control with dedicated network segment and dedicated components.
      f) Ethernet modules shall route messages to devices on other networks.

g) Manufacturer: Allen-Bradley 1756-EN4TR, 1756-EN2TR.

j. Empty Slot Filler:
1) Provide slot filler for all unused chassis slots.
2) Manufacturer: Allen-Bradley 1756-N2.

G. Shelf Mounted Uninterruptible Power Supplies (UPS):
1. Online Double Conversion UPS:
a. Power: 120 VAC input, 45-65 Hz, 120 VAC output, input power factor greater than 0.95.
b. Connection: Input line shall include a NEMA 5-15P plug. A minimum of 4 NEMA 5-15R output receptacles shall be included.
c. Output Voltage Regulation: On utility ±2% nominal, on battery ±3% nominal.
d. Topology: True online double conversion with automatic bypass.
e. Output: Pure sine wave with less than 5% total harmonic distortion (THD), and efficiency greater than 86%.
f. User Interface:
1) Power usage.
2) On battery.
3) Overload.
4) UPS fault.
g. Battery Management: Deep discharge protection.
h. Extended runtime capability with external battery modules.
i. Batteries: Sealed, maintenance free, lead acid, hot-swappable batteries with “start on battery” capability to allow UPS to start up in the absence of utility power.
j. Transfer Time to Battery: 0 ms.
k. Automatic bypass on overload of 130% for 10 seconds.
l. UPS Sizing: Where UPS size is not identified on the Drawings, Contractor shall size UPS to provide a minimum 10 minutes of runtime for control panel and equipment served.
m. All PLC control panels shall be equipped with a UPS whether existing or new. Provide separate enclosures for UPSs which will not physically fit into existing enclosures.
n. Manufacturer:
1) PowerWare: Series 9130.
2) Sola/Hevi-Duty, S4K Series.
3) Liebert, GXT2.
o. Accessories:
1) Mounting bracket or shelf. UPS shall not block other devices or terminals located in the control panel. UPS display and user interface shall be easily viewable without moving UPS.
2) Receptacles to allow for removal of UPS without tools.
3) Relay to monitor UPS power and automatically switch to line power on loss of power from UPS.
4) Relay interface card for UPS alarm to provide PLC input.
5) Provide interposing relays as required.
6) Provide cabling to match UPS relay card connector.
7) Red and white labels on exterior of all enclosures (new and existing) which contain UPS units. Signs to read: “DANGER: BATTERY AND EXTERNAL VOLTAGE PRESENT”. Labels shall be 10-inch x 7-inch minimum.

H. Ethernet Networking Equipment:
1. General:
a. Ethernet Networking Equipment shall be products of a single Manufacturer.
b. Provide dedicated power supply for each Ethernet converter/switch not powered at 120VAC.
2. Unmanaged Switch:
a. Unmanaged Ethernet switch, store and forward switching mode 10Mbit/s and 100Mbit/s.
b. Ports: 10/100BASE-TX RJ-45 ports, auto-crossing, auto-negotiation, auto polarity, 6 ports minimum, additional ports where indicated on the Drawings.
c. Operating Temperature: 0 to 60 degrees Celsius.
d. Relative Humidity: 10% to 95% (non-condensing).
e. Mounting: 35 mm DIN rail.
f. Metal case.
g. Line/star topology.
h. Diagnostic LEDs.

i. 24 Vdc power with plug-in terminal block.
j. Manufacturer:
1) Hirschmann.
2) Moxa.
3) Cisco.

3. Power Supply:
a. Output Power: 3 A (minimum) at 24 Vdc.
b. Input Voltage: 120 VAC nominal.
c. Mounting: 35 mm DIN rail.
d. Manufacturer:
1) Hirschmann.
2) Weidmuller.
3) Phoenix Contact.
4) Hirschmann.
5) Moxa.

