

PUBLIC IMPROVEMENT REQUEST FOR PROPOSAL

RFP# 24-34

MOTOR CONTROL CENTERS E & F REPLACEMENT

City of Ann Arbor
Water Resource Recovery Facility



Due Date: Friday, June 7, 2024 by 3:00 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 an electrical contractor to provide removal and replacement of MCC-E and MCC-F in the WRRF Retention Basin Building.

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 Friday, May 24, 2024 at 5:00 p.m. (local time), and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to Anne M. Warrow, P.E., Senior Engineer, Water Resource Recovery Facility – awarrow@a2gov.org.

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 **Tuesday, May 21, 2024 at 10:00 a.m. at the City of Ann Arbor's Water Resource Recovery Facility located at 49 Old Dixboro Road, Ann Arbor, MI 48105. 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 Friday, June 7, 2024 by 3:00 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. 24-34 – Motor Control Centers E & F Replacement**” and list the bidder’s name and address.

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

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

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

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

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

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

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

H. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a proposal is subject to

disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

I. TYPE OF CONTRACT

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

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

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

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

J. NONDISCRIMINATION

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

K. WAGE REQUIREMENTS

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

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

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based

upon the work including within this contract. **The wage determination(s) current on the date 10 days before proposals are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: www.wdol.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	May 21, 2024, 10:00 a.m. (Local Time)
Written Question Deadline	May 24, 2024, 5:00 p.m. (Local Time)
Addenda Published (if needed)	Week of May 28, 2024
Proposal Due Date	June 7, 2024, 3:00 p.m. (Local Time)
Selection/Negotiations	June 2024
Expected City Council Authorizations	July 2024

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 encourages potential vendors to bring forward emerging and progressive products and services that are best suited to the City's environmental principles.

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.

N. LIQUIDATED DAMAGES

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

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

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

SECTION II - SCOPE OF WORK

Please see the plan set for more details.

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

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

Bidders should organize Proposals into the following Sections:

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

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

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

A. Qualifications, Experience and Accountability - 20 Points

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

B. Workplace Safety – 20 Points

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

C. Workforce Development – 20 Points

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

D. Social Equity and Sustainability – 20 Points

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

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

Washtenaw County 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 proposed use of sustainable products, technologies, or practices for the project, which reduce the impact on human health and the environment, including raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and waste management.
5. The bidder's environmental record, including findings of violations and penalties imposed by government agencies.

E. Schedule of Pricing/Cost – 20 Points

Company: _____

Base Bid –

For the entire work outlined in these documents for **Motor Control Centers E & F Replacement**, complete as specified, using equipment and materials only of the type and manufacturers where specifically named.

_____ (\$_____)

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

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:

Administrative Use Only
Contract Date: _____

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 **Motor Control Centers E & F Replacement – RFP# 24-34** 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) | General Conditions |
| Vendor Conflict of Interest Form | Standard Specifications |
| Prevailing Wage Declaration of Compliance Form (if applicable) | Detailed Specifications |
| Bid Forms | Plans |
| Contract and Exhibits | Addenda |
| Bonds | |

ARTICLE II - Definitions

Administering Service Area/Unit means **Water Resource Recovery Facility.**

Project means **Motor Control Centers E & F Replacement - RFP#24-34.**

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: Anne M. Warrow, P.E. whose job title is Senior 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 within _____ () consecutive calendar days.
- (C) Failure to complete all the work within the time specified above, including any extension granted in writing by the Supervising Professional, shall obligate the Contractor to pay the City, as liquidated damages and not as a penalty, an amount equal to \$_____ for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the City shall be entitled to deduct these unpaid liquidated damages from the monies due the Contractor.

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

ARTICLE IV - The Contract Sum

- (A) The City shall pay to the Contractor for the performance of the Contract, the lump sum price as given in the Bid Form in the amount of:

_____ Dollars (\$_____)

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.

FOR CONTRACTOR

By _____

Its: _____

FOR THE CITY OF ANN ARBOR

By _____
Christopher Taylor, Mayor

By _____
Jacqueline Beaudry, City Clerk

Approved as to substance

By _____
Milton Dohoney Jr.
City Administrator

By _____
Sue F. McCormick
Interim Public Services Area
Administrator

Approved as to form and content

Atleen Kaur, City Attorney

PERFORMANCE BOND

- (1) _____ (referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for \$ _____, the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.
- (2) The Principal has entered a written Contract with the City entitled _____, for RFP No. _____ and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq.
- (3) Whenever the Principal is declared by the City to be in default under the Contract, the Surety may promptly remedy the default or shall promptly:
- (a) complete the Contract in accordance with its terms and conditions; or
 - (b) obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, arrange for a Contract between such bidder and the City, and make available, as work progresses, sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth in paragraph 1.
- (4) Surety shall have no obligation to the City if the Principal fully and promptly performs under the Contract.
- (5) Surety agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying it shall in any way affect its obligations on this bond, and waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work, or to the specifications.
- (6) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202_.

(Name of Surety Company)
By _____
(Signature)

Its _____
(Title of Office)

Approved as to form:

Atleen Kaur, City Attorney

(Name of Principal)
By _____
(Signature)

Its _____
(Title of Office)

Name and address of agent:

LABOR AND MATERIAL BOND

- (1) _____
of _____ (referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for the use and benefit of claimants as defined in Act 213 of Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq., in the amount of \$ _____, for the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.
- (2) The Principal has entered a written Contract with the City entitled _____

_____, for RFP No. _____; and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963 as amended;
- (3) If the Principal fails to promptly and fully repay claimants for labor and material reasonably required under the Contract, the Surety shall pay those claimants.
- (4) Surety's obligations shall not exceed the amount stated in paragraph 1, and Surety shall have no obligation if the Principal promptly and fully pays the claimants.
- (5) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202__

(Name of Surety Company)
By _____
(Signature)
Its _____
(Title of Office)

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

Approved as to form:

Atleen Kaur, City Attorney

Name and address of agent:

GENERAL CONDITIONS

Section 1 - Execution, Correlation and Intent of Documents

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

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

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

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

Section 2 - Order of Completion

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

Section 3 - Familiarity with Work

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

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

Section 4 - Wage Requirements

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

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

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. A sample Prevailing Wage Form is provided in the Appendix herein for reference as to what will be expected from contractors. Use of the Prevailing Wage Form provided in the Appendix section or a City-approved equivalent will be required along with wage rate interviews.

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

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

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

Section 5 - Non-Discrimination

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

Section 6 - Materials, Appliances, Employees

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

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

Adequate sanitary facilities shall be provided by the Contractor.

Section 7 - Qualifications for Employment

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

Section 8 - Royalties and Patents

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

Section 9 - Permits and Regulations

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

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

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

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

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

employees of the City. The Contractor shall obtain and maintain sufficient insurance to cover damage to any City property at the site by any cause.

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

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

Section 11 - Inspection of Work

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

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

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

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

Section 12 - Superintendence

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

Section 13 - Changes in the Work

The City may make changes to the quantities of work within the general scope of the Contract at any time by a written order and without notice to the sureties. If the changes add to or deduct from the extent of the work, the Contract Sum shall be adjusted accordingly. All the changes shall be

executed under the conditions of the original Contract except that any claim for extension of time caused by the change shall be adjusted at the time of ordering the change.

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

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

Section 14 - Extension of Time

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

- (1) When work under an extra work order is added to the work under this Contract;
- (2) When the work is suspended as provided in Section 20;
- (3) When the work of the Contractor is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, and which were not the result of its fault or negligence;
- (4) Delays in the progress of the work caused by any act or neglect of the City or of its employees or by other Contractors employed by the City;
- (5) Delay due to an act of Government;
- (6) Delay by the Supervising Professional in the furnishing of plans and necessary information;
- (7) Other cause which in the opinion of the Supervising Professional entitles the Contractor to an extension of time.

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

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

Section 15 - Claims for Extra Cost

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

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

- (1) The Contractor shall be reimbursed for all reasonable costs incurred in doing the work, and shall receive an additional payment of 15% of all the reasonable costs to cover both its indirect overhead costs and profit;
- (2) The term "Cost" shall cover all payroll charges for employees and supervision required under the specific order, together with all worker's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at agreed upon rates, together with cost of fuel and supply charges for the equipment; and any costs incurred by the Contractor as a direct result of executing the order, if approved by the Supervising Professional;
- (3) If the extra is performed under subcontract, the subcontractor shall be allowed to compute its charges as described above. The Contractor shall be permitted to add an additional charge of 5% percent to that of the subcontractor for the Contractor's supervision and contractual responsibility;
- (4) The quantities and items of work done each day shall be submitted to the Supervising Professional in a satisfactory form on the succeeding day, and shall be approved by the Supervising Professional and the Contractor or adjusted at once;
- (5) Payments of all charges for work under this Section in any one month shall be made along with normal progress payments. Retainage shall be in accordance with Progress Payments-Section 16.

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

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

Section 16 - Progress Payments

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

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

In the case of Contracts which include only the Furnishing and Delivering of Equipment, the payments shall be; 60% of the Contract Sum upon the delivery of all equipment to be furnished, or in the case of delivery of a usable portion of the equipment in advance of the total equipment delivery, 60% of the estimated value of the portion of the equipment may be paid upon its delivery in advance of the time of the remainder of the equipment to be furnished; 30% of the Contract Sum upon completion of erection of all equipment furnished, but not later than 60 days after the date of delivery of all of the equipment to be furnished; and payment of the final 10% on final completion of erection, testing and acceptance of all the equipment to be furnished; but not later than 180 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

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

Section 17 - Deductions for Uncorrected Work

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

Section 18 - Correction of Work Before Final Payment

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

If the Contractor does not remove the condemned work and materials within 10 days after written notice, the City may remove them and, if the removed material has value, may store the material

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

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

Section 19 - Acceptance and Final Payment

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

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

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

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

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

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

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

Section 20 - Suspension of Work

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

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

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

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

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

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

Section 22 - Contractor's Right to Terminate Contract

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

Section 23 - City's Right To Do Work

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

Section 24 - Removal of Equipment and Supplies

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

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

Section 25 - Responsibility for Work and Warranties

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

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

Section 26 - Partial Completion and Acceptance

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

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

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

Section 27 - Payments Withheld Prior to Final Acceptance of Work

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

- (1) Defective work not remedied;
- (2) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor;
- (3) Failure of the Contractor to make payments properly to subcontractors or for material or labor;
- (4) Damage to another Contractor.

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

Section 28 - Contractor's Insurance

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

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

Required insurance policies include:

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

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

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

\$1,000,000 Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined.
\$2,000,000 Per Project General Aggregate
\$1,000,000 Personal and Advertising Injury
\$2,000,000 Products and Completed Operations Aggregate, which, notwithstanding anything to the contrary herein, shall be maintained for three years from the date the Project is completed.

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

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

- (2) Insurance required under subsection (1)(b) and (1)(c) above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute

with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City for any insurance listed herein.

- (3) Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and un-qualified 30-day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company(s); name and address of the agent(s) or authorized representative(s); name(s), email address(es), and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which may be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) and all required endorsements to the City. If any of the above coverages expire by their terms during the term of this Contract, the Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.
- (4) Any Insurance provider of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the City.
- (5) City reserves the right to require additional coverage and/or coverage amounts as may be included from time to time in the Detailed Specifications for the Project.
- (6) The provisions of General Condition 28 shall survive the expiration or earlier termination of this contract for any reason.

Section 29 - Surety Bonds

Bonds will be required from the successful bidder as follows:

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

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

Section 30 - Damage Claims

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

Section 31 - Refusal to Obey Instructions

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

Section 32 - Assignment

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

Section 33 - Rights of Various Interests

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

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

Section 34 - Subcontracts

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

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

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

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

Section 35 - Supervising Professional's Status

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

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

Section 36 - Supervising Professional's Decisions

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

Section 37 - Storing Materials and Supplies

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

Section 38 - Lands for Work

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

Section 39 - Cleaning Up

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

Section 40 - Salvage

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

Section 41 - Night, Saturday or Sunday Work

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

Section 42 - Sales Taxes

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

Section 43

CONTRACTOR'S DECLARATION

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

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

Contractor

Date

By _____
(Signature)

Its _____
(Title of Office)

Past due invoices, if any, are listed below.

STANDARD SPECIFICATIONS

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

Standard Specifications are available online:

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

DETAILED SPECIFICATIONS

APPENDIX

ATTACHMENT B
GENERAL DECLARATIONS

City of Ann Arbor
Guy C. Larcom Municipal Building
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including City Nondiscrimination requirements and Declaration of Compliance Form, Living Wage requirements and Declaration of Compliance Form, Prevailing Wage requirements and Declaration of Compliance Form, Vendor Conflict of Interest Form, Notice of Pre-Bid Conference, General Information, Bid, Bid Forms, Contract, Bond Forms, General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it conducted a full investigation at the site and of the work proposed and is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the City of Ann Arbor, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

The undersigned proposes to perform all work shown on the plans or described in the bid documents, including any addenda issued, and to furnish all necessary machinery, tools, apparatus, and other means of construction to do all the work, furnish all the materials, and complete the work in strict accordance with all terms of the Contract of which this Bid is one part.

In accordance with these bid documents, and Addenda numbered _____, the undersigned, as Bidder, proposes to perform at the sites in and/or around Ann Arbor, Michigan, all the work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become fully familiar with the liquidated damage clauses for completion times and for compliance with City Code Chapter 112, understands and agrees that the liquidated damages are for the non-quantifiable aspects of non-compliance and do not cover actual damages that may be shown and agrees that if awarded the Contract, all liquidated damage clauses form part of the Contract.

The Bidder declares that it has become fully familiar with the provisions of Chapter 14, Section 1:320 (Prevailing wages) and Chapter 23 (Living Wage) of the Code of the City of Ann Arbor and that it understands and agrees to comply, to the extent applicable to employees providing services to the City under this Contract, with the wage and reporting requirements stated in the City Code provisions cited. Bidder certifies that the statements contained in the City Prevailing Wage and Living Wage Declaration of Compliance Forms are true and correct. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

The Bidder encloses a certified check or Bid Bond in the amount of 5% of the total of the Bid Price. The Bidder agrees both to contract for the work and to furnish the necessary Bonds and insurance documentation within 10 days after being notified of the acceptance of the Bid.

If this Bid is accepted by the City and the Bidder fails to contract and furnish the required Bonds and insurance documentation within 10 days after being notified of the acceptance of this Bid, then the Bidder shall be considered to have abandoned the Contract and the certified check or Bid Bond accompanying this Bid shall become due and payable to the City.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

In submitting this Bid, it is understood that the right is reserved by the City to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

SIGNED THIS _____ DAY OF _____, 202_.

Bidder's Name

Authorized Signature of Bidder

Official Address

(Print Name of Signer Above)

Telephone Number

Email Address for Award Notice

ATTACHMENT C
LEGAL STATUS OF BIDDER

(The bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of _____, for whom _____, bearing the office title of _____, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):

* An individual, whose signature with address, is affixed to this Bid: _____
(initial here)

Authorized Official

_____ **Date** _____, 202_

(Print) Name _____ Title _____

Company:

Address:

Contact Phone () _____ Fax () _____

Email _____

ATTACHMENT E
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than \$10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than \$10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than \$10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here No. of employees _____

The Contractor or Grantee agrees:

- (a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as \$16.43/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than \$18.32/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

- Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits
- Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

- (b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.
- (c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.
- (d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.
- (e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

Company Name

Street Address

Signature of Authorized Representative

Date

City, State, Zip

Print Name and Title

Phone/Email address

Attachment F

CITY OF ANN ARBOR LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2024 - ENDING APRIL 29, 2025

\$16.43 per hour

If the employer provides health care benefits*

\$18.32 per hour

If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than \$10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than \$500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed \$.50 an hour for an average work week; and the employer cost or contribution must equal no less than \$1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

**For Additional Information or to File a Complaint contact
Colin Spencer at 734/794-6500 or cspencer@a2gov.org**



ATTACHEMENT 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.	<input type="checkbox"/> Relationship to employee <hr/> <input type="checkbox"/> Interest in vendor’s company <input type="checkbox"/> Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

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 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 CERTIFIED PAYROLL

COMPLETION OF CERTIFIED PAYROLL FORM FULFILLS THE MINIMUM MDOT PREVAILING WAGE REQUIREMENTS

(1) NAME OF CONTRACTOR / SUBCONTRACTOR (CIRCLE ONE) (2) ADDRESS

(3) PAYROLL NO. (4) FOR WEEK ENDING (5) PROJECT AND LOCATION (6) CONTRACT ID

(a)	(b)	(c)	(d) DAY AND DATE							(e)	(f)	(g)	(h)	(i)	(j) DEDUCTIONS						(k)
															TOTAL HOURS ON PROJECT	PROJECT RATE OF PAY	PROJECT RATE OF FRINGE PAY	GROSS PROJECT EARNED	GROSS WEEKLY EARNED	TOTAL WEEKLY HOURS WORKED ALL JOBS	
EMPLOYEE INFORMATION	WORK CLASSIFICATION	Hour Type	HOURS WORKED ON PROJECT							TOTAL HOURS ON PROJECT	PROJECT RATE OF PAY	PROJECT RATE OF FRINGE PAY	GROSS PROJECT EARNED	GROSS WEEKLY EARNED	TOTAL WEEKLY HOURS WORKED ALL JOBS	FICA	FEDERAL	STATE	OTHER	TOTAL DEDUCT	TOTAL WEEKLY WAGES PAID FOR ALL JOBS
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00
ETH#GEN: ID #:	GROUP/CLASS #:	S							0											\$0.00	\$0.00
NAME:									0				\$0.00							\$0.00	\$0.00

Date _____

I, _____ (Name of Signatory Party) _____ (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the _____ (Contractor or Subcontractor)
 _____; that during the payroll period commencing on the _____ (Building or Work)
 _____ day of _____, _____, and ending the _____ day of _____, _____,
 all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full _____ (Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

- in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION
REMARKS:	
NAME AND TITLE	SIGNATURE
THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.	

SECTION 01000

GENERAL SPECIFICATIONS

1.1 WORKING SPACE

- A. The contractor shall interfere as little as possible with traffic and in all cases shall confine the work operations to the minimum space possible.
- B. Stockpiling of construction material and equipment will be permitted as necessary, but in no case shall traveled roadways, driveways, or entrances be unduly obstructed.
- C. Should storage areas be desired on private property, the Contractor may obtain such space on privately owned property at his own expense, by agreement with the property owner thereof. The Contractor shall provide the Owner with a copy of the written permission from the private property owner prior to occupying the property.
- D. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.
- E. Provide and maintain access to fire hydrants, free of obstructions.
- F. Provide means of removing mud from vehicle wheels before entering streets.

1.2 LOCATING WORK

- A. The contractor shall accurately locate the work from reference points established by the Owner along the surface of the ground and the line of work. For sewers, "cut sheets" will be furnished by the Owner. Reference points shall be protected and preserved by the contractor.

1.3 SOIL CONDITIONS

- A. The contractor, as such and as bidder, shall make his own determination as to soil and/or rock conditions and shall complete the work in whatever material and under whatever conditions may be encountered or created, without extra cost to the owner. This shall apply whether or not borings are shown on the drawings.
- B. The owner does not guarantee that the ground encountered during construction will conform with any boring information furnished herein.
- C. The Owner and Engineer may have been involved in the design, construction observation, and/or construction of other underground projects in the area of the proposed construction. The observation field reports, soil reports, and any soil information connected with these projects are available for review by the prospective bidders.
- D. See Appendix I for geotechnical report

1.4 ROAD PERMITS

- A. The contractor shall obtain any necessary construction permits required of contractors for work within public streets, highways, roads, or alleys. The cost of construction permits, including, but not limited to, inspection fees, application fees, and/or review fees that may be required in connection with such permits, shall be at the Contractor's expense. Construction operations shall be conducted in accordance with provisions of such permits, including tunneling of pavements where required. The cost of any required bonds shall be included in the cost of the work as bid.

1.5 ROAD DETOURS

- A. The contractor shall provide and maintain all temporary roadways as required for work operations or as required under "Road Permits" or otherwise specified or shown on the drawings at no extra cost to the Owner.

1.6 PROTECTION OF THE PUBLIC

- A. The contractor shall provide sufficient barricades, guard railings, fencing, advance construction signing, coverings or other means to protect the public from injury due to the work operations, including completed or uncompleted work, at all times until acceptance of the work by the Owner at no extra cost to the Owner.

1.7 BARRICADES AND PROTECTION

- A. The contractor shall provide and maintain in good repair, all barricades, guard railings, etc., as required for the protection of the workers, the Owner's employees and employees of Owner's agent in strict compliance with state and local requirements.
- B. At dangerous points throughout the work, the contractor shall provide and maintain guard rails, colored lights, and flags. All possible precautions shall be taken to protect the workers from injury at no extra cost to the Owner.

1.8 FENCING

- A. Provide fencing around construction sites and equip as needed with vehicular and pedestrian gates with locks as shown on the Contract Drawings.

1.9 MAINTENANCE OF TRAFFIC

- A. During the progress of the work, the contractor shall accommodate both vehicular and pedestrian traffic as provided in these specifications and as indicated on the drawings. In the absence of specific requirements, traffic shall be maintained in accordance with the current edition of the Michigan Manual of Uniform Traffic Control Devices. Access to fire hydrants and water valves shall always be maintained. The contractor's truck and equipment operations on public streets shall be governed by County regulations, all local traffic ordinances, and regulations of the Fire and Police Department.
- B. Small street openings necessary for manholes, alignment holes, sewer connections, etc. will be permitted. Such holes shall not be open longer than necessary and shall be protected and any traffic detouring necessary shall be done to the satisfaction of the Owner. Wherever possible,

small openings shall be covered with steel plates at pavement level secured in place during periods that work is not being performed at no extra cost to the Owner.