I. Patch Panels and Patch Cables:
1. General:
a. Network cables that enter or leave an enclosure shall be terminated at a patch panel.
b. Rackmount patch panels shall utilize horizontal and vertical cable manager components. Patch cables shall not block or hang in front of equipment or patch panels.
c. Standalone patch panels shall have hinged mounting brackets.
d. Provide patch cables for all patch panel points, including spare.
2. UTP (CAT 6) Patch Panels:
a. Rack Mount Patch Panel:
1) Either 19/23-inch rack mount or standalone (for control panels).
2) Rack mount patch panels shall feature a removable front access panel.
3) Available with RJ-45 style connectors.
4) Adapter panels shall be available with 6 or 12 connectors each.
5) Manufacturers: Leviton, Panduit; or equal.
b. Mini-Patch Panel:
1) DIN rail mounted.
2) Available with RJ-45 style connectors.
3) Shall be available with 3 connectors each.
4) Manufacturer:
a) Phoenix Contact, VS-PP-F-RJ45-CAT6..
b) Black Box, JPM183A.
c) Hirschmann, MIPP.
3. UTP Patch Cables:
a. Available with RJ-45 style connectors, coordinate lengths with installation requirements.
b. Connectors shall be factory installed, with snagless molded strain relief.
c. Minimum rating Category 6 in accordance with TIA/EIA-568.
d. Stranded construction, factory product. Field assembled terminations will not be acceptable.
e. Provide STP cables in panels where electrical interference may be generated within the panel (e.g. by VFDs or SCR drives).
f. Patch cables shall be colored green, unless otherwise noted.
4. Manufacturers: Leviton, Panduit; or equal.

J. Site Specific Requirements (Major Components):
1. General: The following is provided as an aid to the Contractor. It is the Contractor's responsibility to verify information contained below for completeness and to provide equipment that is indicated elsewhere on Drawings and Specifications, but not listed below.
2. FILTER-CP2:
a. General:
1) NEMA 12 metal.
2) Freestanding. Contractor to size as required for equipment.
3) Circulating cooling fan.
4) LED light interlocked with door.

b. Major Components:
1) ControlLogix I/O and communication modules.
2) UPS.
3. Modifications to Existing Main Control Panel:
a. New programming as required.
b. New networking.

2.3 FIELD INSTRUMENTS

A. General:
1. Schedules are provided as an aid to Contractor. It is Contractor's responsibility to verify information contained in the schedules for completeness and to provide equipment that is indicated elsewhere on Drawings and Specifications, but not listed in schedules.
2. Provide instruments rated for environment.
3. Field verify Manufacturer's cable lengths prior to Shop Drawing submittal.
4. Existing instruments that are relocated or modified shall be recalibrated.
5. Existing instruments with unknown scaling or ranges shall be recalibrated.
6. Existing instruments that do not agree with new instrumentation shall be recalibrated.
7. Existing instruments that are used in conjunction with new control systems shall be recalibrated.
8. Tagging: Equip all instruments with a permanently attached, stamped or engraved identification tag. The tags shall include the device name, Engineer's tag identification, and manufacturer's tag identification if different from Engineer's.
9. Finish: Finish on the instruments and accessories shall provide protection against corrosion by the elements in the environment in which they are to be installed.
10. Temperature Rating: Instruments shall be suitable for the temperature in which they are to be exposed. Therefore, instruments located outdoors or in unheated spaces shall be suitable for -20 degrees F to 120 degrees F. Instruments exposed to direct sunlight (without sunshield) shall be suitable for temperatures up to 140 degrees F.
11. Provide configuration software and cables or hand held device(s) for any instrument which cannot be fully programmed via keypad/interface which is integral to device.

B. Instrument Pipe Stand:
1. General: Modular support system for mounting of instrumentation components.
2. Provide for each instrument that cannot be wall mounted.
3. Material of construction: Galvanized carbon steel, aluminum or stainless steel as required by environment to prevent corrosion.
4. Floor stands shall have gussets for strength and stability.
5. Size as required to mount instrument at 4′-6″ above operating level, unless otherwise noted.
6. Manufacturers:
a. O'Brien, Saddlepak.
b. Techline Mfg.
c. Or equal.

C. Continuous Level Measurement:
1. Differential and Gauge Pressure Transmitters:
a. Microprocessor based smart transmitter.
b. Display: Integral LCD.
c. Material:
1) Stainless steel wetted parts and diaphragm.
2) Teflon O-rings.
3) Silicone fill fluid.
4) Stainless steel mounting bracket and hardware.
5) Epoxy covered aluminum housing.
d. Accuracy: 0.075% of span with 5-year stability.
e. Rangeability: 30:1.
f. Process Connection: Stainless steel 3-valve manifold.
g. Output: 4-20 mAdc plus HART protocol.
h. Range: 0 to 20 feet.
i. Power: Loop powered.

j. Schedule: See Instrument Schedule on Drawings.
k. Manufacturers:
   1) Rosemount.
l. Accessories:
   1) Integral drain and vent valve, differential pressure transmitter only.
   2) Provide 316 stainless steel mounting hardware as required.

2. Non-Contact Radar:
   a. General: Non-contact radar transmitter/receiver to determine level by measuring time-of-flight of a radar pulse from the radar transmitter to the product surface and back.
   b. False Target Rejection shall ignore obstructions including, but not limited to, tank walls.
   c. Micro-processor based transmitter.
   d. Display: Integral LCD.
   e. Material:
      1) Epoxy covered, explosion proof, aluminum housing.
      2) Antenna, as indicated on Drawings.
         a) Process seal antennae.
         b) 316 Stainless steel cone antennae.
   f. Accuracy: ±0.4 inches.
   g. Repeatability: 0.05% full scale.
   h. Output: 4-20mAdc.
   i. Range: 0 to 20 feet.
   j. Power: 24Vdc loop powered.
   k. Mounting, as indicated on Drawings.
      1) Suitable for mounting via 6-inch ANSI pipe flange.
      2) Mounted to bracket.
   l. Provide 316 stainless steel mounting hardware as required.
   m. Schedule: See Instrument Schedule on Drawings.
   n. Manufacturer:
      1) Rosemount.
   o. Accessories:
      1) Programming/diagnostic software, software license and programming cable.
      2) Intrinsically safe barrier, where required by manufacturer for hazardous locations.

D. Continuous Flow Measurement:
   1. Magnetic Flow Meters:
      a. Accuracy: Within ±0.25% of meter scale for a velocity of 1 to 33 fps in either flow direction, and the repeatability shall be within ±0.1% of full scale.
      b. Complete with grounding rings. Grounding probes are not acceptable.
      c. Provide required lengths of Manufacturer's cable between meter tube and wall mounted transmitter.
      d. Provide a standard 3-point calibration report traceable to a recognized standard.
      e. All flow meters shall be of the same model/series.
      f. Meter Tube:
         1) 304 stainless steel flow tube.
         2) Meter shall maintain ISO 13359 standard lay lengths.
         3) Liner:
            a) Teflon, PFA, or Tefzel for 10-inch or smaller.
            b) Polyurethane for 12-inch or greater.
            c) It is the Supplier's responsibility to provide liner that is chemically compatible with the process fluid being measured.
            d) Liners utilized in drinking water applications shall be NSF certified.
         4) Electrodes:
            a) Bullet nose type.
            b) Hasteloy C.
            c) Titanium for Alum and Sodium Hypochlorite.
            d) Platinum for Hydrofluosilicic Acid.
            e) It is the Supplier's responsibility to provide electrodes that are chemically compatible with the process fluid being measured.

5) Grounding Rings:
   a) 316 Stainless Steel for 12-inch or smaller.
   b) 304 Stainless Steel for 14-inch or greater.
   c) Titanium for Alum and Sodium Hypochlorite.
   d) Hasteloy C for Hydrofluosilicic Acid.
   e) It is the Supplier's responsibility to provide grounding rings that are chemically compatible with the process fluid being measured.
6) Flanges:
   a) ANSI 150-pound, raised or flat for 1-inch to 24-inch.
   b) Wafer style to be mounted between 2 ANSI 150-pound flanges for smaller than 1-inch
   c) AWWA Class D flanges for meters larger than 24 inches.
   d) Meter shall be fully rated to withstand the same design pressure as the flanges.
7) Epoxy or Powder Coated: 2 coats for a minimum of 7 mils.
8) Meters above grade and smaller than 12 inches shall be capable of accidental submergence. Meters 14 inches and larger or meters installed in a meter vault shall be capable of continuous submergence or direct burial (IP68/NEMA 6P).
9) Meters located in hazardous areas shall be FM approved for Class 1, Division 2 locations.