- C. Where streets are partially obstructed, the contractor shall place and maintain temporary driveways, ramps, bridges and crossings which in the opinion of the Owner are necessary to accommodate the public at no extra cost to the Owner. In the event of the contractor's failure to comply with the foregoing provisions, the Owner may, with or without notice, cause the same to be done and deduct the cost of such work from any monies due or to become due the contractor under this contract. However, the performance of such work by the Owner, or at his insistence, shall serve in no way to release the contractor from his liability for the safety of the traveling public.
- D. The contractor shall provide flagmen, warning lights, signs, fencing and barricades necessary to direct and protect vehicular and pedestrian traffic at no extra cost to the Owner.
- E. The contractor shall inform the local fire department in advance of work operations of street obstructions and detours, so that the fire department can set up plans for servicing the area in case of an emergency. The governing police department and the owner shall be notified at least one week prior to obstructing any street.

1.10 TRAFFIC REGULATION

- A. The Contractor's trucks and equipment operations shall be governed by all applicable ordinances; the rules and regulations of the Fire, Police, Transportation Departments; and the requirements of any other authority having jurisdiction. Flagman, warning lights, traffic signs, cones, and barricades shall be provided by the Contractor as necessary to direct and protect vehicular and pedestrian traffic at all locations of construction operations.
- B. The Contractor shall be responsible for obtaining approvals and securing permits from all authorities having jurisdiction over work in rights-of-way.
- C. The Contractor shall notify the Engineer, the local police and fire departments, all other interested local authorities, and the residents of all affected streets five days prior to any street closures.
- D. The Contractor shall provide and maintain all temporary facilities required. These shall include but not be limited to facilities necessary to maintain pedestrian and vehicular traffic access through the area or to adjacent properties and to provide unobstructed access to fire hydrants and water and gas valves. The Contractor shall provide all barriers, lights, warning flags and signals, and the like that the Engineer or other authorities may require to accommodate and protect the public.
- E. Should the Contractor fail to promptly provide or neglect to maintain the required temporary facilities or be dilatory in carrying out specific instruction to the Engineer, the Owner may with or without notice to the Contractor take such remedial measures deemed necessary and charge the Contractor with any costs incurred therefor. Any such action, however, shall in no way serve to release the Contractor from his general or particular liability for the safety of the traveling public or the protection of property.
- F.

1.11 PRESERVATION OF TREES

- A. The contractor shall protect and preserve all trees along the line of work, and will be held responsible for any damage to trees. Where necessary to preserve a tree and its main roots, the contractor shall tunnel under such tree. Where specifically called for on the drawings, the contractor shall remove trees completely, including stumps and main roots.
- B. Where tunneling is not required for trees close to the trench and root trimming is necessary, the contractor shall hand trench ahead of the machine digging and cut all roots cleanly to minimize damage to the roots.
- C. Tree branches shall be tied back to protect them from the contractor's machinery.
- D. When a tree is removed by the contractor for his convenience and with the permission of the Owner and the adjacent property owner (where required), the contractor shall furnish one three (3) inch dia. tree for every six (6) inches of diameter of the tree removed. The species shall be as directed by the Owner. All trees installed shall be guaranteed to grow for a period of one (1) year.
- E. The contractor will receive no extra compensation for preservation of trees or for their removal and replacement where called for, and the cost of all work involved shall be included in the unit price bid or at no extra cost to the owner.

1.12 REPLACEMENT OF SHRUBBERY

- A. The contractor shall protect and/or replace all shrubbery damaged or destroyed by operations under this contract at no extra cost to the owner.

1.13 EXISTING STRUCTURES AND UTILITIES

- A. Certain underground structures and utilities have been shown as an aid to the contractor, but the owner does not guarantee their location or that other underground structures or utilities may not be encountered.

1.14 PROTECTION OF PROPERTY AND SURVEY MONUMENTS

- A. Before any monuments or stakes marking the boundaries of property along or near the work are removed or disturbed, notify the Engineer in sufficient time so that they can be properly located and reset. Contractor shall pay all costs incurred in connection therewith.
- B. All precautions shall be taken to avoid disturbance of permanent survey monuments of any city, county, state, or federal authority; and when any of these are disturbed or destroyed, the Contractor shall restore them to the satisfaction of such authority and shall pay all costs incurred by such authority in connection therewith.

1.15 PUBLIC AND PRIVATE UTILITIES

- A. Utilities
 - 1. The Contractor must provide adequate protection for water, sewer, gas, telephone, TV cable, or any other public or private utilities encountered. The Contractor will be held responsible for any damages to such utilities arising from his operation.

2. When it is apparent that construction operations may endanger the foundations of any utility conduit, or the support of any structure, the contractor shall notify the utility owner of this possibility and shall take steps as may be required to provide temporary bracing or support of conduit or structures.
 3. In all cases where permits or inspection fees are required by utilities in connection with changes to or temporary support of their conduits, the contractor shall secure such permits and pay all inspection fees.
 4. Where it is necessary in order to carry out the work, that a pole, electric or telephone, be moved to a new location, or moved and replaced after construction, the contractor shall arrange for the moving of such pole or poles, and the lines thereof, and shall pay any charges therefor.
 5. Where it is the policy of any utility owner to make repairs to damaged conduit or other structures, the contractor shall cooperate to the fullest extent with the utility and shall see that construction operations interfere as little as possible with the utilities operations. The contractor shall pay any charges for these repairs.
- B. Existing Sewer Facilities
1. Existing sewers or drains may be encountered along the line of work. In all such cases, the contractor shall perform the work in such a manner that sewer service will not be interrupted. and shall make all temporary provisions to maintain sewer service as incidental to the work as bid.
 2. Unless otherwise indicated on the drawings, the contractor shall replace any disturbed sewer or drain, or relay same at a new grade and/or location to be established by the Owner such that sufficient clearance for the sewer will be provided.
 3. The contractor will receive no extra compensation for replacement or relocation of sewers or drains encountered, or for relaying at a new grade where called for by the drawings unless a separate bid item has been included in the proposal.
- C. Existing Water Facilities
1. Where existing water mains are encountered in the work, they shall be maintained in operation. If necessary, they shall be re-laid using ductile iron pipe of the type and with joints as specified within the current water main specifications of the governmental agency controlling said utility.
 2. The contractor will receive no extra compensation for the relaying and/or lowering or raising of water mains or water service leads, except where a separate bid item has been included in the proposal.
- D. Existing Gas Facilities
1. Where existing gas mains and services are encountered, the contractor shall arrange with the gas company for any necessary relaying, and shall pay for the cost of such work unless otherwise provided.

1.16 PUMPING, BAILING AND DRAINING

- A. The contractor shall provide and maintain adequate pumping and drainage facilities for removal and disposal of water from trenches or other excavations.
- B. Where the work is in ground containing an excessive amount of water, the contractor shall provide, install, maintain, and operate suitable deep wells or well points, connecting manifolds and reliable pumping equipment to operate same to insure proper construction of the work. Alternate dewatering methods may be implemented if approved by the Owner.

- C. Drainage or discharge lines shall be connected to adjacent public storm water drains or extended to nearby water courses wherever possible. In any event, all pumping and drainage shall be done without damage to any highway or other property, public or private, and without interference with the rights of the public or private property owners and in accordance with the MDEQ and local requirements for soil erosion and sedimentation control.
- D. The contractor shall receive no extra compensation for providing, maintaining or operating any dewatering or drainage facilities.

1.17 GROUND AND SURFACE WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment. All water from whatever sources entering the work during any stage of construction shall be promptly removed and disposed.
- B. All pumping and drainage shall be done without damage to property or structures and without interference with the rights of the public, owners of private property, pedestrians or vehicular traffic, or the work of other contractors. Dewatering shall be done in such a manner that soil under or adjacent to existing structures shall not be disturbed, removed, or displaced.

1.18 SHEETING, SHORING AND BRACING

- A. Where necessary in order to construct the work called for by the contract, to insure the safety of the workers, or to protect other things of value, the contractor shall use and, if necessary, leave in place, such sheeting, shoring, and bracing as is needed to carry out the work or to adequately insure the stability of such work, or to insure the safety of the workers and/or to protect adjoining things of value. The contractor will receive no extra compensation for sheeting, shoring, or bracing, whether removed or left in place.

1.19 DISPOSAL OF EXCAVATED MATERIAL

- A. With the exception of an amount of excavated materials sufficient for backfilling and construction of fills, as called for on the drawings, all broken concrete, stone, and excess excavated materials shall be disposed of from the site by the contractor. The contractor will be required to obtain his own disposal ground, and will receive no extra compensation for disposing of any of the excess materials.

1.20 DISPOSAL OF WASTE MATERIALS

- A. Unless otherwise directed by the owner, all waste materials and debris resulting from the construction work shall be removed from the premises at no extra cost to the owner.
- B. The contractor shall, at all times, keep the premises free from accumulations of waste material or debris caused by his employees or work, and shall remove same when necessary or required by the owner.

1.21 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.23 TUNNELING

- A. The contractor shall construct the work in tunnel where shown on the drawings or required by permits, and at other locations may, at his option, construct the work in tunnel where it crosses existing roadways, public and private utilities, walks or other structures. Tunnel work shall be constructed in accordance with the drawings and specifications, "Road Permit" requirements, or as otherwise noted on the drawings at no extra cost to the owner.

1.24 COMPRESSED AIR

- A. The contractor shall provide compressed air as required for the work at no extra cost to the owner.

1.25 FIRST AID FACILITIES

- A. Provide complete first aid kit fully stocked at all times. Replenish as needed.
- B. Post safety related phone numbers (Police, fire, EMS, hospital, etc.)

1.26 INSPECTION OF PREMISES

- A. The bidder shall visit the premises and thoroughly acquaint himself with the conditions to be encountered in the installation of the work shown on the drawings and described in the specifications, as no extras will be allowed to cover work which he has not included in his tender due to his failure to inspect the premises.

1.27 SCHEDULE OF OPERATIONS

- A. The contractor shall submit, for the owner's review and approval, a schedule of his proposed operations. The contractor's schedule shall be complete and shall show in detail the manner in which he proposed to complete the work under this contract.

1.28 ORDINANCES AND CODES

- A. All work shall be executed and inspected in accordance with all local and state rules and regulations and all established codes applicable thereto and shall conform in all respects to the requirements of all authorities having jurisdiction thereover.
- B. Should any change in the contract plans and/or specifications be required to comply with local regulations, the contractor shall notify the owner in accordance with Specification 000_ITB pages IB-1 thru 6 – Instructions to Bidders. After entering into contract, the contractor will be held to complete all work necessary to meet the local requirements without extra expense to the owner.
- C. Where the work required by the drawings and specifications is above the standard required, it shall be done as shown or specified.

1.29 TRAFFIC CONTROL

- A. During construction the contractor shall control traffic in accordance with the current edition of the Michigan Manual of Uniform Traffic Control Devices issued by the Michigan Department of Transportation.

1.30 DUST CONTROL

- A. The contractor shall provide adequate measures to control dust caused by his operation. The methods employed, and frequency of application shall be as approved and directed by the Owner.

1.31 INCONVENIENCES

- A. The contractor shall at all times be aware of inconveniences caused to the abutting property owners and general public. Where undue inconveniences are not remedied by the contractor, the municipality, upon four hours notice, reserves the right to perform the necessary work and to have the owner deduct the cost thereof from the money due or to become due to the contractor.

1.32 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

- F. Prohibit traffic from landscaped areas.
- G. Prohibit construction traffic from utilizing permanent site access bridge.

END OF SECTION

SECTION 01005

ADMINISTRATIVE PROVISIONS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

- 1.02 Related Sections
- 1.03 Summary of work.
- 1.04 Work sequence.
- 1.05 Alternatives.
- 1.06 Coordination
- 1.07 Cleanliness of the work and streets.
- 1.08 Regulatory requirements.
- 1.09 Alterations of existing water mains and services.
- 1.10 Satisfaction of Claims
- 1.11 Fire protection.
- 1.12 Chemicals.
- 1.13 Historical specimens.
- 1.14 Abbreviations.
- 1.15 References.

1.2 RELATED REQUIREMENTS

- A. Section 000_ITB – Invitation to Bid
- B. Section 01000 - General Specifications.
- C. Section 01310 - Progress Schedules.
- D. Section 01700 - Contract Closeout.
- E. Section 02030 - Sequence of Construction and Special Project Requirements.

1.3 COORDINATION

- A. Contract Documents:
 - 1. It is not the intent nor shall it be so construed that work included in any one Section of the Specifications must be performed by a particular trade or by subcontract. The work to be performed by a particular trade is not necessarily restricted to that of any one Section.
 - 2. Any item mentioned under any heading must be supplied even though it is not called for again under the heading for the respective work.
- B. Existing Facilities:
 - 1. All existing facilities and operations shall be uninterrupted by the Contractor's performances unless otherwise allowed in the Contract Documents.
 - 2. All proposed interruptions or tie-ins to existing facilities or utilities or other activities affecting the operations shall be scheduled.
 - 3. The Engineer shall approve the scheduling of all such activities.

1.4 CLEANLINESS OF THE WORK AND STREETS

- A. The work itself, and all public and private property used therewith, shall be kept in a neat orderly condition at all times. Excess excavation, waste and rejected materials, rubbish, and debris shall not be allowed to accumulate. The newly constructed work shall be cleared of all temporary construction of facilities when such are entirely free of all debris and the premises left in a condition that will not be susceptible to soil erosion and that will not create a situation problem.
- B. Trucks hauling loose materials to or from the site shall be tightly covered and their loads shall be trimmed to prevent spillage on the public streets or roads. This requirement likewise applies to suppliers making deliveries to the site. The Contractor shall promptly clean streets or roads dirtied by any cause arising from his operations or that of his Subcontractors or his suppliers. Should the Contractor fail to maintain proper street or road cleanliness, the Owner will take necessary steps to perform such cleaning and will charge the Contractor for all cost thereof.
- C. The Contractor shall control dust from his operations to meet the requirements of the jurisdictional authorities. Control measures shall include but are not limited to sprinkling, applying calcium chloride, wheel washing, street sweeping, street washing, load covering, and the like.

1.5 REGULATORY REQUIREMENTS

- A. The Contractor shall apply for inspection of the work to any and all local, state, public and/or private utilities or national authorities having jurisdiction and deliver to the Engineer all required certificates of approval of such authorities.
- B. All costs including temporary improvements, and the restoration of existing improvements (e.g. sidewalks, pavements, soil erosion and sedimentation control, landscaping, etc.) to the satisfaction of the authority having jurisdiction in each case shall be included in the Contract Price.

1.6 ALTERATIONS OF EXISTING WATER MAINS OR SERVICES

- A. The cutting, reconstructing, or relocating of any existing water mains or water services connections necessitated to permit construction of the work under this Contract shall be performed by the contractor, and the cost of all work and material including inspection and permits shall be included in the Contract bid price.
- B. The Contractor shall not operate any valves or switches. All valves and switches shall be operated by the Owner's personnel only.
- C. If the Contractor finds it necessary to shut down any existing water mains in services, he shall contact the Engineer and they will then negotiate the best time for shut down mains. A minimum of three (3) days notice must be given.
- D. The Contractor shall receive no extra payment on account of the times when such shut offs and alterations have to be made or on account of delays incurred in conjunction with such alterations.

1.7 SATISFACTION OF CLAIMS

- A. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled, or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained to secure payment therewith interest.
- B. In the event that any Contractor has trespassed upon private property in the prosecution of the work of this contract, the Owner may withhold payment for the value of such work in or on the property, but in any case no less than a sum of \$500 for each property trespassed until the Contractor has secured a release from the property owner upon whose property the trespass was committed.

1.8 FIRE PROTECTION

- A. The Contractor shall take all necessary precautions to prevent fires and shall provide adequate equipment for extinguishing fires. No burning of trash or debris will be permitted.
- B. When fire or explosion hazards are created in the vicinity of the work as a result of the locations of fuel tanks or similar hazardous utilities or devices, the Contractor shall immediately alert the local Fire Marshal, the Engineer, and the Owner. The Contractor shall exercise all safety precautions and shall comply with all instructions issued by the Fire Marshal and shall cooperate with the Owner of the tank or device to prevent the occurrence of fire or explosion.

1.9 CHEMICALS

- A. All chemicals used during construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, or reactant of other classification, must show approval of the EPA, USDA, or both. Use of all such chemicals and disposal of residues shall be in strict conformance with all applicable law, rules, and regulations.

1.10 HISTORICAL SPECIMENS

- A. Any and all specimens of historical or scientific value or interest encountered in the Work shall be preserved and delivered to the Engineer.

1.11 ABBREVIATIONS

- A. The following listed letters or abbreviations wherever they appear in the Contract shall mean and be interpreted as indicated below:
- A.A.S.H.O. - American Association of State Highway Officials
 - A.C.I. - American Concrete Institute
 - A.G.M.A. - American Gear Manufacturers Association
 - A.H.D.G.A. - American Hot Dip Galvanizers Association
 - A.I.A. - American Institute of Architects
 - A.I.S.C. - American Institute of Steel Construction
 - A.I.S.I. - American Iron and Steel Institute
 - A.M.C.A. - Air Moving and Conditioning Association
 - A.N.S.I. - American National Standards Institute
 - A.S.C.E. - American Society of Civil Engineers
 - A.S.H.R.A.E. - American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - A.S.M.E. - American Society of Mechanical Engineers
 - A.S.T.M. - American Society for Testing and Materials
 - A.W.G. - American Wire Gauge
 - A.W.S. - American Welding Society
 - A.W.W.A. - American Water Works Association
 - D.P.W. - Department of Public Works - City of Detroit
 - D.W.S.D. - Detroit Water & Sewerage Department
 - Fed. Spec. - Federal Specification, Federal (of F.S.) Supply Service, General Services Administration, U.S. Government
 - I.E.E.E. - Institute of Electrical and Electronics Engineers
 - I.P.C.E.A. - Insulated Power Cable Engineers Association
 - M.D.O.T. - Michigan Department of Transportation (Formerly M.D.S.H. & T)
 - M.I.O.S.H.A. - Michigan Occupational Safety & Health Act
 - N.B.S. - National Bureau of Standards
 - N.C.P.I. - National Clay Pipe Institute
 - N.E.C. - National Electrical Code
 - N.E.M.A. - National Electrical Manufacturers Association
 - N.F.P.A. - National Fire Protection Association
 - O.S.H.A. - Occupational Safety & Health Administration
 - S.D.I. - Steel Deck Institute
 - S.J.I. - Steel Joist Institute
 - S.S.P.C. - Steel Structures Painting Council
 - U.L. - Underwriters Laboratories

1.12 REFERENCES

- A. Specifications by Reference:
1. Where reference is made in the specifications to specifications or standards of any technical society, association, governmental agency, etc., it is understood and agreed

that such specifications or standards are as much a part of the specifications as though fully repeated therein.

- B. Materials by Reference:
1. A material included in more than one section of the specifications will be specified in detail in only one of the Sections.
 2. In other sections, the material is specified by reference to the section containing the specifications for the same material, and such specifications shall be considered as much a part of the other sections as if they were therein repeated in full.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Related Sections
- B. Coordination.
- C. Pre-Bid Meeting.
- D. Preconstruction Meeting.
- E. Progress Meetings.
- F. Preinstallation Meetings.

1.2 RELATED SECTIONS

- A. Section 000 – ITB (Instructions for Bidders).
- B. Section 01005 - Administration Provisions.
- C. Section 01300 - Submittals.
- D. Section 01310 - Progress Schedules.

1.3 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion and for portions of Work designated for Owner's occupancy.

- E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.4 PRE-BID MEETING

- A. Engineer will schedule a meeting as noted in the Information for Bidders.
- B. Attendance Required: Owner, Engineer, and Bidders.
- C. Attendance Requested: Regulatory Agencies, Utility Representatives.
- D. Agenda:
 - 1. Review of Permits Required.
 - 2. Review of Special Project Requirements.
 - 3. Regulatory requirements affecting the project.
 - 4. Review of Contract Documents.
 - 5. Critical work sequencing.
 - 6. Use of premises by Owner and Contractors
 - 7. Construction facilities and controls provided by Owner.
 - 8. Temporary utilities provided by Contractor and by Owner.
 - 9. Survey and layout.
 - 10. Security and housekeeping procedures.
 - 11. Responsibility for testing.
- E. Record minutes and distribute copies within two days after meeting to participants, with one copy to all participants, and those affected by decisions made.

1.5 PRECONSTRUCTION MEETING

- A. Engineer will schedule a meeting prior to issuing Notice of Award.
- B. Attendance Required: Owner, Engineer, major subcontractors and Contractor.
- C. Agenda:
 - 1. Review of Execution of Owner-Contractor Agreement.
 - 2. Review of Regulatory requirements affecting the project.
 - 3. Distribution of Control Documents.
 - 4. Submission of progress construction schedule.
 - 5. Designation of personnel representing the parties in Contract, and the Engineer.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Critical work sequencing.
 - 8. Use of premises by Owner and Contractor
 - 9. Construction facilities and controls provided by Owner.
 - 10. Mobilization
 - 11. Project Coordination
 - 12. Temporary utilities provided by Contractor and Owner.
 - 13. Survey and layout.
 - 14. Security and housekeeping procedures.

15. Procedures for testing.
16. Procedures for maintaining record documents.

- D. Record minutes and distribute copies within two days after meeting to participants, with one copy to all participants, and those affected by decisions made.

1.6 PROGRESS MEETINGS

- A. The Engineer will schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and Suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems which impede planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of on site and off-site fabrication and delivery schedules.
 7. Maintenance of progress schedule.
 8. Corrective measures to regain projected schedules.
 9. Planned progress during succeeding work period.
 10. Coordination of projected progress.
 11. Maintenance of quality and work standards.
 12. Effect of proposed changes on progress schedule and coordination.

1.7 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a preinstallation meeting at work site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Engineer, Owner, participants, and those affected by decisions made.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. Submittals are required for all items incorporated into the Work
- B. Submittals for the Work include the following
 1. Contractual Requirements
 2. Construction Schedule
 3. Schedule of Values
 4. Shop Drawing Schedule
 5. Progress Meeting Submittals (see Section 01039)
 6. Construction Pay Applications including Certified Payroll
 7. Shop Drawings, Product Data, and Samples including Manufacturer's Certificates and Test Data (when required).
 8. Manufacturer's O & M Manuals
 9. Shut-down Schedule and Work Plans (when required)
 10. Equipment Installation Certification and Field Calibration Reports
 11. Maintenance Log
 12. Lists of Spare Parts
 13. Facility Start-up and Commissioning Documents
 14. As-Built Drawings
 15. Close-Out Documents

1.2 RELATED SECTIONS

- A. Specification 000_ITB pages IB-1 thru 6 – Instructions to Bidders
- B. Section 01039 – Coordination and Meetings
- C. Section 01310 - Construction Progress Schedules
- D. Section 01400 - Quality Control
- E. Section 01650 - Facility Start-up and Commissioning
- F. Section 01700 - Contract Closeout
- G. Section 01730 - Operation and Maintenance Data

1.3 SCHEDULE FOR SUBMISSION

- A. Contractual Requirements such as bonds, insurance, etc., shall be submitted per ITB General Conditions.
- B. The Construction Schedule shall be submitted per Section and 01310.
- C. Schedule of Values and Schedule of Submittals shall be submitted within 20 days of the Notice to Proceed.
- D. Resubmit updated Schedule of Submittals, schedules, and logs at each Progress meeting. (see 01039)
- E. Shop Drawings, Product Data and Samples shall be submitted with sufficient time for Engineering review, modification, re-submittal, re-review, etc. until the submittals are approved.
- F. Manufacturer's Certificates and Test Data shall be submitted with the Shop Drawings or when performed but prior to shipping.
- G. Pay Applications shall be submitted monthly.
- H. Shut-Down Schedule Work Plan shall be submitted 10 days prior to shutdown.
- I. Maintenance Log shall be submitted one month prior to the first shipment of equipment and shall be updated and submitted monthly.
- J. Manufacturer's O&M Manuals shall be submitted prior to equipment shipping.
- K. List of Spare Parts shall be submitted 10 days prior to turnover.
- L. Facility Start-up and Commissioning documents shall be submitted in accordance with Section 01650.
- M. The Construction Schedule, Schedule of Values, and Schedule of Submittals will be reviewed by the Engineer. If rejected, these submittals must be revised and re-submitted until approval. The Engineer reserves the right to withhold the first Pay Application until approval.
- N. Record Drawings and Close-Out Documents shall be submitted per Section 01700.
- O. Schedule submittals to expedite the Project and deliver to the Engineer in a manner to allow sufficient time for review and processing by the Engineer so as to not cause delays in the Work. Coordinate submission of related items.
- P. The Submittals shall not relieve the Contractor of his obligation to comply with specification requirements for items not listed on the schedule. Nothing herein shall be construed as allowing additional time for completion of the project in the event one or more resubmittals are required.

1.4 FORMAT

- A. Submit all submittals in .PDF format. In addition, provide the following:
1. Color charts on gloss paper or color palette
 2. Samples in actual format (bricks, block, etc.)
 3. Final O&M Manuals in paper in 3-ring binder per specification 01730.
 4. Layout drawings in AutoCad, when AutoCad files have been provided to the Contractor for use in shop drawing preparation
 5. Photos in .jpeg format.

1.5 SCHEDULE OF VALUES

- A. The Schedule of Values shall include quantities and unit prices from the Bid Form, and lump sum prices for all remaining work by the Engineer. The lump sum items shall be segregated such that no item has a value larger than two (2) percent of the Total Bid Price unless approved by the Engineer.
- B. Division 00 and 01 Costs.
1. The Schedule of Values shall include Bonds and Insurance, Mobilization, Demobilization, Submittals and Job-site Superintendent. Other job-wide costs can be included.
 2. Separate costs for Item 1.05 B. 1. can also be included for the major subcontractors.
 3. Manufacturer's Division 00 and 01 costs are to be included in the equipment, materials or products costs.
 4. Mob and De-mob costs shall be equal, and the superintendent payments shall be prorated.
- C. Other Costs:
1. Equipment and material costs can include installation and profit, however payment for stored equipment and materials will be based on invoiced costs.
 2. Shop drawing preparation can be paid up to 5% of the equipment price, upon shop drawing approval.
- D. If not separately identified as in 1.05 B., each item shall include its proportionate share of the Contractor's general operating charges such as profit, overhead, supervision, insurance, bond premiums, interest, equipment cost, depreciation and rental, contingencies, expendable tools, equipment and supplies.
- E. The total cost of the items and quantities the Contractor lists in the schedule of values shall equal the lump sum Contract Price established in the Bid Form.
- F. Where required, the Schedule of Values shall include a complete set of detailed work sheets on bid take off and bid summary covering estimated general conditions expense (field overhead, general overhead, profit mark ups and revisions leading to the final bid amount.
- G. When the Schedule of Values is approved by the Engineer, it shall become part of the Agreement and shall be used as the basis for Contractor progress payments, and to establish unit prices at which extra work may be authorized or deducted from the original Agreement.

1.6 SCHEDULE OF SUBMITTALS

- A. The detailed Schedule of Submittals shall include all submittal requirements, including shop drawings, Product Data, Samples, O&M Manuals, spare parts, maintenance log, training, start-up submittals (Section 01650), close-out, etc.
- B. The cloud-based Project Management submittals log once approved, can take the place Schedule of Submittals

1.7 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

- A. General
 - 1. The contract drawings and specifications are complete in all aspects of layout, type of equipment and materials. They do not serve as detailed fabrication, materials, or installation drawings, and the preparation of such submittals required or necessary for this purpose shall be the responsibility of the Contractor.
 - 2. Shop Drawings, Product Data, and Samples are required for all equipment, products, materials, hardware, fasteners, anchors, shims, or anything else incorporated permanently into the work, furnished or installed by the Contractor.
 - 3. For the purposes of these documents:
 - a. Shop Drawings are fabrication, assembly and/or installation drawings, diagrams, schedules or other documents specifically prepared for the Work by the Contractor, subcontractor, manufacturer, supplier and/or distributor to illustrate some portion of the Work.
 - b. Product Data are illustrations, standard schedules, performance charts, instructions, catalog cuts, brochures, diagrams, materials lists and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
 - c. Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
 - 4. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of these submittals is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.
 - 5. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Engineer. Such Work shall be in accordance with approved submittals.
 - 6. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and the Engineer has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in the Shop Drawings, Product Data, Samples or similar submittals by the Engineer's approval thereof, as the Engineer's review is intended to cover compliance with the Contract Document and not to enter into every detail of the shop work.

7. The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those required by the Engineer on previous submittals.
8. When professional certification of performance criteria of materials systems or equipment is required by the Contract Documents, the Engineer shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

1.8 SUBMITTAL PREPARATION

- A. All drawings, information and documentation shall be prepared in English language and dimensions in US Customary units.
- B. Identify any variations or substitutions from the Contract Documents. If none exist, state “No Variations or Substitutions to the Contract Documents” in each submittal. Submit the Shop Drawing Certificate (attached) declaring and identifying any changes.
- C. When needed, clearly identify or highlighting any required field dimensions or existing elevations requests, coordination required to adjoining or related work required of the Owner or Engineer.
- D. Provide room and/or Building layout drawings to scale, identifying concrete pads, equipment placement, panel locations, piping, drains, etc. Identify dimensions to adjacent equipment or work. Identify any manufacturer’s recommended space requirement for equipment access or maintenance.
- E. Identify all equipment and component dimensions, materials, special service or maintenance access requirements, wiring diagrams, motor data, etc.
- F. Provide space for Contractor and Engineer review stamps.
- G. All subcontractors and manufacturers' drawings shall first be sent directly to the Contractor, who shall keep a record of the drawing numbers and the dates of receipt. The Contractor shall:
 - a. check thoroughly all such drawings, as regards measurements, sizes of members, materials, and all other details to assure himself that they conform to the intent of the drawings and the specification,
 - b. coordinate submittal with related work supplied by others, including electrical and instrumentation equipment, and
 - c. shall promptly return to the subcontractors and/or manufacturers for correction such drawings as are found inaccurate or otherwise in error.
 - d. When properly prepared, Contractor to affix the Contractor’s Review statement.

1.9 CLOUD-BASED CONSTRUCTION MANAGEMENT AND E-SUBMITTAL PROCEDURES

- A. The Contractor shall procure the services of a cloud-based construction documentation service to send/receive, store, log and otherwise manage all project submittals and documentation. Samples and color palettes shall be transmitted in a means suitable to the Owner.
- B. The Construction Management service shall customize the project documentation folders per the Owners and Engineering’s direction. The folders can include Project Meeting/Communications, Shop Drawings, O&M Manuals, Changes in the Work (RFIs,

RFQs change Orders), Pay Applications, Field Observations and Photos, Materials and Other Field Tests, Start-up / Commissioning, and Construction Close-out.

- C. All submittals shall be identified in a submittals log. Submittals Types shall be identified per 1.06 A. Software shall sort on the submittal type. Contractor to provide Submittals report at each Progress Meeting.
- D. The website submittals shall be set-up to notify certain team members of posted information including shop drawings
- E. Unless otherwise noted, all transmittals, shop drawings and product data shall be in PDF, photos in .JPG and cad files in .DWG formats.

1.10 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer approved submittal form. Sequentially number the transmittals in accordance with the specification number. Add SD for shop drawings, OM for O&M Manuals and a brief descriptor. Re-submittals shall have original number and a sequential decimal suffix. (i.g. 15060.2 SD Pipe is the second shop drawing submittal for pipe.)
- B. Identify Project, Contractor, Subcontractor and supplier; pertinent drawing and detail number, and/or specification section number on each submittal.
- C. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- D. Revise and resubmit submittals as required and identify all changes made since previous submission. Submit the full document as a re-submittal, so the last version is complete.
- E. The Engineer reserves the right to refuse to check or review any submittal of a subcontractor or manufacturer which is not presented in compliance with the foregoing requirements.

1.11 SAMPLE SUBMITTALS

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of sufficient size and representative of finishes indicating textures, and patterns for Owner selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number of samples specified in individual specification sections; two of which will be retained by the Engineer.
- E. Reviewed samples which may be used in the work are indicated in individual specification sections.

- F. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or contained within such submittals with the requirements of the Work and of the Contract Documents.

1.12 SUBMITTAL REVIEW

- A. The Engineer reserves the right to reject outright any submittal which is deemed incomplete or not adequately coordinated with other work elements.
- B. The Engineer will review the submittals within a reasonable time after receipt thereof and will comment directly on the PDF submittal with any notes or corrections which may be necessary to meet the Contract requirements.
- C. The Contractor shall then review such notations and/or instructions and if he concurs therein, shall make or have made such required corrections, and shall repost corrected drawings to the website for final review. The Contractor shall include a 'cover sheet' identifying how each comment was addressed. The entire submittal shall be resubmitted such that the final accepted submittal ins complete.
- D. Such further review by the Engineer will be limited to the corrections only, and the Contractor, by such re-submission shall be held to have represented that such drawings contain no other alterations, additions or deletions, unless the Contractor (in writing) directs the Engineer's specific attention to same. Should the Contractor question, or dissent from, such notations and/or instructions, he shall so inform the Engineer and request further clarification before resubmitting the drawings.
- E. The review of Contractor's, subcontractors', and manufacturers' drawings by the Engineer is for coordination and assistance, and the Engineer does not thereby assume responsibility for errors or omissions. Such errors or omissions must be made good by the Contractor, irrespective of the receipt, review of the drawings by the Engineer, and even though the work is done in accordance with such drawings.
- F. Manufacturer Certificates
 1. When specified in individual sections, submit manufacturer's certification to the Engineer.
 2. Indicate material or Product meets or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 3. Certificates may be recent or previous test results on material or Product, but must be acceptable to the Engineer.

1.13 SHUT-DOWN SCHEDULE AND WORK PLANS

- A. The Contractor shall schedule shut-downs a minimum of 10 days in advance. Such shut-downs can include bulkhead installation and removal, pump, valve or pipe replacement, hydraulic connections and electrical and instrumentation connections.
- B. The Contractor shall submit a Shut-Down Work Plan for each interruption, on a form provided by the Engineer.

1.14 EQUIPMENT INSTALLATION, CALIBRATION REPORT AND SERVICE REPORT

- A. When specified, the Manufacturer shall submit a certificate to check that the equipment has been properly installed by the Contractor and calibrated or set-up by the field technician.
- B. When a product or equipment must be checked or serviced, a service report shall be submitted identifying what was served or if any parts were replaced.
- C. Additional demonstration submittals are detailed in Section 01650.

1.15 START-UP AND COMMISSIONING DOCUMENTS

- A. Submit documents in accordance with Section 01650.

1.16 CONTRACT CLOSE-OUT DOCUMENTS

- A. Submit Contract Close-out Documents per Section 01700.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01310
CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Project Construction Schedule and look-ahead schedules
- B. Format, content, revisions and submittals

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Shop drawings, product data, and samples
- B. Section 01950, 3.15 Substantial Completion

1.3 QUALITY ASSURANCE

- A. Any and all float shall not be used exclusively by Contractor but shall be available to both the Owner and Contractor alike.
- B. Any schedule showing completion of the Work prior to the contractual Substantial and/or Final Completion dates, nor the review of such schedule shall signify agreement and acceptance of early completion, nor shall it be a means on which to base delay claims.
- C. The Contractor shall obtain input from all sub contractors when compiling and updating the schedules.
- D. The schedule shall be prepared using Primavera, Microsoft Project or approved software.

1.4 CONSTRUCTION SCHEDULE FORMAT

- A. Identify each work element with a task ID.
- B. Prepare schedule as a horizontal bar chart with separate bar for each major portion of work or operation, identifying first workday of each week.
- C. Sequence of Listings: The chronological order of the start of each item of work.
- D. Show link to interdependent tasks as a dashed or phantom line
- E. Critical path: Denote Work in red.
- F. Scale and Spacing: To provide space for notations and revisions.
- G. Sheet Size: 11 x 17 inches

1.5 CONSTRUCTION SCHEDULE CONTENT

- A. Identify Notice to Proceed, intermediate Substantial Completion (See Section 01950, 3.15), Project Substantial Completion and Final Completion dates.
- B. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- C. Identify the dates and duration when processes or major equipment are taken out of service.
- D. The schedule will include submittal preparation, review, re-submittal, fabrication/assembly, delivery, installation, testing and startup for all major equipment.
- E. Include equipment start-up and facility commissioning
- F. Identify the Project Float, defined as the time between early completion and final (contractual) completion.
- G. Identify interdependent work elements.
- H. Identify work per 01950, 3.15 and other logical / grouped activities.
- I. Provide sub-schedules to define critical portions of the entire schedule.
- J. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the last day of each month.

1.6 REVISIONS TO CONSTRUCTION SCHEDULES

- A. The construction schedule shall be updated for each progress meeting, but not more often than twice a month.
- B. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
- C. Identify activities modified since previous submittal, including any schedule slippage, revision to Project Float, major changes in scope, and other identifiable changes.
- D. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect, on schedules of separate contractors

1.7 SUBMITTALS

- A. Submit initial schedule within 30 days of the NTP.
- B. Submit initial and all revisions to the submittals website
- C. Bring color paper copies to Progress Meeting when requested.

1.8 LOOK-AHEAD SCHEDULES

- A. Look-Ahead Schedules are informal short-term schedules used to present the work details in a two-week or an otherwise agreed upon period, to help facilitate construction coordination.
- B. Look-ahead schedule will include shutdowns, inspections, start-up, and other key dates, equipment deliveries and critical path submittals. They do not include float, critical path work, interdependencies, or other details show on the construction schedule.
- C. Present Look-ahead schedules to the RPR each week as a means of coordinating work activities and at each Progress Meeting.
- D. Look-ahead schedule format can be excel, word or other informal means

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance – Quality Control of installation, tolerances, references, mockup, inspecting and testing laboratory services, and manufacturers' field services and reports.
- B. Quality Control (QC) Plan, to ensure an acceptable level of quality for all products, materials, equipment, and the proper coordination, installation and start-up of the same.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01600 – Materials, Products and Equipment: Requirements for material and product quality.

1.3 SUBMITTALS

- A. Corporate Quality program, including training, certificates, or other personnel advancements.
- B. Quality Control Plan for this project, including procedures to:
 - 1. Review and coordinate submittals prior to posting
 - 2. Field verify key measurements
 - 3. Monitor the quality of subcontractor's work
 - 4. Scheduling, coordinating and monitoring all on-site testing
 - 5. Means to identify, track and remedy non-satisfactory work
- C. Submittals shall be reviewed, signed and posted by the QC Officer.

1.4 QUALITY ASSURANCE – QUALITY CONTROL OF INSTALLATION

- A. The Contractor shall maintain quality through construction, including the monitoring quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Contractor to name a Quality Control Officer, responsible for all aspects of QC. The QC Officer shall be an on-site engineer with at least 20 years of related experience.
- C. Contractor shall contract with subcontractors with specific expertise in the contracted areas of work. Subcontractors field personnel shall have expertise, training and certifications in the specific areas of their work. Master millwrights, plumbers, electricians are required for key installations.
- D. The installation contractor(s) shall comply with manufacturers' instructions in each step of the installation sequence, including the use of any specific tools.

- E. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- F. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- G. Perform work by persons qualified to produce workmanship of specified quality.
- H. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.5 TOLERANCES

- A. Pipe, tubing, conduit, supports, etc. shall be plumb vertically and horizontally. Unless identified elsewhere, out of plumb shall be no more than ¼” in 10 feet. Where multiple runs are installed, each pipe, tube, conduit shall be directly in-line and equally spacing to the other pipes, tubes or conduits.
- B. Contractor to monitor tolerance control of installed products to produce uniform quality Work. Where non-uniform or out-of-plumb work is identified, work shall be corrected to the tolerance specified or the Owner’s approval.
- C. Where specifications are available, comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Adjust Products to appropriate dimensions; position before securing Products in place.

1.6 REFERENCES

- A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date specified in the individual specification sections, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Architect/Engineer shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.7 MOCK-UP

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

- C. Accepted mock-ups are representative of the quality required for the Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so.

1.8 TESTING SERVICES

- A. The Contractor to hire and provide independent third-party testing services as necessary to comply with the specification herein. Testing shall include:
 - 1. Soil material Compaction tests
 - 2. Concrete material air, slump and compression tests
 - 3. Pachometer or GPR tests (01045, 3.1 C.)
 - 4. Anchor pull-out tests
 - 5. H&V balance tests
 - 6. Electrical tests
 - 7. Non-destructive examination tests for bolting and welding.
 - 8. Discontinuity (holiday) testing of concrete protective coating systems.
 - 9. Other tests as identified herein.Note: Pressure tests can be performed by the Contractor, and equipment start-up tests are identified elsewhere
- B. The independent firm's qualifications shall be submitted for approved by the Engineer. The testing firm will perform inspections, tests, and other services specified in individual specification sections and as required by the Engineer or the Owner.
- C. Inspecting, testing, and source quality control may occur on or off the project site. Perform off-site inspecting or testing as required by the Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Contractor to cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Engineer and independent firm 48 hours prior to expected time for testing services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing or inspecting does not relieve Contractor of performing Work to contract requirements.
- G. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer.

1.9 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and as applicable, and to initiate instructions when necessary.

- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report in duplicate within 30 days of observation to Engineer for information.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

- A. The QC Officer shall:
 - 1. Review all product data for application requirements
 - 2. Monitor paint surface preparation and coat mil thickness
 - 3. Observe and access aesthetics of masonry, tile and grout work
 - 4. Monitor ambient and substrate temperatures and production application temperature requirements
 - 5. Monitor bolt and anchor torque
 - 6. Coordinate the same with the on-site RPR.
- B. The QC Officer shall review all work and perform a preliminary punch-list inspection for all items that do not conform to the construction documents.
- C. Perform at critical junctures in the work and prior to intermediate Substantial Completion items. Provide that list as a QC Report to the Engineer.
- D. Monitor correction of any deficiencies. When corrected, notify the Engineer that the facility or area is ready for the Engineer's inspection.
- E. QC Officer may be requested to attend the final inspection along with the Engineer and Owner.

END OF SECTION

SECTION 01600

MATERIALS, PRODUCTS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. This Work includes:
 - 1. Transportation, storage, handling, and installation of all work.
 - 2. Maintenance of stored and installed equipment.
 - 3. Product options and substitutions for materials and equipment supplied and installed.
 - 4. The type of materials required relative to their environment.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals.
- B. Section 01400 - Quality Control

1.3 SUBMITTALS

- A. Maintenance Log, updated monthly

1.4 GENERAL PROVISIONS

- A. Materials, Products and Equipment (MP&E) (including all materials, machinery, equipment, components, hardware, anchors, couplings, and ancillary equipment or systems) shall be carefully designed, manufactured and installed to ensure that all required functions are adequately performed within specified degrees of precision, performance criteria are met, and that each unit shall operate with every other part, furnished or existing, to provide a complete integrated system which shall operate to the satisfaction of the Engineer.
- B. The Contractor shall recognize and acknowledge that the Contract Documents may represent a specific product make and model even though other makes and models may be specified or accepted as substitutes. Any changes or revisions of work made necessary by the type and dimensions of furnished MP&E shall be made at no cost to the Owner, and he shall furnish detail drawings showing such changes or revisions for the approval of the Engineer.
- C. All materials, equipment, and accessories shall be new and unused and shall be essentially the products of a manufacturer regularly engaged in the production of such material or equipment and shall essentially duplicate material or equipment that has been in satisfactory operation at least 5 years.
- D. The owner reserves the right to reject any material or equipment manufacturer who, although he meets the above requirements, does not provide satisfactory evidence indicating adequate and prompt post-installation repair and maintenance service as required to suit the operational requirements of Owner.