g. Transmitter:
1) One for each flow tube.
2) Solid state type.
3) Housing:
   a) Die-cast aluminum.
   b) Remote mounted transmitters shall have rectangular housing.
4) Remote mounted from meter tube when indicated on Drawings.
5) HART protocol.
6) Provide universal HART communicator/configurator which supports all HART devices.
7) Display:
   a) Flow rate and totalized flow displayed on a backlit display.
   b) Integral transmitter display shall be able to rotated 90 or 180 degrees to accommodate meter mounting position/orientation.
8) Transmitter shall include nonvolatile memory so that flow totalization is not lost during power interruptions. Provide totalizers for forward, reverse and net flow.
9) Output:
   a) 4-20 mAdc into 0 to 800 ohms, proportional and calibrated to stated bidirectional flow range.
   b) HART.
10) Provide empty pipe detection as standard.
11) Power: 120Vac, 60 HZ.
12) Enclosure: NEMA 4X.
13) Provide required lengths of Manufacturer's cable for remote mounted indicators.

h. Schedule: See Flow Meter Schedule on Drawings.
i. Manufacturer:
1) Rosemount.

E. Continuous Analytical Measurement:
1. Particle Count Analyzer:
   a. Range: 2 to 750 microns.
   b. Display: 0 to 9,999,999 counts.
   c. Counting Mode: Cumulative or differential.
   d. Flow Rate: 100 ml/min.
   e. Pressure: 55 psig continuous.
   f. Sample and Hold Time: Programmable for 1 second to 24 hours.
   g. Power: 120 VAC cord plug transformer/adapter.
   h. Fluid Connections: 1/4-inch quick disconnect tubing.
   i. Selectable bins from 2 µm to 15 µm.
   j. Communication: RS-485. Provide Belden 9841 cabling; or equal.
   k. Zero and Span: Programmable for 1 to 9,999,999 counts.
   l. Configuration: Two weirs, not using weir arms.

m. Accessories:
1) Water weir flow controller, and all associated clamps, etc.
2) OPC Explorer software.
n. Schedule: See Instrument Schedule on Drawings.
o. Manufacturer: Chemtrac, PC3400

2. Turbidimeter:
a. Sensor and analyzer shall be of the same Manufacturer.
b. Measures 90-degree scattered light.
c. Complete with internal bubble trap.
d. Analyzer shall have programmable range from 0-1000NTU.
e. Analyzer shall have an analog 4-20mAdc output proportional to programmed NTU range.
f. Analyzer shall have 0.001NTU sensitivity.
g. Provide all interconnecting cables between analyzer and sensor, power supply, and digital display.
h. Minimum 4 digit LED or backlit LCD display.
i. Unit shall be provided with 120VAC, 60Hz power supply, provide cord and plug. Provide 20A, 125V, heavy duty, duplex receptacle with weatherproof while in use cover and non-metallic wall box, wall mounted near each turbidimeter.
j. Wall or strut mounted sensor and analyzer, NEMA 4X.
k. Schedule: See Instrument Schedule on Drawings.
l. Manufacturer:
1) Sensor: Hach Solitax w/ Wiper
2) Controller: SC200, one per two turbidimeters.
m. Accessories:
1) Digital indicator.
2) Power supply.
3) One Aquatrend user display/interface for each four turbidimeters to be mounted in the lab, or as noted on the Drawings. Provide repeaters as required to achieve required distances from transmitter(s) to display module.