- E. Items of any one type of materials or equipment shall be the product of a single manufacturer.

1.5 TRANSPORTATION AND HANDLING

- A. No equipment, materials or other products shall be shipped without O&M Manuals, or approved storage, handling and/or maintenance requirements from the manufacturer.
- B. The manufacturer shall crate all parts of equipment carefully to facilitate shipping and handling. Crates shall completely protect the equipment and be sufficiently strong to permit lifting and skidding without additional bracing or reinforcement.
- C. Transport and handle MP&E in accordance with manufacturer's instructions. Transport and handle all MP&E in such a manner to avoid breakage, inclusion of foreign materials, and/or damage by water or other causes.
- D. All equipment shipments shall be identified on the Maintenance Log. Notify the Engineer at least two days in advance of the delivery of equipment. The Engineer or RPR shall be notified of the time of delivery and shall be present. The Contractor shall inspect all equipment before off-loading.
- E. Equipment cannot be shipped or accepted at the site prior to 2 weeks before installation. Equipment shall not be delivered unless it can be immediately incorporated into the work or proper storage facilities are available.
- F. Deliver packaged materials in original unopened shipping containers. Packages or materials showing evidence of damage or contamination regardless of cause will be rejected. The Contractor shall promptly inspect apparently undamaged shipments to ensure that MP&E comply with requirements, quantities are correct, and MP&E are undamaged.
- G. The Contractor shall repair or replace all items damaged or broken as a result of the Contractor's operation at no cost to the Owner.
- H. When specified in individual sections, equipment shall be tested or made available for performance witness testing by the Engineer at the factory prior to shipment.
- I. Provide equipment and personnel to handle, off-load and store MP&E to prevent damage.

1.6 STORAGE AND PROTECTION

- A. When MP&E cannot be immediately incorporated into the Work, store, protect and maintain MP&E in accordance with manufacturers' instructions.
- B. Store sensitive MP&E in weather tight, climate controlled enclosures. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- C. For exterior storage of MP&E, place on sloped supports, above ground. Cover all openings.
- D. Cover MP&E subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product. Provide temporary heat where required.

- E. Provide power to all motor heaters if stored outdoors or in unheated areas. Rotate all shafts periodically as required by the manufacturer.
- F. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Arrange storage of MP&E to permit access for inspection and maintenance. Periodically inspect to verify MP&E are undamaged and are maintained in acceptable condition.

1.7 MAINTENANCE OF STORED AND INSTALLED EQUIPMENT

- A. The Contractor shall remain responsible for the care and proper maintenance of all stored and installed equipment until the Work is accepted per Section 01650 and defined as Substantially Complete.
- B. The Contractor shall submit a Maintenance Log 10 days prior to the first delivery and shall update and resubmit the Log prior to accepting delivery of all new equipment. Notify the Engineer at least two days in advance of the delivery of equipment. The log shall:
 - 1. Identify when the shipments are scheduled to arrive.
 - 2. Identify the manufacturer's requirements including the time and/or frequency of the required maintenance. Note: This must be provided by the Mfr.
 - 3. Identify the date, time and initials for recording when the maintenance is performed.
- C. No equipment, materials, or other MP&E shall be shipped without approved O&M Manuals, or approved storage, handling and/or maintenance requirements from the manufacturer.
- D. The Contractor shall rotate, lubricate, heat, and otherwise maintain all equipment in accordance with the Maintenance Log until acceptance by Owner. The Contractor shall record in the log, the maintenance performed and by whom, immediately after performance.
- E. The Engineer shall review the log from time to time and may reject partial payment if the maintenance is not being performed as required. The Engineer may also, from time to time, inspect the maintenance being performed.
- F. The log shall be turned over to the Owner prior to Substantial Completion. The Owner will maintain equipment following Substantial Completion.

1.8 PRODUCT OPTIONS

- A. Products specified by Reference Standards or by Description Only:
 - 1. Any Product meeting those standards or description may be submitted for review.
- B. Products specified by naming one or more manufacturers with a provision for "or Equal" or "Approved Equal":
 - 1. Substitutions are allowed
 - 2. Submit a request for substitution for any manufacturer not named in accordance with the following article.
 - 3. Refer to ITB document for requirements on substitution requests.

- C. Products specified by naming one or more manufacturers with the provision "No Substitutions":
 - 1. Provide products of named manufacturers meeting specifications,
 - 2. No substitutions are allowed.

1.9 "OR EQUAL" CLAUSE

- A. Specifying an article, material, or piece of equipment by reference to a proprietary product or by using the name of a manufacturer or vendor followed by the clause "or equal" shall be understood to indicate the type, function, minimum standard of design, efficiency, and quality required and shall not be construed in such a manner as to exclude MP&E of comparable quality, design, and efficiency.
- B. Comparable MP&E shall be capable of performing equal function and shall be compatible with other equipment, materials, or systems to which they connect or will become an integral part of.
- C. The clause "or approved equal" which may appear elsewhere in the documents shall mean the same as "or equal".
- D. Wherever a MP&E is defined by specifying a proprietary product or manufacturer, the term "or equal" is not be implied.
- E. Substitutions of "or equal" MP&E are subject to the approval of the Engineer.

1.10 SUBSTITUTIONS

- A. Engineer will only consider Requests for Substitutions following the Bid, provided those substitutions are listed in the ITB Bid Form, Section 2. There is no guaranty that any listed substitution will be approved.
- B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- C. Each request shall include the credit amount for the substitution. This amount must include any and all cost adjustments to the other trades as a result of this substitution.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Will provide the same warranty for the Substitution as for the specified Product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

- F. Substitution Submittal Procedure:
1. Formally submit or post the Request For Substitution (RFS) for consideration. Limit each request to one proposed Substitution.
 2. Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature and performance data together with samples of the materials where feasible to enable the Engineer to determine if the proposed substitution is equal to that specified.
 3. Contractor shall submit certified tests where applicable by an independent laboratory, acceptable to the Owner, attesting that the proposed substitution is equal.
 4. A list of installations where the proposed substitution is used.
 5. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the Owner.
 6. The Engineer will prepare a Work Change Directive, which will include the hours and cost to review the substitution request. A decision will then be made by the Owner, in review of the credit amount, and savings in O&M costs and the cost to review the substitution.
 7. Where the approval of a substitution requires revision or redesign of any part of the work, all such revision and redesign and all new drawings and details required, therefore, shall be provided by the Contractor at his own cost and expense and shall be subject to the approval of the Engineer.
 8. In all cases, the Engineer shall be sole judge as to whether a proposed substitution is to be approved. The Contractor shall abide by the Engineer's decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the work without approval of the Engineer.

PART 2 - PRODUCTS

2.1 ATMOSPHERIC AND NFPA 82 DESIGNATIONS

- A. Atmospheres to establish the minimum material characteristics are designated as Chemically Corrosive, Heavily Corrosive, Moderately Corrosive and Neutral. Area designations relative to these atmospheres are shown on Sheet G-02
- B. Atmospheres for fire protection shall following NFPA 820 Standards for Fire Protection in Wastewater Treatment and Collection Facilities, 2008 edition. Area designations relative to NFPA 820 are show on Sheet G-02

2.2 MATERIALS

- A. Unless otherwise specified, materials for miscellaneous metals, anchors, hangers and supports, Unistrut, pipe/wall sleeves, hardware (nuts, bolts, washers), segmented compressible seals (rubber and hardware), shims/spacers/plates, etc., incorporated into the work are designated in accordance with the atmosphere, location and/or condition of service.
- B. The materials shall apply to all trades and subcontractors

- C. Table 1 identifies the minimum material type or products to be used for each atmospheric designation. Where more stringent materials are identified on the Drawings or Details Specifications, those materials shall be used.

TABLE 1: ATMOSPHERES, AREAS AND MATERIALS

Area Designation	Process/Building Areas	Materials
Chemically Corrosive (CC)	N/A	PVC, FRP, 316 SS and Titanium. Material selection must be compatible with the product.
Heavily Corrosive (HC)	Headworks Building, including the screenings room, and garage / storage area, South Headworks Building and South Garage Outside areas including Raw Influent Pump Station, Upper and Lower Alcove Area, Influent Flow Area, Within 18” Above Exterior Grit Chambers and Channels, and Flow Splitter Area	316 (L) SS.
Moderately Corrosive (MC)	Odor Control + Grit Pump Building, Outside Odor Control Vessels, Larger than 18” Above Tank Deck	Galvanized carbon steel.
Neutral (N)	Headworks Building Electrical Room	Painted/coated carbon steel (See Specification 09900)

- D. **STAINLESS STEEL**
- Provide 316 in all areas except wet wells and inside of tanks.
 - 304L and 316 L – Low Carbon stainless steel – shall be used for all welding applications. 304/316 shall be used for all other applications.
 - Stainless steel shall meet ASTM A240, A312, A403, A774, A778, and must be pickled. 316 (L) shall be used for all applications visible without combined space entry.
 - Stainless steel shall not be used directly with chlorine related compounds; titanium must be used instead.
- E. **Galvanized Steel**
- Galvanizing is specified in Section 05500.
- F. **PVC and FRP**
- PVC and FRP materials, seals and gaskets must be appropriate for the chemical/application.
- G. Where different atmospheric conditions apply to the same material, the harsher environment controls the material type, e.g., a sleeve through a pipe gallery into a tank must be 316 SS.
- H. Architectural and structural product materials may be specified elsewhere and take precedence over this specification.

2.3 NEMA RATINGS AND ELECTRICAL CONDUIT AND COMPONENTS

- A. Provide NEMA rated panels and conduit materials as show on G-02.
- B. Electrical components relative to NFPA atmospheric conditions, including intrinsically safe components for Class 1, Divisions 1 and 2 environments, are specified in Division 16.

PART 3 - EXECUTION

- 3.1 Contractor shall coordinate all materials with Subcontractors, Suppliers and Vendors at the time of the Bid.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes the necessary work and submittals necessary to close out the project.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals
- B. Section 01650 – Equipment/Facilities Start-up and Commissioning
- C. Section 01730 - Operation and Maintenance Data

1.3 SUBMITTALS

- A. Electronic file transfer of all project documents posted to the submittal's website. Files must be transferred before the website is discontinued
- B. Record Drawing Sets, from General Contractor, and Mechanical Electrical and Systems House Subcontractors
- C. Final Change Order
- D. Final Application for Payment
- E. Contractual Statements including:
 - 1. Waiver of Lien
 - 2. Contractor's Affidavit
 - 3. Contractor's Declaration
 - 4. Release of Surety.
- F. Manufacturers' Extended Warranties, Material and Guaranty Bond (if required).
- G. Copy of Occupancy Permit and any other permits from local governing authority (if required).
- H. Start-Up and Commissioning Documents
- I. Final O&M Manuals
- J. Construction Photographs and Video(s) where specified.

1.4 CLOSEOUT PROCEDURES

- A. Submit statement certifying that all submittals have been “Accepted” and Contractor requirements are “None”.
- B. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- C. Perform satisfactory completion of Punch List.
- D. Submit final Application for Payment identifying Total Adjusted Contract Sum, previous payments, and sum remaining due.
- E. Provide satisfactory evidence that all claims have been settled.

1.5 FINAL CLEANING

- A. Complete final cleaning and restoration prior to final project inspection.
- B. Remove all temporary labels, stains, and foreign substances. Wash or clean by approved methods all surfaces on which dust and dirt has collected.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Clean debris from drainage systems.
- E. Clean site, sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- G. Restore disturbed area. Lawn area may be seeded unless otherwise noted. Paved area shall be restored to their original condition, compatible with the surrounding area, using like materials and workmanship.
- H. Touchup painted surface. Clean and repaint with matching color all scratched, marred, or otherwise damaged painted surfaces of all equipment and enclosures.

1.6 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.7 PROJECT RECORD DOCUMENTS

- A. Maintain As-Built set on site, with regular red-line markups by the General Contractor and Mechanical, Electrical and I&C Subcontractors. Note As-Builts are drawings produced by the Contractor, and Record Drawings are produced by the Engineer.
- B. As the work progresses, keep a complete and accurate record of all changes in the Contract Documents indicating the work as actually installed. All changes shall be neatly shown on

prints of the drawings affected which shall be kept at the job site for inspection by the Owner and the Engineer.

- C. Record the location of existing buried utilities uncovered during the course of construction. Measure the location of the utilities from permanent structures or surface features
- D. Ensure entries are complete and accurate, enabling future reference by Owner. Record information concurrent with construction progress. Engineer to review progress monthly prior to approval of Pay application.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of other floors, slabs, platforms, and foundations in relation to finish main floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities, conduits, and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension, detail, and placement.
 - 5. Details not on original Contract drawings.
 - 6. Conduit and wiring information changed, or not shown on drawings including home runs.
- F. On completion of the work, prior to the Contractor's application for final payment, the Contractor shall scan and transfer the As-Built drawings and transfer them to the Engineer. The Engineer shall review these Drawings for completeness and accuracy and may require re-submittals.
- G. Written approval or other evidence satisfactory to the Engineer of the final conditions of the work shall be obtained from all public authorities or agencies having jurisdiction over any portion of the work.
- H. All public authorities or agencies having jurisdiction over any part of the work shall be determined, and all the requirements of these authorities or agencies with respect to but not limited to inspection, permits, fees, approval, and the like regardless of whether they are listed above or not shall be met.
- I. Submit all documents to Engineer for approval prior to submittal of final Application for Payment.

1.8 SATISFACTION OF CLAIMS

- A. Before final payment can be made, the Contractor shall furnish satisfactory evidence that all claims for damage have been legally settled, or sufficient funds to cover such claims have been placed in escrow, or that an adequate bond to cover such claims has been obtained to secure payment therewith interest.
- B. In the event that any Contractor has trespassed upon private property in the prosecution of the work of this contract, the Owner may withhold payment for the value of such work in or on the property, but in any case, no less than a sum of \$500 for each property trespassed until the

Contractor has secured a release from the property owner upon whose property the trespass was committed.

1.9 SUBSTANTIAL COMPLETION

- A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy and utilize the facilities for its intended use.
- B. Substantial Completion is covered under Section 01650-Equipment Start-Up and Commissioning.

1.10 WARRANTIES

- A. Assemble and provide all extended warranties (more than the project warranty period) all from subcontractors, suppliers, and manufacturers, dated to the date of Substantial Completion(s). Insert warranty documents into the Warranty tab Section of the O&M Manuals.
- B. Submit warranty documents prior to final Application for Payment.
- C. All parts of the work or equipment which is in the opinion of the Engineer prove defective in material, workmanship, or operation within the warranty period shall be removed and replaced or repaired in a manner satisfactory to the Engineer and at no cost to the Owner. Work so repaired or remedied will receive the same warranty period, starting at the date of the accepted re-work.
- D. Any service material or equipment required because of the defect shall be supplied without charge.
- E. All work specified to be designed by the Contractor shall be guaranteed to perform as specified.
- F. The general Warranty period is stipulated in ITB General Conditions, starting at the date of Substantial Completion unless:
 - 1. A greater period is specified elsewhere.
 - 2. Owner chooses to take over and use a portion of the Work as provided for in the Specifications; in which case the warranty shall be from agreed upon takeover and date of use.
- G. Equipment or work replaced and/or repaired during the warranty period shall be guaranteed for the additional warranty period from the date of acceptance of the repair or replacement or until expiration of the original warranty period whichever comes later.

1.11 FINAL PAYMENT

- A. Within thirty (30) days after the completion of the work under this Contract to the satisfaction of the Owner and the Engineer, in accordance with all and singular terms and stipulations herein contained, the Owner shall make final payment, from a final estimate made by the Engineer. Before final payment is made, the Contractor shall, as directed by the Owner, furnish a Contractor's Affidavit that he has paid or satisfactorily secured all claims of every nature. Also, the Contractor shall furnish a release from the surety or sureties and permit

agencies as applicable, approving payment of final estimate by the Owner. The final payment, when made, shall be considered as final approval and acceptance of the completed work herein specified.

- B. The acceptance by the Contractor of the final payment aforesaid shall operate as, and shall be, a release to the Owner and his agents, from all claim and liability to the Contractor for anything done or furnished for, relating to the work, or for any act or neglect of the Owner or of any person relating to or affecting the work.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01700

SECTION 01990

PERMITS

PART 1 GENERAL

1.1 GENERAL

- A. The Permits included in this Section shall be applied for and paid for by the Contractor. The requirements and regulations contained in these documents shall be adhered to by the Contractor as they pertain to the work done under this Contract.

1.2 RELATED SECTIONS

- A. Section 01000 - General Specifications

1.3 PERMIT

- A. Electrical Permit – Ann Arbor Township

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 16010

GENERAL ELECTRICAL, INSTRUMENT, AND CONTROL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General requirements for electrical power, instrumentation, and controls systems.

1.2 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 00800 – General Supplementary Conditions.
- C. Section 01000 – General Specifications.
- D. Section 16050 – Basic Electrical Materials and Methods.

1.3 REFERENCES

- A. All equipment and workmanship shall be in conformance with the following documents:
 - 1. National Electrical Code, latest approved edition.
 - 2. Any and all Federal, State, and/or local codes, ordinances, or regulations.
 - 3. Latest approved standards of ISA, IEEE, ANSI, NEMA, and Underwriters' Laboratories.
- B. All equipment shall be designed, constructed, installed, and tested in conformity with all requirements, as a minimum, of applicable standards of IEEE, NEMA, ISA, ANSI, ICEA, and OSHA, except as modified herein.

1.4 GENERAL REQUIREMENTS

- A. Unless otherwise specified, provide tools, equipment, apparatus, transportation, labor, and supervision to complete and place in satisfactory operation the work indicated on the Drawings and specified herein. Where permits or inspection fees are required in connection to the work under this Specification, the Contractor shall secure such permits and pay all fees.
- B. Where any public or private utilities are encountered, the Contractor shall be responsible for any damages thereto resulting from his operations. Any existing lines or utilities damaged during the construction and which are not to be abandoned or removed, shall be replaced or repaired. The Contractor shall be responsible for determining the exact location of all underground or otherwise concealed utilities, conduit runs, piping, etc. which may interfere with construction or which require modifications.
- C. All work shall be done in conformity with the applicable requirements of the codes, rules, and regulations of public utilities and all others having jurisdiction.

- D. Where the Specifications describe or the Drawings show materials of higher quality than required by the above rulings and codes, the Drawings and Specifications shall govern the quality of materials which shall be furnished.
- E. The wire, conduit, and equipment sizes shown on the Contract Drawings are based on estimated ratings. If ratings of equipment as furnished under the Contract exceed the estimated ratings, the wire, conduit, and equipment sizes shall be adjusted to meet NEC requirements at no additional cost to the Owner.
- F. The phrase "below grade," when used in reference to the interior of buildings, rooms, or other structures in these Specifications and on the Drawings, shall apply to the entire internal volume of the room, area, or structure where 50% or more of the volume is actually below the average of the exterior finished grade elevations. In all other cases, the phrase shall only apply to the volume of space actually below finished grade.
- G. Dry locations are defined as interior; above grade; heated rooms, structures, buildings, cabinets, enclosures, etc. not normally subject to dampness or wetness. Damp locations are defined as interior; above grade; unheated rooms, structures, and buildings. Wet locations are defined as all outdoor areas; all underground rooms, structures, building areas, vaults, etc.; whether heated or unheated. Refer to National Electrical Code Article 100, "Location:" for additional definitions.

1.5 PROJECT CONDITIONS

- A. Before submitting his proposal, this Contractor shall be held to have examined the site and satisfied himself as to the existing conditions under which he will be obliged to work. The Contractor will be allowed no claim(s) for extra(s) due to his failure to make the above examination.

1.6 INSPECTION

- A. At the proper time, the Contractor shall file application for inspection of his work with the local, State, or National authority having jurisdiction and shall deliver to the Owner all required certificates attesting to approval by such authorities.

1.7 GUARANTEE

- A. The equipment and installation furnished under this Section shall be guaranteed for a period of one (1) year as specified under Section 01700, Contract Closeout, except as modified by the Division 16 Specifications.
- B. Repair and maintenance for the guarantee period is the responsibility of the Contractor and shall include all repairs and maintenance other than that which is considered as routine. (This is replacement of lamps, oiling, greasing, etc.) The Owner shall be the judge of what shall be considered as routine maintenance.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. All materials and equipment shall be new, except where specifically identified otherwise.
- B. All materials and equipment shall be listed or labeled by Underwriters' Laboratories, Inc., except for materials and equipment not available from any source with such listing and/or labeling, or as specifically required by the Division 16 Sections.
- C. All conductor terminations, lugs, and connectors on all equipment supplied under this Contract shall be 75°C rated for copper conductors.
- D. Concrete for electrical work shall be ready-mix or transit mixed concrete to the requirements of ASTM C94, latest edition. Concrete shall have a compressive strength, after twenty eight (28) days, of 3,500 psi (minimum).

2.2 LOOSE AND DETACHABLE PARTS

- A. The Contractor shall retain all loose and small detachable parts of the apparatus and equipment furnished under his Contract, until the completion of his work, and shall then turn same over to the Owner or his representative delegated to receive them and obtain from the Owner an itemized receipt, therefore, in triplicate, the Owner retaining the original. The Contractor shall retain one copy of this receipt for his files and shall attach the other two to any request for final payment for the work.

2.3 STANDARDS

- A. All materials shall be new and shall conform as a minimum with NEMA, ANSI, and Underwriters' Laboratories, Inc. (UL) in every case where such a standard has been established for the particular type of material in question.

2.4 SPARE PARTS

- A. Spare parts shall be provided for electrical equipment supplied under this Contract, as specified in individual Specification Sections, and shall be furnished and delivered to the Owner. Spare fuses are specified under Section 16477.
- B. Spare parts shall be packed and individually boxed for storing with each box labeled with the part's description including its part or catalog number, its use, and the equipment for which it is a part. Parts used during startup shall be replaced prior to acceptance.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All floor mounted equipment shall be provided with a minimum 4 inch high concrete pad, unless a higher dimension is shown (or called for) on the Drawings.

- B. Material and equipment furnished and installed by the Contractor shall be completely protected against damage, pilferage, dampness, or abuse until turned over and accepted by the Owner.
- C. The installation of all electrical, instrumentation, and control equipment shall meet the requirements of the State and Federal Occupational Safety and Health Statutes.

3.2 DRAWINGS AND MEASUREMENTS

- A. Drawings shall be submitted in accordance with Sections 01300 and 01700 of these Specifications and as specified hereinafter. No work shall be undertaken until the Engineer has reviewed and approved the shop drawings. Only approved materials shall be installed and only approved installation methods shall be used.
- B. The Drawings show the arrangement, general design, and extent of the systems. The work is shown on the Drawings by symbols, as shown in a legend on the Drawings. Equipment is shown in its general location, except where in certain cases the Drawings may include details giving the exact location and arrangement. Existing, underground or otherwise concealed utilities, piping, conduit runs, etc. indicated on the Drawings are shown in approximate locations and orientations only; the Contractor shall field verify exact locations.
- C. The Drawings are not intended to be scaled for roughing-in measurements nor to serve as shop drawings. Where drawings are required for these purposes or have to be made from field measurements, they shall be prepared by the Contractor. Field measurements necessary to determine the required quantities of materials and fitting the installation of all materials and equipment into the building construction shall be taken by the Contractor.
- D. Installation drawings and manufacturer's shop drawings are required for all electrical, instrumentation, and control work. Installation drawings shall show panel layout, conduit connection sizes, and location and equipment foundations, details, and locations, accurately dimensioned. Exposed runs of conduit need not be dimensioned. Conduit layout and installation drawings shall be submitted for approval and shall show all conduit runs, complete from origination to termination, and shall indicate conduit sizes and fills, raceway system components, methods and spacing of supports, etc.
- E. Control schematics shall be provided for all new and modified existing control circuits. Control schematics shall use the ladder diagram type format incorporating line numbers, operation function statements, contact location line numbers with underlines indicating normally closed contacts. A description of the operation of each device and complete written sequence of operation shall be provided with all control schematics. Format and symbols shall be as approved by the Owner. Wire and terminal numbers shall be clearly shown.
- F. Upon completion of the work, complete "As-Built" drawings shall be provided. For additional requirements see Section 01700, Contract Closeout, Project Record Documents.

3.3 STORING OF EQUIPMENT

- A. All equipment shall be stored in accordance with the manufacturer's recommendations. A letter from the manufacturer shall be provided stating those recommendations.

- B. All equipment which has been set in place but not in operation shall be protected from damage or deterioration from whatever causes in accordance with the manufacturer's recommendations until the equipment has been accepted by the Owner.
- C. All wire and cable shall be stored on the original, manufacturer's reels, protected from the weather, and all cable end seals shall be maintained intact until the cable is installed.
- D. During construction, all electrical equipment insulation shall be protected against absorption of moisture and metallic components shall be protected against corrosion by strip heaters, lamps, or other acceptable means. This protection shall be provided immediately upon receipt of the equipment and maintained continuously.

3.4 CLEANUP

- A. After substantial completion and prior to final acceptance, all electrical equipment shall be cleaned up, interior and exterior, to be free of dust and other foreign matter. Internal components shall be vacuumed, including windings of dry type transformers, and wiped free of dust.
- B. De-energization of equipment to accomplish the cleaning work shall be done at a time as approved by the Owner.

3.5 PAINTING

- A. The exterior of all enclosures shall be cleaned and touched up with matching paint where scratched or marred so that the exterior presents an "as new" appearance.
- B. All factory finished equipment shall be protected from damage during erection, thoroughly cleaned after erection, and touched up as required. If the factory finish has, in the opinion of the Owner, been seriously damaged, the equipment shall be refinished.

3.6 SALVAGED ELECTRICAL EQUIPMENT

- A. All electrical equipment in the existing facility that is removed and not reused shall be turned over to the Owner or disposed of as directed by the Owner.

3.7 SUBSTANTIAL COMPLETION

- A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete, in accordance with the Contract Documents, such that the Owner can occupy the facilities and/or utilize the system for its intended use.
- B. Substantial Completion shall be determined by the Owner and/or the Engineer based on completion of Testing, Start-up, and Demonstration requirements as specified in Sections 16960 and 16980. See Section 01700, Contract Closeout for additional requirements.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General electrical equipment and installation requirements.

1.2 RELATED SECTIONS

- A. Section 00700 – General Conditions.
- B. Section 00800 – General Supplementary Conditions.
- C. Section 01000 – General Specifications.
- D. Section 16010 – General Electrical, Instrument, and Control Requirements.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Short Circuit, Flash Hazard, and Protective Devices Coordination Analyses: Submit per paragraph 3.3.
- C. Temporary Power Plan and Schedule: Submit proposed sources of temporary power, means of power distribution, protection of temporary cables, and schedule of any power outages required.

1.4 WORK INCLUDED

- A. The Contractor shall furnish all labor, material, and equipment required for the installation of the modifications to existing electrical systems and the completion of the work as herein specified and/or indicated on the Drawings. It is the intent that the Drawings and Specifications, which are general only, shall provide for finished, first-class work, and that the equipment and appurtenances thereto shall be of such construction and details, and of such materials, as to function completely and properly, and so as to be of long life; and such as not to require excessive upkeep or maintenance; and that operation shall be simple and control convenient. Any items omitted therefrom which are clearly necessary for the completion of the work or its appurtenances shall be considered a portion of the work though not directly specified or shown. All work shall conform with NECA 1-2010, Good Workmanship in Electrical Contracting.
- B. The Contractor shall provide and install all conduit and wire connections required between components of equipment and systems supplied under other Sections of these Specifications, where shown or indicated on the Drawings.

PART 2 PRODUCTS

- A. The Contractor shall furnish and install modifications to the existing power distribution system, together with all necessary supports, framing, hangers, and all other appurtenances. He shall furnish and arrange for the setting of anchor bolts, channels, etc. which are to be set in the concrete. He shall connect and make operable any and all electrical equipment whether or not it was furnished under this section of the Specifications, except as stated in Section 15010. The work shall include, but is not limited to, the following items:
1. Motor Control Centers
 2. Motor Starters
 3. Medium Voltage Motor Starters
 4. Distribution Panelboards
 5. Electrical Equipment and Devices
 6. Raceway System
 7. Power Feeder and Branch Circuit Wiring
 8. Modifications to Existing Motor Control Centers
 9. Disconnect Switches
 10. Busway
 11. Welder Receptacles
 12. Hoist Receptacles
 13. Surge Protection Devices

PART 3 EXECUTION

3.1 TEMPORARY POWER FOR CONSTRUCTION

- A. The Contractor shall be responsible for providing temporary electrical power as required during the course of construction and shall remove temporary service equipment when no longer required. The Contractor shall coordinate with the Owner for sources of required temporary power. Temporary power sources shall be installed per NECA 200-2010, Temporary Electric Power at Construction Sites, Standards.

Load cables shall be routed and protected to prevent damage and to prevent exposing personnel to hazards. Cables shall be of the heavy duty jacketed type, Bronco/66 Type G cable as manufactured by Teledyne Western Wire Co., Essex Type G, or equal.

3.2 DRAWINGS AND MEASUREMENTS

- A. Outlets connected by lines show switch control or circuiting only and are not actual runs of conduit. All light and receptacle outlets are lettered and numbered; the letter indicates the panelboard from which the circuit is to be powered. All outlets bearing the same letter and number shall be connected to the same circuit.
- B. Power feeders shall be run in individual conduits, from source to load, as indicated in schedules, wiring diagrams, or by home runs on the Drawings.

3.3 SHORT CIRCUIT, FLASH HAZARD, AND PROTECTIVE DEVICES COORDINATION ANALYSES

- A. A power system short circuit analysis shall be provided by the Contractor to analyze the electrical system and verify the correct application of the power system devices and other power system components provided under this Contract. This and the following flash hazard and coordination analyses shall be carried from Substation 2B (Breakers feeding MCC-E and MCC-F) through the branch circuit protective devices. The analyses shall include all existing electrical distribution system components to remain in service.
- B. A flash hazard analysis shall be provided by the Contractor to determine the flash protection boundary and the level of personal protective equipment (PPE) required for each switch enclosure, panel, device, and equipment containing electrical circuits per NFPA 70E. The results of this analysis shall be used to prepare arc-flash and shock hazard warning labels for electrical equipment enclosures, where required by the National Electrical Code.
- C. A protective devices coordination analysis shall be provided by the Contractor to analyze and verify the selection and settings of the protective devices in the electrical system. Devices shall be selected to provide a maximum of circuit protection and selectivity consistent with a maximum in service continuity. Composite coordination curves shall be provided by the Contractor to verify that selectivity will be provided by the devices used.
- D. In the short circuit analysis, provide calculation methods and assumptions, the base quantities selected, one-line diagram, source impedance data (including power company system characteristics), impedance diagrams or data tables, typical calculations, tabulations of calculated quantities and results, conclusions, and recommendations. Provide calculated short circuit interrupting and momentary duties for an assumed three phase bolted fault at the secondary unit substations, motor control centers, distribution panelboards, branch panelboards, and other significant locations throughout the modified distribution system. Include in the tabulations: fault impedance, X/R ratios, asymmetry factors, motor contribution, short circuit kVA, and symmetrical and asymmetrical fault currents. Calculations shall be of the per unit impedance method on a 100 MVA or 1,000 kVA base.
- E. The flash hazard analysis shall include calculations of the flash protection boundary and incident energy for each piece of electrical equipment utilizing the formulas in the current edition of NFPA 70E and IEEE Standard 1584. The analysis results shall include the following for each piece of electrical equipment:
 1. Nominal System Voltage
 2. Arc Flash Boundary in inches.
 3. Available Incident energy and the corresponding working distance in calories per square centimeter (cal/cm^2) and/or minimum arc rating of clothing and/or site-specific level of PPE .
 4. Limited approach distance (when door or cover is open) in inches.
 5. Restricted approach distance (when door or cover is open) in inches.
- F. In the protective devices coordination analysis, provide time-current curves graphically indicating the coordination proposed for the system, including ground fault protection, centered on conventional full size log-log paper. Include with each curve sheet a complete title and one-line diagram with legend identifying the specific portions of the system covered by that particular curve sheet. Each curve sheet shall display curves for a maximum of four (4) protective devices. Include a detailed description of each protective device identifying

type, function, and degree of coordination achieved. Tabulate recommended device pick-up, instantaneous, and time delay settings.

- G. Include on the curve sheets characteristics of system load protective devices. Include all devices down to the low voltage feeder breakers. Include transformer deconstruct curves (ANSI method; including thermal and mechanical stress limits) and significant symmetrical and asymmetrical fault currents. Terminate device characteristic curves at a point reflecting the maximum symmetrical or asymmetrical fault current to which the device is exposed.
- H. The short circuit, flash hazard, and protective devices coordination analyses must include complete fault tabulations from the sources shown on the Drawings. Obtain the existing analyses for the existing portions of the plant's electrical distribution from the Owner, as a basis for the additions and modifications.
- I. The short circuit, flash hazard, and protective devices coordination analyses shall be provided by an electrical power distribution equipment manufacturer or an electrical distribution systems analyst. Analyses shall be prepared by persons experienced in the work.
- J. The Drawings and Specifications indicate the general requirements for the electrical equipment being provided. Changes and additions to equipment characteristics may be suggested by the results of the short circuit, flash hazard, and protective devices coordination analyses. Submit any such proposed changes and additions as a part of the analyses document. Necessary field settings of devices, adjustments, and modifications to equipment to accomplish conformance with the approved short circuit, flash hazard, and protective devices coordination analyses shall be carried out by the particular manufacturer or by the Contractor at no additional cost to the Owner. Required field settings and adjustments shall be made on existing protective devices also.

3.4 SEQUENCE OF CONSTRUCTION AND DEMOLITION

- A. The following is a suggested sequence of construction and demolition. The Contractor shall provide and submit a sequence of work and work schedule for review. All necessary outages shall be kept to a minimum and coordinated with the Owner.
 - 1. Install New Distribution Panel DP-E
 - 2. Install New Motor Starters fed from DP-E
 - 3. Feed DP-E from Unit Sub 2B spare breaker. Set the trip unit and revise CTs on the breaker as required.
 - 4. Move loads from MCC-E to DP-E.
 - 5. De-energize and remove MCC-E.
 - 6. Install New Distribution Panel DP-F
 - 7. Install New Motor Starters fed from DP-F
 - 8. Feed DP-F from Unit Sub 2B breaker which formerly fed MCC-E.
 - 9. Move loads from MCC-F to DP-F
 - 10. De-energize and remove MCC-F

END OF SECTION

SECTION 16110

RACEWAYS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit.
- B. Liquidtight flexible metal conduit.
- C. Fittings and conduit bodies.

1.2 RELATED SECTIONS

- A. Section 16010 – General Electrical, Instrument, and Control Requirements.
- B. Section 16050 – Basic Electrical Materials and Methods.
- C. Section 16130 – Boxes.
- D. Section 16170 – Grounding and Bonding.
- E. Section 16190 – Supporting Devices.
- F. Section 16195 – Electrical Identification.

1.3 REFERENCES

- A. ANSI C80.1 – Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 – Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. ANSI/NFPA 70 – National Electrical Code.
- E. NECA 101-2013, Steel Conduits (Rigid, IMC, EMT).
- F. NECA 111-2003, Standard for Installing Non-metallic Raceways.
- G. NEMA RN 1 – Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- H. NEMA TC 2 – Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- I. NEMA TC 3 – PVC Fittings for Use with Rigid PVC Conduit and Tubing.

- J. UL 6 Standard for Rigid Metal Conduit.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Conduit layout and installation drawings shall be submitted for approval and shall show all conduit runs, complete from origination to termination, and shall indicate conduit sizes and fills, raceway system components, methods and spacing of supports, etc. Indicate materials, finishes, dimensions, listings, and standards compliance.
- C. Product Data: Provide data for conduit, tubing, duct, fittings, and accessories.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Section 01600.
- B. Accept conduit on site. Inspect for damage.
- C. Conduit shall be delivered at the construction site in not less than ten foot lengths; each length of conduit to have approval label of the Underwriters.
- D. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- E. Protect PVC conduit from sunlight.

1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations, unless dimensioned. Route as required to complete the raceway system.

PART 2 PRODUCTS

2.1 CONDUIT AND FITTINGS

- A. Provide all conduit, conduit fittings, outlet boxes, pull boxes, supports, hangers, plates, and such other items as are incidental to or required for a complete installation, all of which shall be made of cast iron, malleable iron, or galvanized steel, unless indicated otherwise.
- B. No threadless couplings or running threads will be permitted on rigid conduits.
- C. No conduit smaller than 3/4 inch shall be used, unless otherwise indicated or specified.

- D. All raceways shall be marked with the manufacturer’s name or trademark as well as type of raceway and size. This marking shall appear at least once every 10 feet and shall be of sufficient durability to withstand the environment involved.
- E. Wherever conduits cross building, tank, or other structural expansion joints, the Contractor shall provide and install conduit expansion/deflection fittings as manufactured by O.Z./Gedney Type DX, Crouse-Hinds, Thomas & Betts, or equal, unless indicated on the Drawings as requiring an expansion fitting.
- F. Expansion fittings with copper, ground bonding jumpers shall be installed where indicated on the Drawings and shall be O.Z./Gedney Type AX with Type BJ bonding jumper, Crouse-Hinds, or equal.

2.2 RIGID STEEL CONDUIT

- A. Rigid steel conduits shall consist of heavy wall, mild steel tube, hot-dipped galvanized with threads electrogalvanized after cutting, and especially selected with reference to uniformity of thickness and freedom from defects. All fittings shall be suitable and approved for use in rigid steel conduit systems.
- B. Manufacturers:
 - 1. Wheatland Tube Company
 - 2. Allied Tube & Conduit Corporation
 - 3. Maverick Pipe
 - 4. Or Approved Equal
- C. Rigid Steel Conduit: ANSI C80.1, UL 6.
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; UL Standard 514B; all steel fittings.

2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Anaconda “Sealtite” Type LA
 - 2. Electriflex
 - 3. AFC
 - 4. Thomas & Betts Corp.
 - 5. Or Approved Equal
- B. Description: Interlocked steel construction with PVC jacket.
- C. Fittings: ANSI/NEMA FB 1.
- D. All fittings used with this conduit shall be of the liquidtight type and shall be equipped with approved type grounding devices to insure continuity between the conduit and the connection. The fittings shall seal out vapors, coolants, oil, water, dust, and other foreign matter and shall be installed with a sealing O-ring between the fitting and the box. The fittings shall be “ST” series connections as manufactured by Appleton Electric Co., Ideal Industries 75-000 Series, or equal.

2.4 MISCELLANEOUS FITTINGS AND MATERIALS

- A. Insulated grounding bushings shall be Type HBLG as manufactured by O.Z./Gedney, American Fittings Corp., Thomas & Betts, or equal.
- B. Insulating bushings shall be high impact resistant, thermoset plastic, 150°C rated, Type A as manufactured by O.Z./Gedney, American Fittings Corp., Thomas & Betts, or equal.
- C. All locknuts shall be of the sealing type, O.Z./Gedney Type SLG, Appleton, American Fittings Corp., Thomas & Betts, or equal.
- D. Liquidtight hubs shall have a sealing ring between the fitting and the box and an insulated throat to insure protection of the wires as pulled. Hubs shall be made of nodular or malleable iron steel, zinc plated for corrosion resistance, UL listed, and shall meet or exceed the requirements of UL test 514B. Liquidtight hubs shall be Bridgeport, O.Z./Gedney Type CHM, Ideal Industries 75-000 Series, American Fittings Corp., Thomas & Betts, or equal.
- E. Couplings and fittings for electrical metal tubing shall be zinc plated steel compression or setscrew connectors and couplings as manufactured by O.Z./Gedney, American Fittings Corp., Thomas & Betts, or equal.
- F. Conduit sealing compound shall be Waterguard Desiccants Industrial Encapsulant, Polywater FST-250, or equal.
- G. Link seal for sealing conduits into sleeves and cored openings shall be GPT Industries - Thunderline, Metraflex Co. Metraseal, Calpico, or equal.

PART 3 EXECUTION

3.1 INSTALLATION OF RACEWAYS

- A. Install conduit in accordance with NECA 101-2013, Steel Conduits (Rigid, IMC, EMT).
- B. Arrange supports to prevent misalignment during wiring installation.
- C. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- D. Do not attach conduit to ceiling support wires.
- E. Arrange conduit to maintain headroom and present neat appearance.
- F. Identify raceway systems under provisions of Section 16195.
- G. Joints shall be made tight with standard couplings and corners turned with elbows or long radius bends in pipe.
- H. Exposed multiple runs of conduit indoors shall be supported on hangers suspended from concrete inserts or structural steel. Single runs of conduit may be attached to ceilings or walls by means of approved type anchors. Conduit and other equipment may be attached to structural steel only where approved by the Owner. All conduit shall be secured to the

supports by means of galvanized malleable iron clamps using two bolts or machine screws. Conduit supports, hangers, and anchors shall be as specified under Section 16190.

- I. The use of wood plugs for anchoring raceways to concrete or masonry will not be permitted.
- J. All conduits installed exposed shall be run vertically or horizontally and shall be parallel or at right angles to the building or structure walls.
- K. The Contractor shall provide and install, where required, the additional steel to adequately support all conduits, boxes, and all other electrical equipment.
- L. All conduit shall be dry, clean, and free of obstructions before conductors are pulled in. If there is evidence of moisture, obstructions, or foreign matter in the conduit when the conductors are installed, the wiring shall be removed and the conduit cleaned to the satisfaction of the Owner. All wiring showing evidence of damaged insulation shall be replaced.
- M. Concealed conduit shall be placed in floors, ceilings, and walls before concrete is poured and in masonry walls as the walls are laid up. The conduit shall be blocked and fastened in place to prevent any displacement during construction. Conduits shall be separated by at least one conduit diameter, unless specifically authorized by the Owner to do otherwise. All conduit joints shall be made tight with galvanized couplings or approved unions.
- N. All steel conduit run exposed shall be supported at intervals not exceeding 8 feet, unless shown otherwise on the Drawings. Multiple runs of conduit shall be mounted with steel supports so arranged that each individual conduit is clamped in place.
- O. Conduit installed on walls shall be mounted on spacers to provide not less than 1/4 inch space between the conduit and the wall.
- P. Conduit installed exposed outdoors shall be supported by structural steel members.
- Q. All conduit entrances through below grade walls and poured-in-place concrete roofs shall be installed through sleeves poured in place or through core drilled opening, unless poured in place.
- R. Sleeves for passage of conduits through poured concrete roofs and below grade walls shall be constructed of heavy wall steel pipe with full circle continuously welded water stop plate. Sleeves shall be sized to accommodate the conduit and link seal combination as specified hereinbefore.
- S. All conduits passing through openings or sleeves in roofs, below grade walls, or floors shall be sealed in place and made watertight with link seal.
- T. All conduit stubs for future use shall be terminated with pipe caps.
- U. Conduit runs installed horizontally overhead shall allow a minimum of 7 feet of headroom, except where installed along structures, piping, equipment, or in other areas where headroom cannot be maintained because of other considerations.