F. Discrete Level Switch:
1. Float Type Switch (Mercury Free):
a. Mechanical acting.
b. Molded corrosion resistant, polypropylene or PVC body suitable for fluid application.
c. Float switches shall have 3.5-inch actuation/de-actuation level.
d. Output Contact: SPDT, 7/3.5 A, 120/230 VAC.
e. Cable shall be PVC type STO with No. 18 AWG (minimum) conductors:
1) Jacket for cable shall be factory molded to the float.
2) Minimum cable length of 20 feet.
f. Schedule: See Instrument Schedule on Drawings.
1) High Level Switches to be installed approximately 2’0” below Operating Gallery Floor, coordinate with Engineer on precise location.
2) Low Level Switches to be installed approximately 6’0” below Operating Gallery Floor coordinate with Engineer on precise location.
g. Manufacturer: Anchor Scientific “Eco-Float”; or equal.
h. Accessories:
1) Corrosion resistant hardware and mounting accessories.
2) See installation detail(s) for additional requirements.

PART 3 - EXECUTION

3.1 INSTALLATION COORDINATION

A. Install process control equipment and instrumentation in conformance with:
1. Shop Drawings reviewed by Engineer.
2. Manufacturer’s recommendation.

B. Electrical:
   1. Install wiring in conformance with applicable Sections of Division 26 – Electrical.
   2. Run all 4-20 mAdc process control wiring in separate conduit from power and control wiring.
   3. Communication cabling shall be in separate conduits from power control and analog signal wiring.

C. Mount Control Panels:
   1. Securely with framing and fasteners capable of handling additional future loads.
   2. In a way that does not restrict access to internal components.

3.2 FIELD QUALITY CONTROL

A. Contractor's Field Service:
   1. Assist with start-up and conduct performance demonstrations of filters as they are put into service. Coordinate testing/demonstrations with Owners.
   2. Schedule field services as soon as practical and at times approved by Engineer.
   3. Promptly make all changes and additions required and as necessary for proper operation of the system.

B. Field Performance Demonstration:
   1. General.
      a. Procedures shall be developed by system Supplier and submitted to Engineer for review prior to scheduling demonstration.
      b. Schedule a minimum of 2 weeks in advance.
      c. Demonstration shall include "simulation" of system operation, prior to actual operational demonstration, where Plant operation could be negatively affected.
      d. Schedule and coordinate with Owner and Owner's operation staff to minimize disruptions to plant operation.
   2. Pre-Requisite:
      a. Complete installation and test all functionality prior to calling for witnessed field demonstration by Engineer.
      b. Complete integrator sign-off portion of test procedures and route to Engineer for verification.
   3. Equipment:
      a. Demonstrate proper operation.
      b. Demonstrate that system performs control functions as specified and indicated on the Drawings.
   4. Instruments:
      a. Demonstrate proper calibration and maximum accuracy.
      b. Demonstrate that system performs monitoring functions as specified and indicated on the Drawings.
   5. System:
      a. Demonstrate proper operation in failure modes.
      b. Demonstrate backup and recovery modes.
   6. Other Supplier's Systems: Participate in Field Performance Demonstration of systems provided by other suppliers where those systems communicate with SCADA system.
   7. Demonstration shall be repeated as required by Engineer until satisfactory results are obtained.

3.3 I/O LIST

A. See the I/O lists on the Drawings.

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APPENDIX

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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 has be 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 $17.42/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 $19.42/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, 2026 - ENDING APRIL 29, 2027

$17.42 per hour
If the employer provides health care benefits*

$19.42 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

ATTACHMENT G

Vendor Conflict of Interest Disclosure Form

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:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee _____ ( ) Interest in vendor's company ( ) 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.

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:		
Vendor Name	**Vendor Phone Number**	
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, 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.

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. Then submit it to the Human Rights Commission by e-mail (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.

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
CP-347 (04/10)

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) EMPLOYEE INFORMATION	(b) WORK CLASSIFICATION	(c) Hour Type	(d) DAY AND DATE / HOURS WORKED ON PROJECT							(e) TOTAL HOURS ON PROJECT	(f) PROJECT RATE OF PAY	(g) PROJECT RATE OF FRINGE PAY	(h) GROSS PROJECT EARNED / GROSS WEEKLY EARNED	(i) TOTAL WEEKLY HOURS WORKED ALL JOBS	(j) DEDUCTIONS FICA	FEDERAL	STATE		OTHER	TOTAL DEDUCT	(k) TOTAL WEEKLY WAGES PAID FOR ALL JOBS
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											

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 Start. 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.