- V. Wherever a conduit emerges from the underside of a slab or roof or enters an area from above and that slab or area or conduit is exposed to the weather, then that conduit shall be provided with a pull box or fitting and filled to a length of 12 inches minimum with conduit sealing compound where the conduit emerges indoors to prevent water from following the conduit interior. The sealing compound shall be as specified hereinbefore under Miscellaneous Fittings and Materials.
- W. Wherever a conduit enters an electrical equipment enclosure from an underground or outdoor location and other locations where indicated on the Drawings, the conduit opening shall be sealed after the wires and/or cables are pulled. One and one half (1½) inch and smaller conduits with more than 20 percent wire fill may be sealed with conduit sealing compound; all other conduits, where required, shall be provided with conduit sealing bushings or compound bushings with ground conductor connectors, as manufactured by O.Z./Gedney or equal. Conduit sealing compound shall be forced into conduits to a minimum depth of 12 inches.
- X. Field bends in conduit shall not be of a lesser radius than that of manufactured elbows of the same trade size and shall show no flattening of the conduit. Conduit bends shall be held to as large a radius as possible for ease in pulling of conductors and to provide a neatly installed appearance. Generally, conduits 1" and smaller shall be bent in the field. Other conduit bends shall conform to the following: 2" and 2½" conduit, 24" radius, 3" and larger with a minimum radius of 36". Except where conduit runs are shown in exact detail on Drawings, the maximum length of straight conduit runs shall be 200 ft. between pull boxes, with 50 ft. deducted for each 90 degree bend and 25 ft. deducted for each 45 degree bend, reduction in length for all other angle bends shall be figured on a similar basis.
- Y. Conduit parallel to or crossing uninsulated hot water or steam pipes shall be separated from same by 12", if parallel, or 7", if crossing. Where hot water or steam pipe lines are insulated, conduit shall clear the insulation surface by 2". Conduit shall not run directly under cold water lines.
- Z. Conduit stub-ups into the bottom of floor mounted enclosures, including motor control centers, shall enter the enclosure through individual holes in the bottom plate or sheet steel bottom and the openings shall be sealed around each conduit to maintain the enclosure's rating.
- AA. All conduits and sleeves passing through openings in walls above grade or floors shall be sealed in place and made watertight with non-shrink grout or other Owner approved sealant. Non-shrink grout used in floor or wall openings, shall be of the non-metallic type. All openings in fire rated walls and floors shall also be sealed with a fire barrier sealing system capable of maintaining the designed fire rating of the wall or floor and suitable for sealing out smoke and fumes. The fire barrier sealing system shall be capable of passing the ASTM E-814 (UL 1479) fire test and shall be subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory; provide products by Hilti Construction Chemicals, Inc.; 3M™ Fire Protection Products; or equal.
- BB. Openings in boxouts through floors or walls or in the bottom of electrical equipment shall be closed using split insulating blocks or non-shrink grout in a manner as approved by the Owner. All unused sleeves shall be capped or plugged at both ends with approved fittings.
- CC. Metallic sleeves containing a ground conductor shall be bonded at each end to the ground conductor.

- DD. The ends of all metallic conduits or elbows shall be cut square, reamed, and threaded.
- EE. The threads of all steel conduit connections concealed in concrete shall be coated at the time of installation with No. B69A45 Zinc clad primary coating, as manufactured by Sherwin William's Corp., Ideal Industries No. 40-630, CRC Chemicals Zinc-It, or equal.
- FF. The threads (metallic) of all corrosive area, outdoor, below grade, and hazardous area equipment connections including conduit, conduit fittings, pull and junction box covers, lighting fixture reflector, guard, and outlet box connections, wiring device boxes, etc. shall be coated with an anti-seize, lubricating, and protective compound prior to final assembly. Coating compound shall be NO-OX-ID "A Special" by Sanchem, Inc., Never-Seez as manufactured by Bostik Div. of Emhart Corp., "Dry Molybdenum Lubricant" No. 40-640 by Ideal Industries, CRC Chemicals Lectra-Shield, or equal.
- GG. Ground and bond metallic raceway systems under provisions of Section 16170.
- HH. All metallic conduits, except those terminated in metal boxes or enclosures without knockouts and secured with double locknuts, integral hubs, or liquidtight hubs, shall be terminated with insulated grounding bushings. Conduits terminated in metal boxes or enclosures without knockouts and secured with double locknuts shall be terminated with an insulating bushing.
- II. All conduits and sleeves, metallic and non-metallic, intended for the passage of wire or cable and not terminated with a fitting, shall be terminated with a bushing or end bell.
- JJ. All connections between metallic conduits and NEMA Type 1 or NEMA Type 12 steel boxes shall be made with double locknuts. All connections between conduits and NEMA Type 3, 3R, 4, and 4X boxes shall be made with watertight connections. Watertight connections shall consist of integral hubs or liquidtight hubs.
- KK. Electrical metal tubing or so called "Thin Wall" conduit and fittings shall not be used.
- LL. Flexible conduit may be used only where rigid conduit is impracticable or where indicated on the Drawings.
- MM. Liquidtight, PVC coated, flexible metal conduit and associated fittings shall be installed as follows:
 - 1. All sections of flexible conduit larger than 1¼ inches in diameter shall be paralleled with a braided copper bonding strap connected between the last section of rigid conduit and the frame of the equipment to ensure a continuous ground.
 - 2. Liquidtight, PVC coated, flexible metal conduit shall be installed with watertight connectors and in minimum lengths without sharp bends.
- NN. All final conduit connections to motors and other machinery, equipment, and devices which may be subject to movement or vibration shall be made with 15" to 18" of flexible, liquidtight, metallic conduit.

END OF SECTION

SECTION 16123

WIRE AND CABLE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building wire.
- B. Wiring connectors and connections.

1.2 RELATED SECTIONS

- A. Section 16050 – Basic Electrical Materials and Methods.
- B. Section 16110 – Raceways.
- C. Section 16130 – Boxes.
- D. Section 16190 – Supporting Devices.
- E. Section 16195 – Electrical Identification.

1.3 REFERENCES

- A. ANSI/NFPA 70 – National Electrical Code.
- B. Underwriters’ Laboratories Standard UL-83.
- C. Underwriters’ Laboratories Standard UL-44.
- D. Federal Specification A-A-59544.
- E. ANSI Standard C33.80.
- F. ICEA – Insulated Cable Engineers Association.
- G. ASTM – American Society for Testing and Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide for all wire and cable.
- C. Test Reports: Indicate procedures and values obtained.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.

1.5 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing shown on Drawings is approximate. Route wire and cable as required to meet Project Conditions.
- C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.6 COORDINATION

- A. Coordinate Work under provisions of Section 01039.
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.1 GENERAL

- A. All wires and cables shall be permanently identified, at intervals not exceeding 3 feet, indicating type, size, voltage rating, and manufacturer's name.
- B. All wires and cables shall be continuous and shall be delivered in reels or in coils. Reels and coils shall be plainly marked for complete identification, including the wire or cable size, the number of conductors, the type of wire or cable, length, weight, thickness and character of the insulation, and the name of the manufacturer.
- C. All coils and reels of wires or cables shall carry original date perforated inspection labels of the Underwriter's laboratories, Inc. showing the number of feet and type of wire contained.

2.2 MANUFACTURERS – BUILDING WIRE

- A. General Cable
- B. Southwire Corporation

2.3 BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor: Annealed, uncoated copper. All conductors shall be stranded. ASTM designation B-3.
- C. Conductor Temperature Rating: 90°C in wet locations; 90°C in dry locations.

- D. Insulation Voltage Rating: 600 volts.
- E. Insulation: ANSI/NFPA 70, Type THWN; high temperature polyvinyl chloride with nylon jacket or Type XHHW-2, high temperature cross-linked polyethylene.

2.4 MANUFACTURERS – WIRING CONNECTORS AND ASSOCIATED MATERIALS

- A. Solderless Pressure Connectors:
 - 1. 3M™ Company Model Scotchlok
 - 2. Thomas & Betts Model Sta-Kon
 - 3. Burndy Model Insulug Type TN
- B. Spring Wire Connectors:
 - 1. 3M™ Company Model Scotchlok
 - 2. Ideal Model Wing-Nut
- C. Compression Connectors:
 - 1. 3M™ Company Model Scotchlok
 - 2. Thomas & Betts Model Color-Keyed
 - 3. Burndy Model Hylug
- D. Tap Connectors:
 - 1. Thomas & Betts Model Color-Keyed
 - 2. Burndy Model Crimpit
 - 3. Anderson Model Crimptaps
- E. Watertight, Twist-On Connectors:
 - 1. 3M™ Company Direct Bury Splice Kits
 - 2. King Innovation “DryConn”
 - 3. Ideal Industries, Inc. Twister DB Plus
- F. Watertight, Insulated Connector Blocks:
 - 1. Utilco Type USPA-SS, Type PSA-SS, or Type PED-SS
 - 2. IIsco Type USPA-SS
- G. Electrical Insulating Tape:
 - 1. 3M™ Company “Scotch” No. 33+
 - 2. Plymouth “Premium Black”
- H. High Temperature Tape:
 - 1. 3M™ Company “Scotch” No. 70
 - 2. Plymouth “Plysil”
- I. Fireproofing Tape:
 - 1. 3M™ Company “Scotch” No. 77
 - 2. Plymouth No. 50
- J. Woven Fiberglass Tape:
 - 1. 3M™ Company “Scotch” No. 69
 - 2. Plymouth “Plyglas”

- K. Color Coding Tape:
 - 1. 3M™ Company “Scotch” No. 35
 - 2. Plymouth “Slipknot” No. 45

- L. Insulating and Watertight Sealing Materials:
 - 1. 3M™ Company “Scotchcast” kits
 - 2. Raychem WCS Series heat shrinkable sleeves
 - 3. 3M™ Company 8400 Series cold shrink materials
 - 4. 3M™ Company “Scotchkote” sealant

- M. Metal Clad Cable Fittings:
 - 1. PLM Products JAG Series and TFA Series

- N. Watertight Cord Grip Fittings:
 - 1. Crouse-Hinds CGB-SG Series
 - 2. Appleton Electric Co.
 - 3. Thomas & Betts

- O. Cable or Cord Strain Relief:
 - 1. Hubbell-Kellems
 - 2. Daniel Woodhead Co.

- P. Cable Pulling Lubricant:
 - 1. American Polywater “Dyna-Blue”
 - 2. Ideal “Aqua Gel”
 - 3. Minerallac “Golden Glide”
 - 4. 3M™ Company “GEL”

2.5 WIRING CONNECTORS AND ASSOCIATED MATERIALS

- A. All wiring connectors shall be 75°C rated and suitable for use on copper conductors.

- B. Cable or cord strain reliefs shall consist of stainless steel wire mesh with support bale. Strain reliefs shall be of the split rod type where required or indicated on the Drawings.

- C. Cable Pulling Lubricant:
 - 1. Lubricant shall be UL listed and approved for use on the cable jacket or insulation.
 - 2. Lubricant shall be polymer based and shall dry completely when exposed to air.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.

- B. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 WIRING METHODS

- A. Interior Locations:
 - 1. Wire for general power, light, and control shall be building wire, Type THWN or Type XHHW-2 insulation, in raceway.
- B. Use wiring methods indicated on Drawings.
- C. Color Coding:

The color schedule for the conductor insulation of wire and cable shall conform to the following:

 - 1. Three phase lighting and power, 208Y/120 VAC-Black, Red, Dark Blue, White or Gray, and Green ground.
 - 2. Three phase lighting and power, 120/240 VAC-Black, Red, Orange (high leg to ground), White or Gray, and Green ground.
 - 3. Single phase lighting and power, 120/240 VAC-Black, Red, White or Gray, and Green ground.
 - 4. Three phase lighting and power, 480 VAC-Brown, Orange, Yellow, and Green ground.
 - 5. Three phase lighting and power, 480Y/277 VAC-Brown, Orange, Yellow, Gray, and Green ground.
 - 6. DC power – Red with White stripe (+) and Light Blue with White stripe (-).
 - 7. Single conductor control, AC voltage – Red.
 - 8. Multi-conductor control cables – ICEA Method 1.
 - 9. Alarm, annunciator, instrumentation, graphic, and telemetering (if not shielded), AC voltage – Pink.
 - 10. Alarm, annunciator, instrumentation, graphic, and telemetering (if not shielded), DC voltage – Light Blue.
 - 11. Intrinsically safe circuits – Purple.
 - 12. On wire sizes larger than Number 8 AWG and/or where authorized by the Owner, coding may be identified by taping with the appropriate colored self-adhesive vinyl color coding tape.
 - 13. Grounding conductors shall be continuous green or bare for all systems.
 - 14. Neutral conductors shall be continuous white or gray for all systems.
- D. The installation of intrinsically safe circuits shall meet all requirements of the NEC.
- E. Wiring Connections:
 - 1. Dry location splices and tap connections shall consist of compression connectors or tap connectors, taped to 150 percent of insulation rating of the conductors.
 - 2. Final connections to equipment wire leads for No. 8 AWG and smaller wire in dry locations only, except 480 volt motor leads, may be made with spring wire connectors.
 - 3. Wet and damp location splices and tap connections shall consist of compression connectors or tap connectors with insulating and watertight sealing materials; water tight, twist-on connectors for wire sizes up to three No. 10 AWG; or watertight, insulated connector blocks; providing watertight connections suitable for direct burial.
 - 4. All conductor terminations at screw terminals shall consist of solderless pressure connectors, except where conductor terminations are included with the equipment being connected.

5. Insulation of connections in lighting fixture and high temperature equipment shall consist of silicone rubber type high temperature tape with a woven fiberglass tape over-wrap.
6. Electrical insulating tape (plastic type) shall be used on all splice and tap connections, unless wire manufacturer's recommendations require otherwise.

3.4 INSTALLATION

- A. All wiring shall be run in rigid metal raceway systems unless noted otherwise.
- B. Install products in accordance with manufacturer's instructions.
- C. The minimum size of conductors shall be No. 12 AWG, unless specifically approved and/or shown otherwise on the Drawings.
- D. Use stranded conductors for control circuits, No. 14 AWG minimum, unless shown otherwise on the Drawings.
- E. Pull all conductors into raceway at same time. Cable pulling tensions shall not exceed manufacturer's recommended values.
- F. Use suitable wire pulling lubricant for wire, No. 4 AWG and larger, and for all cables. No soap flakes, vegetable oils, clays, or grease shall be permitted in raceways.
- G. Use suitable cable fittings and connectors.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards. Wires and cables shall be bundled and laced as specified in Section 16190.
- I. All wires and cables routed through large pull boxes and terminal cabinets shall be looped to provide two to three feet (minimum) of slack within the enclosure, where practical.
- J. Clean conductor surfaces before installing lugs and connectors.
- K. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- L. Wire and cable shall be supported in vertical runs by insulated clamps so that wire or cable weight will not be unduly supported from conductor terminations.
- M. Spade or fork tongue lugs shall not be used, except where approved by the Owner.
- N. Conductor terminations and tap splices within lighting fixture pole/transformer bases shall be suitable for wet or damp locations.
- O. Wires and cables shall, in general, be run continuously, without splicing, from origination to termination. No splices shall be permitted in any feeder circuit, except in outlet, junction, and/or pull boxes, or where specifically noted on the Drawings. Use sufficient length of wire for connecting to equipment without straining. All methods of splicing shall meet cable manufacturer's recommendations. All splices shall be carefully placed in outlet boxes, etc. without crowding. No splicing shall be permitted in signal cables.

- P. Splices and tap connections shall be made in junction boxes only; conduit type fittings shall not be used as junction boxes.
- Q. All wires and cables shall be tagged as specified in Section 16195.
- R. Motor control center feeder circuits and distribution panelboard branch circuits shall each be run in individual raceways from source to motor or other load.
- S. Vertical lengths of wire and cable shall be supported as required by Article 300.19 of the National Electrical Code. Cable weight shall not be unduly supported from conductor terminations.
- T. Vertical lengths of exposed cable or cord runs over ten feet long shall be supported with a strain relief.
- U. Where an exposed run of cable or cord enters a box or enclosure, provide a watertight cord grip fitting suitable for the cable or cord diameter.
- V. All 120 VAC, single phase loads shall be connected to provide a balanced load on the lighting transformers. All 480 VAC, single phase loads shall be connected to provide a balanced load on the 480 VAC, three phase system.
- W. Make conductor length for parallel feeders identical on each phase leg.
- X. Feeders shall be connected for correct phase rotation. Where possible, busses shall be connected to result in the “A” or “X” phase being in the north, east, or top position with the other phases following in sequence. The terminals H1, H2, and H3 of transformers shall be connected to A, B, and C; 1, 2, and 3; or X, Y, and Z conductors, respectively, of incoming feeders.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 16195.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.6 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Sections 01400 and 16960.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer’s recommended values.
- D. Verify continuity of each branch circuit conductor.
- E. Verify continuity of each feeder conductor.

END OF SECTION

SECTION 16130

BOXES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.
- C. Wireways.

1.2 RELATED SECTIONS

- A. Section 16010 - General Electrical, Instrument, and Control Requirements.
- B. Section 16050 - Basic Electrical Materials and Methods.
- C. Section 16110 - Raceways.
- D. Section 16140 - Wiring Devices.
- E. Section 16160 - Cabinets and Enclosures.
- F. Section 16190 - Supporting Devices.
- G. Section 16195 - Electrical Identification.

1.3 REFERENCES

- A. NECA - Standard of Installation.
- B. NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- D. NEMA OS 2 - Non-metallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- F. NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate materials, finishes, dimensions, listings, and standards compliance.

- C. Product Data: Provide data for boxes, wireways, and accessories.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.5 SUBMITTALS FOR CLOSEOUT

- A. Section 01700 - Contract Closeout: Submittals for Project closeout.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70, National Electrical Code.
- B. Provide Products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to the authority having jurisdiction, as suitable for the purpose specified and indicated.
- C. All boxes shall be sized per Article 314 of the National Electrical Code as a minimum.

PART 2 PRODUCTS

2.1 PULL AND JUNCTION BOXES

- A. Manufacturers: Manufacturers and model numbers of cabinets, enclosures, and associated components shall be as follows:
 - 1. Cabinets and Enclosures: Hoffman Engineering Co., Saginaw Controls, Stahlin, or Hammond.
- B. Cabinets and enclosures in dry locations shall be dust and oil tight, rated NEMA Type 12, and of 14 gauge (minimum) painted sheet steel construction or comparable non-metallic.
- C. The doors shall be gasketed.
- D. Cabinets and enclosures shall be provided with full-length door hinges. Hinges shall be stainless steel and the doors shall have a one point latch.
- E. All interior cabinet or enclosure surfaces, except fittings, shall be painted with two coats of primer and two coats of white, high gloss, baked epoxy enamel paint. The exterior shall be painted with one coat of primer, two coats of ANSI 61 gray paint, and a final coat of clear polyurethane.
- F. Conduit bodies and fittings shall be of cast iron, malleable iron, and/or galvanized steel.

2.2 WIREWAYS

- A. Wiring ducts shall be NEMA Type 12 galvanized steel in indoor, above grade locations; non-metallic, NEMA Type 4X in corrosive locations; or stainless steel, NEMA Type 4 in all

other locations or where indicated on the Drawings. Metallic wireways shall be 14 gauge steel raceways and all wireways shall be provided with removable covers held with captive screws. All fittings shall be designed to be used with the ducts to result in an unobstructed system. The ducts and fittings shall be sized as shown on the Drawings. All hardware on stainless steel and non-metallic wiring ducts shall be made of stainless steel.

- B. The wiring ducts shall be as manufactured by Keystone, Hoffman Engineering Co., B-Line, or equal.

2.3 MISCELLANEOUS COMPONENTS

- A. Anti-seize, lubricating, and protective compound shall be Never-Seez as manufactured by Bostik Div. of Emhart Corp., "Dry Molybdenum Lubricant" No. 40-640 by Ideal Industries, CRC Chemicals Lectra-Shield, Crouse-Hinds HTL, Sanchem, Inc. NO-OX-ID "A Special", or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify locations of floor boxes and outlets in all work areas prior to rough-in.

3.2 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install pull boxes and junction boxes in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Pull boxes and/or junction boxes shall be used in any conduit run where a splice is required. Pull boxes shall be provided every 200 feet of straight run, every 150 feet after 90 degrees of bends, every 100 feet after 180 degrees of bends, and every 50 feet after 270 degrees of bends. More than 270 degrees worth of bends shall not be installed between pulling points in any conduit run.
- D. Pull boxes, auxiliary pull fittings (slip joints), and cable raceways for the pulling, nesting, or concealment of wires or cables shall be provided where indicated on the Drawings and also where required, though not indicated, as specified above.
- E. Mark or label all boxes as specified in Section 16195.
- F. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- G. Enough room shall be supplied in boxes for insulating joints, wires, and bushings, and deep boxes shall be installed where required by the type of fixture or outlet called for on the Drawings.
- H. Wire and cable splices and tap connections shall be made in junction boxes only; conduit type fittings shall not be used as junction boxes.

- I. Electrical boxes are shown on Drawings in approximate locations, unless dimensioned. Adjust box location up to 8 feet, if required to accommodate intended purpose.
- J. Maintain headroom and present neat mechanical appearance.
- K. Install boxes to preserve fire resistance rating of partitions and other elements.
- L. Support boxes independently of conduit.
- M. Wall and ceiling mounted pull and junction boxes shall be spaced 1/2 inch minimum out from the wall or ceiling using corrosion resistant channel: Unistrut; Grinnell “Power-Strut”, or other approved corrosion resistant spacers.
- N. Large Pull Boxes: Use hinged enclosure in interior dry locations.

3.3 ADJUSTING

- A. Section 01700 - Contract Closeout: Adjusting installed work.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.4 CLEANING

- A. Section 01700 - Contract Closeout: Cleaning installed work.
- B. Clean interior of boxes to remove dust, debris, and other material.
- C. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16160
CABINETS AND ENCLOSURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal boxes.
- D. Accessories.

1.2 RELATED SECTIONS

- A. Section 16010 - General Electrical, Instrument, and Control Requirements.
- B. Section 16050 - Basic Electrical Materials and Methods.
- C. Section 16055 - Basic I & C Materials and Methods.
- D. Section 16110 - Raceways.
- E. Section 16130 - Boxes.
- F. Section 16190 - Supporting Devices.
- G. Section 16195 - Electrical Identification.

1.3 REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.
- C. ANSI/NFPA 70 - National Electrical Code.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturer's standard data for enclosures and cabinets.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

- D. Certified shop drawings and diagrams shall be furnished by the Contractor and delivered to the Owner for approval as follows:
 - 1. General dimensions and outline drawings showing the principal dimensions of the equipment and the location and size of electrical conduit connections.
 - 2. Detailed drawings, descriptive data, and other data sheets showing design information which verified that the equipment meets the technical requirements of the Specifications.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 CABINETS AND HINGED COVER ENCLOSURES – TERMINAL BOXES

- A. Provide free standing panels shall be of NEMA Type 12, 12 gauge minimum, cold rolled sheet steel construction, with full height gasketed doors equipped with three-point vault type hardware, removable hinge pins, lockable handle. NEMA Type 12 free standing panels shall be provided with rectangular openings in the bottom for conduit entry. Removable, gasketed cover plates shall be provided for these openings.
- B. Manufacturers: Manufacturers and model numbers of cabinets, enclosures, and associated components shall be as follows:
 - 1. Cabinets and Enclosures: Hoffman Engineering Co., Saginaw Controls, Stahlin, or Hammond.
 - 2. Terminal Blocks: Allen-Bradley No. 1492-CA1, CA3, or -CD8.
 - 3. Substitutions: Items of equal function and performance are acceptable, if in conformance with all sections of this Specification.
- C. Provide an internal, mild steel sub-plate for mounting of internal components.
- D. Cabinets and enclosures shall be provided with full-length door hinges. Hinges shall be stainless steel and the doors shall have a one point latch.
- E. All interior cabinet or enclosure surfaces, except fittings, shall be painted with two coats of primer and two coats of white, high gloss, baked epoxy enamel paint. The exterior shall be painted with one coat of primer, two coats of ANSI 61 gray paint, and a final coat of clear polyurethane.
- F. Terminal blocks shall be provided for all wiring entering cabinets and enclosures from external devices. Provide 10 percent spare terminals, in addition to those required.
- G. Terminal blocks for power conductor connections shall be power distribution blocks for connection of copper wire with individual, set screw type connectors for each terminated conductor, Ferraz Shawmut 66000 Series, Marathon 143 Series, or equal. Provide with transparent safety cover.

- H. Terminal blocks for control conductor connections shall be of the screw terminal type, number of blocks as required, Allen-Bradley No. 1492-CA1 with associated mounting devices, Square D, or equal.
- I. Provide an insulating barrier between the power and the control terminations.

2.2 ENCLOSURE ACCESSORIES

- A. All hardware on the exterior of NEMA Type 4 and NEMA Type 4X enclosures, including hinge pins, screws, bolts, nuts, washers, etc., shall be made of 300 series stainless steel.
- B. Combination drain and breather shall be Crouse-Hinds ECD Combination Series, Appleton, or equal. Combination drain and breather shall be Stahlin Drain Vent or equal on NEMA Type 4X enclosures.
- C. Anti-seize, lubricating, and protective compound shall be Never-Seez as manufactured by Bostik Div. of Emhart Corp., "Dry Molybdenum Lubricant" No. 40-640 by Ideal Industries, CRC Chemicals Lectra-Shield, Crouse-Hinds HTL, Sanchem, Inc. NO-OX-ID "A Special", or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify installation conditions under provisions of Section 01039.
- B. Verify that surfaces are ready to receive work.

3.2 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner.
- C. Install cabinet fronts plumb.
- D. All internal cabinet and enclosure components shall be mounted on the sub-plate positioned for easy access, convenient wiring, and for easy removal.
- E. See Section 16110, Raceways for conduit entrance to cabinets and enclosures requirements.
- F. Mark or label all boxes, cabinets, and enclosures as specified in Section 16195.

END OF SECTION

SECTION 16170
GROUNDING AND BONDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Equipment grounding conductors.
- B. Bonding.

1.2 RELATED SECTIONS

- A. Section 16010 - General Electrical, Instrument, and Control Requirements.
- B. Section 16050 - Basic Electrical Materials and Methods.
- C. Section 16670 - Surge Suppression Systems.
- D. Section 16960 – Electrical Testing and Equipment.

1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.4 GROUNDING ELECTRODE SYSTEM

- A. Metal underground utility piping.
- B. Metal frame of the building.
- C. Ground loops, risers, and conductors.
- D. Rod electrodes.
- E. Ground mat.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.
- B. In the event that the ground resistance is not 5 ohms or less, additional rods or longer rods shall be installed or the soil treated to reduce its resistance by approved practices. All ground resistance measurements shall be made using the fall-of-potential method only and test reports shall be provided as specified under Section 16960, Electrical Testing and Equipment.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01300.

- B. Product Data: Provide data for grounding electrodes and connections.
- C. Test Reports: Indicate facility's overall resistance to ground.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Accurately record actual locations of grounding electrodes.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 MECHANICAL CONNECTORS

- A. All compression connectors, lugs, etc., used in grounding circuits in any location shall have bolts, nuts, etc., of silicon bronze alloy equal to "Everdur" metal. Grounding connections, clamps, etc., shall be as manufactured by Burndy Engineering Company, Thomas and Betts Company, Delta-Star Electric Company, Harger, or equal.
- B. Fittings for bonding a grounding conductor to metallic conduit shall be Thomas and Betts Series 3900BU or equal. Fittings for bonding a grounding conductor to its own conduit shall be Burndy Engineering Company GAR-BU Series, Thomas and Betts Series 3900, Harger, or equal.
- C. Where connections to ground rods or ground mats must be disconnected for testing, the fittings shall be Burndy Engineering Co. Type GD, GG, GAR; Thomas and Betts Co. Series 3902BU; Harger; or equal.

2.2 CONDUCTORS

- A. Grounding conductors, loops, and risers shall be bare, stranded, soft-drawn copper and shall be of the sizes indicated on Drawings.
- B. All bonding jumpers shall be copper and of a cross-sectional area at least equal to their corresponding grounding conductors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Provide bonding to meet Regulatory Requirements.
- C. The non-current carrying parts of all electrical equipment installed under this Contract, including but not limited to raceways, raceway supports, and equipment enclosures, shall be bonded by means of bare copper cable or copper strap to the grounding system as shown on the Drawings and specified hereinafter.
- D. All grounding cables, bus, etc., in locations where subject to mechanical damage, shall be protected by rigid metal conduit, steel guards, non-metallic conduit, or other suitable shield. In all cases, where conduit or other metallic encasement of grounding conductors is required, the conductor shall be permanently and effectively grounded to the enclosure at both ends of its length. This requirement applies to all such enclosures regardless of their length.
- E. Where attached to equipment, conduits, cabinets, etc., suitable approved solderless lugs, compression connectors, or clamps shall be used. No soldered connections shall be used on grounding circuits at any point.
- F. All metal ducts, conduits, starters, panels, switches, etc., which are not rigidly secured to and in good electrical contact with the grounded structural metal frame of the building or grounded conduit system, or which are subject to excessive vibration and loosened ground contacts, shall be securely bonded to grounded building steel or to the grounded conduit system by means of stranded copper jumpers. This jumper shall have a circular-mil cross section of not less than 50 percent of that of the largest conductor entering the enclosure being grounded, with a minimum size of No. 8 AWG stranded copper being used in any jumper.
- G. Conduits which run to boxes or cabinets having concentric or eccentric knockouts which partially perforate the metal around the conduit and impair the electrical connection to ground shall be provided with approved bonding jumpers. Jumpers shall consist of a stranded, braided copper wire at least No. 8 AWG with solderless indent type lugs. Jumper shall be connected from a grounding type locknut or bushing on the conduit inside the box to a stud or silicon bronze alloy bolt in the cabinet frame.
- H. All metal support racks for electrical equipment and enclosures shall be securely bonded to grounded building steel or the grounding system with a No. 2 AWG grounding conductor.
- I. A copper ground conductor shall be carried for each power, lighting at 120 volts and higher, and receptacle circuit with the circuit conductors. The ground conductor shall have the same type insulation as the circuit conductors and shall be green in color through No. 10 AWG and bare copper wire for larger sizes.

- J. Switchgear, motor control center, distribution panelboard, and automatic transfer switch grounding shall consist of ground connections to feeder conduits, ground busses, etc. as required or as indicated on the Drawings.
- K. Splices in wire or cable ground leads shall not be permitted.

3.3 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

SECTION 16190
SUPPORTING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.2 REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. ANSI/NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- C. Conduit and equipment supports and hangers shall be made of galvanized structural steel, with welded or bolted joints. Conduit and equipment supports and hangers shall be fabricated from "Unistrut" Series P1000 galvanized channels and fittings, as manufactured by the Unistrut Products Company, Superstrut A-1200 Series, Grinnell "Power-Strut" PS-200, or equal.

- D. All conduit and equipment supports, hangers, beam clamps (no "C" clamps shall be allowed), and other similar devices made of steel shall be hot dipped galvanized or sherardized after fabrication. All hanger rods, U-bolts, bolts, nuts, and other threaded support components shall be electro-galvanized (per ASTM-B633 Type III SC1) or sherardized. Field cuts and all welds shall be coated with an approved cold or hot galvanizing compound: Z.R.C., CRC Chemicals Zinc-It, or equal. All hanger rods shall be 3/8 inch diameter minimum.
- E. Threaded anchors shall be epoxy based adhesive anchors with threaded rod and screen tube. Adhesives shall match the application, as recommended by the anchor manufacturer. Threaded rods, nuts, and washers shall be furnished with a rustproof finish. Adhesive anchors shall be Hilti Type HIT or equal.
- F. Anchors for light loads (i.e.: conduit clamps, outlet boxes, small pull and junction boxes) supported from masonry or precast concrete panels shall be lead type or plastic expansion anchors with corrosion resistant screws.
- G. Threaded rods, nuts, washers, screws, and bolts for anchors used in areas classified as hazardous and in corrosive areas shall be made of 316 stainless steel. Also expansion anchors for light loads used in masonry or precast concrete panels in these areas shall be plastic only.
- H. Anti-seize, lubricating, and protective compound shall be Never-Seez as manufactured by Bostik Div. of Emhart Corp., "Dry Molybdenum Lubricant" No. 40-640 by Ideal Industries, CRC Chemicals Lectra-Shield, Crouse-Hinds HTL, Sanchem, Inc. NO-OX-ID "A Special", or equal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions. Tighten all bolted connections to manufacturer's recommended torque values with compensation for lubricated threads (anti-seize, lubricating and protective compound applied) to avoid over-torqueing.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not anchor supports from pipes, ducts, mechanical equipment, or conduit.
- D. Do not use spring steel clips and clamps.
- E. Obtain permission from Architect/Engineer before using powder-actuated anchors.
- F. Obtain permission from Architect/Engineer before drilling or cutting structural members.
- G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

- I. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch (25 mm) off wall.
- J. All electrical enclosures, including raceways, boxes, panelboards, motor control equipment, etc., shall be securely attached to the building or structure walls by means of concrete inserts or expansion anchors, unless indicated as rack mounted on the Drawings or of free standing design. Unless otherwise indicated, all electrical enclosures, except conduit and outlet boxes, shall be spaced at least 1/2 inch from the wall or ceiling with Unistrut, Grinnell "Power-Strut", or equal.
- K. The use of wood plugs for anchoring raceways, cabinets, enclosures, or equipment to concrete or masonry will not be permitted.
- L. The Contractor shall provide and install, where required, the additional steel to adequately support all conduits, boxes, and all other electrical equipment.
- M. All wires and cables shall be laced when entering or leaving pull or junction boxes and at each termination. Wires and cables shall be laced so that the wires of the individual circuits are laced together by circuit. All wiring entering and exiting electrical enclosures shall be bundled into groups. Power, lighting, control, alarm, annunciator, and instrumentation wiring shall be bundled and laced as specified herein.
- N. The threads of all corrosive area, hazardous area, outdoor, and below grade support connections shall be coated with an anti-seize, lubricating, and protective compound prior to final assembly.

END OF SECTION

SECTION 16195
ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.
- D. Electrical signs.
- E. Display diagrams.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide catalog data for nameplates, labels, signs, diagrams, and markers.
- C. Submit schedule of proposed equipment labels.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

PART 2 PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. The nameplates shall be 1 1/4" high by 3 1/2" wide (minimum), except pushbutton and selector switch stations and other enclosures where space is limited may have smaller plates of suitable size, and shall be attached to the equipment by means of corrosion resistant screws. Nameplates may be attached to equipment located in dry, interior areas by means of pressure sensitive, firm acrylic adhesive tape, 3M "Scotch" No. 468 or equal. The plates shall be white laminated plastic with engraved black letters approximately 3/32" thick with beveled edges. Engraved letters shall be 1/8" high (minimum), block type.

- B. Circuit number markers shall consist of self adhesive vinyl cloth or polyvinyl fluoride film markers with 1/8" high (minimum), black lettering on a yellow background, W. H. Brady Co. 3410 Series, Ideal Industries 44-500 Series and 44-600 Series, or equal. Circuit number markers may also consist of computer or typewriter generated, vinyl cloth, permanent, non-smearing, self-adhesive markers such as Brady Datab, BradyMarker XC Plus, 3M Scotchcode SCS or STS, or equal. Circuit number markers for panelboard circuit breakers may be the manufacturer's standard.

- C. Arc flash and shock hazard warning labels shall consist of self-adhesive vinyl or polyester signs, 3-1/2" by 5" minimum, with “! WARNING” header (black letters on orange field), “Arc Flash and Shock Hazard” subheader and write-in spaces for the following information:
 - ___ Flash Hazard Boundary
 - ___ cal/cm² Flash Hazard at 18 inches
 - ___ PPE _____
 - ___ Shock Hazard When Cover is _____
 - ___ Limited Approach
 - ___ Restricted Approach _____
 - Equipment Name: _____

Warning labels shall be in compliance with NEC 110.16 requirements. Warning labels shall be Brady Signmark No. 89220, Lab Safety Supply Co. No. 68691, Seton Style No. M0548, or equal.

2.2 WIRE MARKERS

- A. Wire and cable tags for use in large pull boxes and large junction boxes shall be made of minimum 1/8" thick white laminated plastic, 1-1/4" by 3-1/2", with black engraved identification in letters 3/64" deep by 3/16" high minimum. Tags shall be drilled at each end and secured twice to each cable by 3/32" minimum diameter polyethylene cord. Tags shall be engraved with the circuit number, equipment served, and associated nominal voltage level.

- B. Wire and cable number tags for use in pull or junction boxes and at termination points shall be computer or typewriter generated, vinyl cloth, permanent, non-smearing, self-adhesive markers such as Brady Datab, Brady Marker XC Plus, or 3M Scotchcode. Pre-printed, vinyl cloth, plastic coated, self-adhesive, tape markers as manufactured by W. H. Brady Co. or 3M Company shall also be acceptable.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive nameplates and labels.

3.2 INSTALLATION

- A. Nameplates shall be installed on the doors or covers of all panels, panelboards, starters, contactors, transfer switches, relays, control devices, signaling devices, and all other electrical equipment furnished under this Contract, except remote mounted pushbutton and selector switch stations, mounted adjacent to identified and associated disconnect switches or other control devices, need not be identified as described herein.

- B. Nameplate engraving for equipment and devices associated with switchgear, motor starters, panelboard, or control panel circuits shall match the engraving indicated in schedules on the Drawings, except nameplates for spare units and devices shall be furnished blank. All other nameplates shall be engraved as follows and shall be included on nameplate schedules submitted to the Owner for approval:
1. First Line - Process description, equipment served, or area served (if applicable).
 2. Second Line - Equipment or device description.
 3. Third Line - Equipment or device designation number and power source circuit number.
 4. Abbreviations shall be used only where full wording will not fit. See the Drawings for nameplate details.
- C. All devices and equipment powered from lighting panelboards shall be marked with the appropriate circuit number(s). Lighting circuits shall be identified on switch cover plates, receptacles on cover plates, and other devices on enclosure door or on associated disconnect switch door or cover.
- D. All pull boxes shall be marked with the type of system within them, i.e.: 480V power, alarm, 120V control, etc.
- E. All wires and cables within control panels, motor starters, terminal boxes, etc. shall be tagged at each termination.
- F. The wires and cables of each circuit in pull boxes and junction boxes larger than 12" by 12" by 8" shall be bundled together, neatly arranged, and clearly identified with a tag secured with polyethylene cabling twine indicating circuit number, equipment served, and nominal voltage level.
- G. A system shall be developed and submitted to prevent duplication of wire numbers for all wiring external to equipment. Equipment numbers or designations may be used as prefixes. Interconnecting diagrams shall clearly show wire numbers, originating terminal numbers, and destination terminal numbers.
- H. All enclosures, panels, boxes, and devices containing electrical components and circuits with exposed, energized parts when the door is open, shall have an arc flash and shock hazard warning label affixed to the door. All label blank fields shall be filled in with permanent markers according to the results of the Short Circuit, Flash Hazard, and Protective Devices Coordination Analyses, in Section 16050.

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Distribution panelboards.

1.2 RELATED SECTIONS

- A. Section 16010 – General Electrical, Instrument, and Control Requirements.
- B. Section 16050 – Basic Electrical Materials and Methods.
- C. Section 16190 – Supporting Devices.
- D. Section 16195 – Electrical Identification: Engraved nameplates.

1.3 REFERENCES

- A. NECA (National Electrical Contractors Association) “Standard of Installation.”
- B. NEMA AB 1 – Molded Case Circuit Breakers.
- C. NEMA PB 1 – Panelboards.
- D. NEMA PB 1.1 – Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or less.
- E. NFPA 70 – National Electrical Code.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker arrangement and sizes.
- C. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Record actual locations of Products; indicate actual branch circuit arrangement.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 DISTRIBUTION PANELBOARDS

- A. The distribution panelboards shall be NEMA Type 12 rated and shall have overall doors. Boxes shall be made of galvanized steel and the fronts and doors shall be made of painted steel. The fronts shall be designed for surface or floor mounting as shown on the Drawings. The doors shall be equipped with flush hinges and locks. All locks shall be keyed alike and six keys shall be furnished and delivered to the Owner. Glazed directory frames and cards designating the branch circuits shall be mounted on the inside of each of the cabinet doors. The door and panel trim shall be given one primer coat and not less than two coats of ANSI 61 paint. The panelboards shall have ground buses for terminating ground conductors.
- B. The panelboards shall be of the circuit breaker type and shall be designed for 600 volt, 3 phase, 3 wire, 60 Hertz alternating current service. The panelboards shall be equipped with main lugs and bus and branch circuits of sizes as shown on the Drawings. Feed through lugs, sized the same as the main lugs, shall be included where space limitations require additional panelboard section(s) to accommodate the scheduled branch circuit breakers. All panelboard bus work shall be copper and all terminals or lugs shall be 75°C rated for copper conductors.
- C. The circuit breakers shall be of the molded case, bolt-in-place type with thermal magnetic trip and shall be 600 volt, quick-make, quick-break with indicating trip and interrupting capacity as required by the short circuit study. Breaker handles shall clearly indicate the “on”, “off”, and “tripped” positions. Each circuit breaker shall be provided with a padlockable handle lock hasp.
- D. Distribution panelboards shall be provided with 20% spare breakers and/or bussed space.
- E. The panelboards shall be Eaton Cutler-Hammer Pow-R-Line 4B, Square D by Schneider Electric I-Line Type HCM, or General Electric Type CCB.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1 and NECA 407-2015, Panelboards.
- B. Install panelboards plumb. Install recessed panelboards flush with wall finishes. Provide supports in accordance with Section 16190.
- C. Wall Mounting Height: 6 ft. (2 M) to top of panelboard; install panelboards taller than 6 ft. (2 M) with bottom no more than 4 inches (10 cm) above floor.
- D. Provide filler plates for unused spaces in panelboards.
- E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- F. All panelboard circuit breakers or switches shall have a circuit number marker on or adjacent to the breaker or switch.
- G. Provide engraved plastic nameplates and circuit number markers under the provisions of Section 16195.
- H. Arc-flash and shock hazard warning labels shall be provided on the door of each panelboard and shall be marked as specified in Section 16195.

3.2 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Sections 01400 and 16960.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- C. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers and lugs.

END OF SECTION

SECTION 16477

FUSES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fuses.

1.2 RELATED SECTIONS

- A. Section 16010 - General Electrical, Instrument, and Control Requirements.
- B. Section 16050 - Basic Electrical Materials and Methods.

1.3 REFERENCES

- A. NFPA 70 - National Electric Code.
- B. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data sheets showing electrical characteristics including time-current curves and fuse let-through values for fault current available.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.
- B. Submit series ratings for fuse and circuit breaker combinations, where applicable.
- C. Provide type II documents for motor starters.
- D. Record actual fuse sizes.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

1.7 EXTRA MATERIALS

- A. Furnish under provisions of Section 01700.

- B. Provide ten (10) spare fuses of each size and type, rated 600 VAC and lower, installed.
- C. For additional spare parts requirements, see Section 16010.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Bussmann
- B. Mersen
- C. Edison
- D. Littelfuse

2.2 FUSE REQUIREMENTS

- A. Dimensions and Performance: NEMA FU 1, Class as specified or indicated.
- B. Voltage: Provide fuses with voltage rating suitable for circuit phase-to-phase voltage.
- C. Fuses shall be dual element or current limiting type, Class R, or as otherwise required for installation in the equipment furnished, and as shown on the Drawings. Fuses shall provide type II protection for motor circuits.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install fuses in accordance with manufacturer's instructions.
- B. Install fuse with label oriented such that manufacturer, type, and size are easily read.
- C. All fuse holders shall be provided with fuses.
- D. The Contractor shall replace all blown fuses and the quantities specified above shall be turned over to the Owner at the time of completion.
- E. Spare fuses shall, be packed and boxed for storing with each box labeled with fuse rating, class, etc.

END OF SECTION

SECTION 16481

ENCLOSED MOTOR CONTROLLERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Combination magnetic motor starters.
- B. Soft Starters

1.2 RELATED SECTIONS

- A. Section 16010 - General Electrical, Instrument, and Control Requirements.
- B. Section 16050 - Basic Electrical Materials and Methods.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification: Engraved nameplates.

1.3 REFERENCES

- A. NFPA 70 - National Electrical Code.
- B. UL 198C - High-Interrupting Capacity Fuses; Current Limiting Type.
- C. UL 198E - Class R Fuses.
- D. NECA "Standard of Installation," published by National Electrical Contractors Association.
- E. NEMA AB 1 - Molded Case Circuit Breakers.
- F. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- G. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- H. NEMA KS 1 - Enclosed Switches.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Test Reports: Indicate field test and inspection procedures and test results.

- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- E. The equipment shall not be released for manufacture prior to approval of, and coordination with, the Short Circuit, Flash Hazard, and Protective Devices Coordination Analyses specified in Section 16050.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction, as suitable for purpose specified and shown.

1.7 SPARE PARTS

- A. Furnish under provisions of Section 01700.
- B. Furnish one (1) set of replaceable contacts for each type of relay and each size of contactor or starter installed in motor controllers furnished under this Contract.
- C. For additional spare parts requirements, see Section 16010.

PART 2 PRODUCTS

2.1 MAGNETIC MOTOR STARTERS

- A. Full voltage starters shall be combination motor circuit protector type, unless otherwise noted, and motor starter complete with three pole, ambient compensating overload relays, and control circuit transformer. Starters shall be equipped with a spare auxiliary contact in addition to those shown on the Drawings, shall be minimum NEMA Size 1, and shall have 120 volt coils.
- B. Starters shall be electrically operated and held type, three pole assemblies with coil, contact assemblies, and integral overload protection. Coil shall be warranted for life.
- C. Motor overload protection shall consist of a thermal overload relay of the three pole, ambient compensating, manual reset, and solid state type.
- D. Solid state motor overload protection shall include time-current characteristics and shall be field selectable or adjustable. Accuracy shall be within 2%. Solid state overloads shall monitor three phase motor current utilizing three current sensors. The trip Class 10, 20, and 30 shall be field selectable and provide 10, 20, or 30 second delay at six times the full load running protection respectively. Solid state overloads shall be manually reset with the ability

to convert to automatic reset in the field. Overload relay shall have two outputs: 1) an alarm indicator indicating motor is running in overload and, 2) an overload trip indicator.

- E. Oiltight pushbutton and selector switches and push-to-test, LED type, indicating lights shall be provided as indicated on the Drawings. Control devices mounted on doors of NEMA Type 4 enclosed starters shall be NEMA Type 4 rated. All starters with manual reset overload relays shall have an external overload reset pushbutton mounted on the enclosure door.
- F. Starters for 120 volt, single phase motors shall be combination, non-fused disconnect switch and two pole motor starter complete with single pole overload relay.
- G. Starters shall have NEMA Type 12 enclosures where mounted indoors, stainless steel NEMA Type 4 enclosures where outdoors or below grade indoors, or non-metallic NEMA Type 4X enclosures in corrosive locations, unless otherwise shown on the Drawings. All hardware on the exterior of NEMA Type 4 enclosures, including hinge pins, screws, bolts, nuts, washers, etc., shall be made of stainless steel.
- H. Control circuit transformers shall have fused primary windings and 120 volt, fused, and grounded secondary windings. Control circuit transformers shall have extra capacity where required to carry connected loads.
- I. Fuses shall be as specified under Section 16477.
- J. All unit line and load terminals or lugs shall be 75°C rated for copper conductors. Terminal boards or blocks shall be provided for all external connections and shall be readily accessible from the front of the starter enclosure. All wiring to external devices shall be terminated at the terminal blocks, excluding incoming power feeders and motor leads. All wires and terminals shall be tagged to agree with schematic and wiring diagrams.
- K. Each starter shall have a reduced size, approved, “as-built,” schematic wiring diagram, in ladder diagram format, inside each unit, indicating all internal components and wiring terminal strip connections, all 480 V. power wiring, all 120 V. control and power wiring, all instrument wiring, and all external components and wiring (shown dotted). Wiring diagrams shall have a plasticized coating to protect them from dirt, heat, and normal wear and tear.
- L. Motor starters shall be Eaton Cutler-Hammer A200 Series, Allen-Bradley Bulletin 500 Line, or Square D.

2.2 SOLID-STATE REDUCED VOLTAGE MOTOR CONTROL (SOFT STARTERS)

- A. Soft Start Controller shall be as follows:
 - 1. Controller shall be Eaton, Allen-Bradley, Square D by Schneider Electric, or ABB.
 - 2. The solid-state reduced-voltage starter shall be UL and CSA listed. The solid-state reduced-voltage starter shall be an integrated unit with power SCRs, logic board, paralleling bypass contactor, and electronic overload relay enclosed in a single molded housing.
 - 3. The SCR-based power section shall consist of six (6) back-to-back SCRs and shall be rated for a minimum peak inverse voltage rating of 1500 volts PIV.
 - 4. Units using triacs or SCR/diode combinations shall not be acceptable.
 - 5. Resistor/capacitor snubber networks shall be used to prevent false firing of SCRs due to dV/dT effects.

6. The logic board shall be mounted for ease of testing, service and replacement. It shall have quick disconnect plug-in connectors for current transformer inputs, line and load voltage inputs and SCR gate firing output circuits.
7. The logic board shall be identical for all ampere ratings and voltage classes and shall be conformally coated to protect environmental concerns.
8. The paralleling run bypass contactor shall energize when the motor reaches 90% of full speed and close/open under one (1) times motor current.
9. The paralleling run bypass contactor shall utilize an intelligent coil controller to limit contact bounce and optimize coil voltage during varying system conditions.
10. The coil shall have a lifetime warranty.
11. Starter shall be provided with electronic overload protection as standard and shall be based on inverse time-current algorithm. Overload protection shall be capable of being disabled during ramp start for long acceleration loads via a DIP switch setting on the device keypad.
12. Overload protection shall be adjusted via the device keypad and shall have a motor full load ampere adjustment from 30 to 100% of the maximum continuous ampere rating of the starter.
13. Starter shall have selectable overload class setting of 5, 10, 20 or 30 via a DIP switch setting on the device keypad.
14. Starter shall be capable of either an electronic or mechanical reset after a fault.
15. Units using bimetal overload relays are not acceptable.
16. Overtemperature protection (on heat sink) shall be standard.
17. Starters shall provide protection against improper line-side phase rotation as standard. Starter will shut down if a line-side phase rotation other than A-B-C exists. This feature can be disabled via a DIP switch on the device keypad.
18. Starters shall provide protection against a phase loss or unbalance condition as standard. Starter will shut down if a 50% current differential between any two phases is encountered. This feature can be disabled via a DIP switch on the device keypad.
19. Starter shall provide protection against a motor stall condition as standard. This feature can be disabled via a DIP switch on the device keypad.
20. Starter shall provide protection against a motor jam condition as standard. This feature can be disabled via a DIP switch on the device keypad.
21. Starter shall be provided with a Form C normally open (NO), normally closed (NC) contact that shall change state when a fault condition exists. Contacts shall be rated 60 VA (resistive load) and 20 VA (inductive load). In addition, an LED display on the device keypad shall indicate type of fault (Overtemperature, Phase Loss, Jam, Stall, Phase Reversal and Overload).
22. The following control function adjustments on the device keypad are required:
 - a. Selectable Torque Ramp Start or Current Limit Start
 - b. Adjustable Kick Start Time: 0-2 seconds
 - c. Adjustable Kick Start Torque: 0-85%
 - d. Adjustable Ramp Start Time: 0.5-180 seconds
 - e. Adjustable Initial Starting Ramp Torque: 0-85%
 - f. Adjustable Smooth Stop ramp Time: 0-60 seconds.
23. Units shall be enclosed in a NEMA type 12 enclosure in combination with a circuit breaker disconnecting means.
24. Maximum continuous operation shall be at 115% of continuous ampere rating.
25. Provide pilot devices as shown on the wiring diagrams.

PART 3 EXECUTION

3.1 INSTALLATION

- A. The Contractor shall verify all motor horsepowers prior to procurement of starters and installation of motor wiring.
- B. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.
- C. Install enclosed controllers plumb. Provide supports in accordance with Section 16190.
- D. Height: 5 ft. (1.6 M) to operating handle or as indicated on the Drawings.
- E. Install fuses in fusible switches.
- F. Select and install overload heater elements or set solid state overload relays in motor controllers to match installed motor characteristics.
- G. All device settings shall be provided and installed by the device supplier, based on equipment operating and protection requirements. Submit for Owner approval prior to implementation. All as-built settings shall be included in supplied O&M manuals.
- H. Provide engraved plastic nameplates under the provisions of Section 16195.
- I. Provide neatly typed label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
- J. Arc flash and shock hazard warning labels shall be provided on the door of each contactor and starter enclosure and shall be marked as specified in Section 16195.

3.2 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Sections 01400 and 16960.
- B. Inspect and test each enclosed controller to NEMA ICS 2.

END OF SECTION

SECTION 16960

ELECTRICAL TESTING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Division 16 testing requirements.
- B. Sample forms.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control: Manufacturer's Field Reports.
- B. Section 16010 - General Electrical, Instrument, and Control Requirements.
- C. Section 16050 - Basic Electrical Materials and Methods.

1.3 REFERENCES

- A. All testing methods shall be in conformance with the following documents:
 - 1. National Electrical Code, latest approved edition.
 - 2. Any and all Federal, State, and/or local codes, ordinances, or regulations.
 - 3. NETA Acceptance and Maintenance Specifications and Safety Guidelines.
- B. All equipment shall be tested in conformity with all requirements, as a minimum, of applicable standards of IEEE, NEMA, ISA, ANSI, ICEA, UL, and OSHA, except as modified herein.

1.4 SUBMITTALS

- A. Submit on Products under provisions of Section 01300.
- B. Product Data: Indicate electrical characteristics and specifications; including layout of switches, buttons, displays, dimensions, weights, and external power requirements; and, list cables, connections and all available accessories.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit test results under provisions of Section 01700.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01700.
- B. Operation Data: Include bound copies of operating and programming instructions.

- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and use of product(s).

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience.
- B. Cable testing shall be performed by technicians certified in accordance with ANSI/NETA ETT-2000 Standards for the Certification of Electrical Testing Technicians. Technicians performing these electrical tests and inspections shall be trained and experienced concerning the apparatus and systems being evaluated. These individuals shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved. They must evaluate the test data and make an informed judgment on the continued serviceability or non-serviceability of the specific equipment. Each on-site crew leader shall hold a current certification, Level III or higher, in electrical testing.

1.8 REGULATORY REQUIREMENTS

- A. Furnish Products listed and classified by Underwriters Laboratories, Inc. (UL), Factory Mutual (FM), and/or Canadian Standards Association (CSA), as specifically indicated, and as acceptable to authority having jurisdiction, as suitable for purpose specified and indicated.
- B. All test instruments and devices shall be in conformance with all applicable standards and requirements of ISA, IEEE, ANSI, NEMA, and Underwriters' Laboratories. NIST – traceable certificates of calibration shall be provided with each instrument/device.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01600.
- B. Accept products on site in factory containers. Inspect for damage. Turn over to Owner immediately.

PART 2 PRODUCTS

None.

PART 3 EXECUTION

3.1 TESTING

- A. The Contractor shall perform all testing necessary to ensure that the work performed under the Contract is satisfactory and in conformity with the requirements of the Contract Documents.
- B. All testing shall be performed prior to start-up of equipment or systems as specified under Section 16970.

- C. All tests shall be witnessed by the Owner's Representative and four (4) copies of all field tests, as specified herein and in other Sections, shall be submitted to the Owner. Twenty-four (24) hours (minimum) written notice shall be given the Owner prior to performing the tests. Such tests shall be scheduled at a time agreed upon by the Owner and the Contractor.
- D. Testing shall include, but shall not be limited to, the following tests:
 - 1. Insulation resistance to ground of all conductors and equipment.
 - 2. Continuity, connections, and integrity of the grounding system.
 - 3. Continuity, polarity, phase sequence, and connection of all current carrying conductors and equipment.
 - a. Wire insulation tests shall be made with a 1000 volt megger on 480 volt power distribution cables and/or wires. Each test shall be continued for a time sufficient to charge the cable or wire.
 - 4. The following information shall be included in a test report on each cable:
 - a. Complete identification of cable, including approximate length.
 - b. Approximate average cable temperature.
 - c. Megger readings versus time data, including converted values.
 - 5. In order to be acceptable, the cable must withstand the specified high voltage without breakdown or have satisfactory megger readings.
- E. All improper connections, or materials, and equipment not adapted to the purpose for which it is intended, or material, or equipment found to be faulty while performing the tests, shall be corrected; and any changes or repairs necessary to put the work in satisfactory condition and operation shall be done by the Contractor and re-tested at no additional cost to the Owner.

3.2 CONTRACTOR'S ASSISTANCE

- A. Testing of Package equipment, as described in Section 16010, shall be as required in other Sections of this Specification.
- B. The Contractor shall provide the services of an electrician to assist either the Contractor or the equipment manufacturer's service representatives on any and all field test and adjustments as may be made or required by equipment manufacturers or the Contractor as the equipment is put into service. The Contractor shall make equipment manufacturers' service representatives available as required to assist in testing or putting equipment into operation.

END OF SECTION

CABLE TEST CERTIFICATE

1.0 TECHNICIAN INFORMATION

Company Name: _____ Contact Person: _____
 Address: _____ Phone No.: _____

2.0 CABLE IDENTIFICATION

Cable Designation or Circuit No.: _____
 Cable Source _____ Air Temperature _____
 Termination Point _____ Humidity _____
 Connected Equipment _____ Equipment Temperature _____

 Test Voltage _____ No. of Conductors _____ Age _____
 Length _____ Size _____ Operating Voltage _____
 Cable Type _____ Rated Voltage _____ Ground Type _____

 Manufacturer _____ Insulation Type _____
 Insulation Thickness _____ Installed In _____
 Conductor Material _____

Phase Color Identification

Phase A: _____ Phase B: _____ Phase C: _____

3.0 TEST INSTRUMENT

Manufacturer _____ Model No. _____

4.0 POWER CABLE TEST – MEGGER TEST

Time Minutes	Phase A Megohms		Phase B Megohms		Phase C Megohms	
	Before	After	Before	After	Before	After
.25						
.50						
.75						
1.00						
1.25						
1.50						
1.75						
2.00						
2.25						
2.50						
2.75						
3.0						
4.0						
5.0						

5.0 CERTIFICATION

I certify that the above information is correct and that the cable installation and condition conforms to manufacturer and Contract Specification requirements, unless otherwise noted.

Technician Signature: _____ Date: _____

6.0 ENGINEER REVIEW

Test Witnessed: Yes No Reviewer Signature: _____ Date: _____

SECTION 16980

DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Requirements for Demonstration of equipment and/or systems for the Owner's personnel.
- B. Requirements for Training of Owner's personnel in the operation and maintenance of the equipment/system.
- C. Acceptance requirements.

1.2 RELATED SECTIONS

- A. Section 01400 - Quality Control: Manufacturer's Field Reports.
- B. Section 01700 - Contract Closeout.
- C. Section 16010 - General Electrical, Instrument, and Control Requirements.
- D. Section 16050 - Basic Electrical Materials and Methods.
- E. Section 16960 - Electrical Testing and Equipment.

1.3 REFERENCES

- A. All equipment and workmanship shall be in conformance with the following documents:
 - 1. National Electrical Code (NEC), latest approved edition.
 - 2. Any and all Federal, State, and/or local codes, ordinances, or regulations.
- B. All equipment shall be designed, constructed, installed, and tested in conformity with all requirements, as a minimum, of applicable standards of IEEE, NEMA, ISA, ANSI, ICEA, UL and OSHA, except as modified herein.

PART 2 PRODUCTS

None.

PART 3 EXECUTION

3.1 DEMONSTRATION OF EQUIPMENT

- A. Demonstration of equipment and systems, and training of the Owner's personnel in the proper operation and maintenance of the equipment and systems, shall be performed as required, as

described below, and per the requirements of the Section under which the equipment/system was furnished.

- B. The following shall occur prior to scheduling demonstration and training of any equipment and/or system:
 - 1. The Contractor shall have submitted reports indicating successful completion of start-up for the equipment/system being started.
 - 2. Any deficiencies in the manufacturer's Operation and Maintenance (O&M) Manuals and/or "As-Built" drawings, noted during Start-up shall be corrected prior to scheduling the Owner's Demonstration and Training.
 - 3. The Contractor shall submit for approval a proposed agenda for said demonstration/training, and shall adhere to the approved agenda for the demonstration and training session(s).
 - 4. Any and all test equipment, maintenance equipment, tools, or devices, and/or spare parts required to be furnished under Division 16 shall be turned over, and stored as required under Sections 01700 and 16010.
- C. After completing the above items, the Contractor shall schedule the Owner's Demonstration and Training. Seventy-two (72) hours (minimum) written notice shall be given the Owner's Representative prior to performing any Demonstration and/or Training. Such sessions shall be scheduled at a time agreed upon by the Owner and the Contractor. Multiple sessions shall be scheduled to allow attendance by all Owner's Personnel.
- D. The Demonstration shall instruct the Owner's personnel in all facets, features, and functions of the operation of the equipment and/or system. Training shall be performed using the manufacturer's Operation and Maintenance Manual and "As-Built" drawings, and shall familiarize the Owner's personnel in identifying improper operation, troubleshooting for the cause(s), and performing repair, replacement, and recalibration/setup necessary to correct the mis-operation. Use of any test equipment necessary, and a review of any recommended and/or provided spare parts shall be included in the Training.
- E. Verification of the Demonstration and Training for the equipment and/or system shall be provided in the form of a report, indicating that the Owner's personnel attended and witnessed all functions and operations required of the equipment and/or system, and received the required instruction. Demonstration and Training will be witnessed by the Owner's Representative and four (4) copies of all demonstration and training reports, as specified above and in other Sections, shall be submitted to the Owner.
- F. Successful and approved completion of the Demonstration and Training requirements is a prerequisite to determining whether the Work or a portion of the Work is Substantially Complete as specified under Section 16010.

3.2 CONTRACTOR'S ASSISTANCE

- A. Demonstration and Training of Package Equipment, as described in Section 16010, shall be as required in other Sections of this Specification.
- B. The Contractor shall provide the services of an electrician to assist either the Contractor or the equipment manufacturers' service representatives on any and all field set-ups and adjustments as may be required to demonstrate operation of the equipment or system. The Contractor shall

make equipment manufacturers' service representatives available as required to assist in demonstrating equipment operation.

3.3 CLEANUP

- A. Cleanup shall occur as required under Section 01700, and as specified under Section 16010.

3.4 ACCEPTANCE

- A. Acceptance shall occur after all the above requirements have been satisfied, and as per Section 01700.
- B. Acceptance of equipment and/or systems shall be signified by execution of Guarantees as described below.

3.5 GUARANTEES

- A. The equipment and installation furnished under Division 16 shall be guaranteed for a period of one (1) year as specified under Section 01700, Contract Closeout.
- B. The Contractor's Guarantee shall be furnished as follows:
1. Provide multiple copies.
 2. Execute for Owner's signature a certificate of Contractor's guarantee, listing date of acceptance as start of warranty period (except where indicated otherwise under the detailed equipment specifications), for all work and materials provided and installed under this Division.*
 3. Execute and assemble any and all transferable warranty and/or license documents from Subcontractors, suppliers, and manufacturers.
 4. Provide Table of Contents and assemble in three D, side ring binder with durable plastic cover.
- * For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of Owner's acceptance as start of warranty period.
- C. The Owner's dated signature on these documents shall constitute acceptance for warranty purposes.

END OF SECTION