

**BID DOCUMENTS**  
**FOR**  
**WATER TREATMENT PLANT SCADA UPGRADES**



**CITY OF OWOSSO**  
**301 W. MAIN STREET**  
**OWOSSO, MICHIGAN 48867**

**December 12, 2022**

## NOTICE TO BIDDERS

### WATER TREATMENT PLANT SCADA UPGRADES FOR THE CITY OF OWOSSO, MICHIGAN

Sealed proposals will be received by the city of Owosso for the WATER TREATMENT PLANT SCADA UPGRADES bid and should be addressed to:

Bid Coordinator, City of Owosso  
301 W. Main Street, Owosso, Michigan 48867

Major items include:

Control Panel replacements, electrical upgrades including variable frequency drive for High Service pump, network equipment and wiring upgrades, SCADA equipment upgrades, radio communication upgrades including installation of a new direct buried monopole at the WTP and wood poles at the remote sites, mounting, configuration and commissioning of related radio equipment. In addition, a new security camera system will be installed at the WTP and remote site locations. Related work includes all other work shown on contract drawings.

Bids will be accepted until **3:00 p.m. January 17, 2023**, for the **Water Treatment Plant SCADA Upgrades** at which time bids will be publicly opened and read aloud.

All bids must be in writing and must contain an original signature by an authorized officer of the firm. Electronic bids (i.e., telephonic, fax, email, etc.) are **NOT** acceptable.

The bidder agrees that if the city accepts their proposal, the bidder will, within 10 consecutive calendar days after receiving notice of this acceptance, enter into a contract to furnish all labor, equipment and tools necessary to execute the work at the unit prices named in the bid proposal and will furnish the surety for performance, for one hundred percent (100%) of this bid, which shall be accepted and approved by the city.

All bids shall clearly contain on the outside of the **sealed** envelope in which they are submitted:

### WATER TREATMENT PLANT SCADA UPGRADES

An onsite **Mandatory Prebid Meeting** will be held on **December 20, 2022, at 10:00 A.M.** at the Owosso Water Treatment Plant located at 1111 Allendale Ave. Owosso, MI 48867

Work is to be completed within 500 days from Notice to Proceed.

Hard copies of the proposal, contract forms and specifications are on file and may be obtained for a fee in accordance with the city's FOIA Policy at the office of the Bid Coordinator, City Hall, 301 West Main Street, Owosso, Michigan 48867. Bid documents are available at no charge on our website at [www.ci.owosso.mi.us](http://www.ci.owosso.mi.us) or on the MITN website at [www.mitn.info](http://www.mitn.info).

The city reserves the right to accept any proposal; or to reject any proposal; to waive irregularities in a proposal; or to negotiate if it appears to be in the best interest of the city of Owosso.

### INQUIRIES/ADDENDUMS

Addendums will be available on the city's website at [www.ci.owosso.mi.us](http://www.ci.owosso.mi.us) and on the MITN website at [www.mitn.info](http://www.mitn.info).

All inquiries regarding this bid request must be received at least seven (7) calendar days prior to the submission and shall be received in, and responded to, in writing by e-mail to [Gene.Jones@tetrattech.com](mailto:Gene.Jones@tetrattech.com) . Phone: 313-402-8846.

## INSTRUCTIONS TO BIDDERS

1. Each proposal must be signed by the bidder with his usual signature. Bids by partnerships should be signed with the partnership name by one of the members of the partnership or by an authorized representative, followed by the signature and title of the person signing. Proposals by corporations must be signed with the name of the corporation, followed by the signature and designation of the president, vice-president or person authorized to bind it in the matter. **Any paperwork not filled out properly or signed will cause the bid to be considered non-responsive and shall be rejected by the city.**
2. Proposals, to receive consideration, must be received prior to the specified time of opening and reading as designated in the invitation.
3. Bidders are requested to use the proposal form furnished by the city when submitting their proposals. Envelopes must be **sealed** when submitted and clearly marked on the outside indicating the name of the bid.
4. Proposals having and erasures or corrections thereon may be rejected unless explained or noted over the signature of the bidder.
5. References in the specifications or description of materials, supplies, equipment, or services to a particular trade name, manufacturer's catalog, or model number are made for descriptive purposes to guide the bidder in interpreting the type of materials or supplies, equipment, or nature of the work desired. They should not be construed as excluding proposals on equivalent types of materials, supplies, and equipment or for performing the work in a manner other than specified. However, the bidders' attention is called to General Condition seven (7).
6. Proposals should be mailed or delivered to: Bid Coordinator's Office, City Hall, 301 W. Main Street, Owosso, MI 48867.
7. Special conditions included in this inquiry shall take precedence over any conditions listed under General Conditions or Instructions to Bidders.
8. Insurance coverage – The winning bidder, prior to execution of the contract, shall file with the city copies of completed certificates of insurance naming the city of Owosso as an additional insured party, as evidence that the contractor carries adequate insurance satisfactory to the city.
9. The city of Owosso has a local preference policy for the purchase of goods and services. The policy in part states: *A business located within the city limits and paying real or personal property taxes to the city of Owosso will be granted a six percent (6%) bid advantage or \$2,500, whichever is less, over a business located outside Shiawassee County. A business located outside the city limits but within Shiawassee County and paying property taxes to the county will be granted a three percent (3%) bid advantage or \$2,500, whichever is less, over a business located outside Shiawassee County. The preference also applies to subcontractors performing twenty-five percent (25%) or more of the work of a general contract.*
10. **The following items must be included with the bid response:**
  - a. **Vendor Proposal**
  - b. **Local Preference Affidavit**
  - c. **W-9 Request for Taxpayer ID No. and Certification**
  - d. **Signature Page & Legal Status/ Acknowledgement of Addendum(s)**
  - e. **Insurance Endorsement**

## BID PROPOSAL

### WATER TREATMENT PLANT SCADA UPGRADES

TO: THE CITY OF OWOSSO (HEREINAFTER CALLED THE "CITY")

Bidder must provide pricing for each item listed. If additional pricing elements are being offered by the bidder, they are to be listed under "other services/items offered."

The undersigned, having examined the bid proposal forms and specifications, does hereby offer Water Treatment Plant SCADA Upgrades listed below at the following prices to wit:

Item	Description	Total Cost
1	Project Base Bid	
2	Deduct Alternate 1 – Remove High Service Pump VFD and Related Work (show price reduction from base bid price)	
3	Deduct Alternate 2 – Remove WTP Cameras and Related Work (show price reduction from base bid price)	
4	Deduct Alternate 3 – Remove Remote Cameras and Related Work (show price reduction from base bid price)	

Bidder's Initial \_\_\_\_\_

VARIANCE FROM SPECIFICATIONS: If the bidder is unable to comply with the specifications as outlined, the bidder shall clearly note these variations from the specifications. The bidder may also propose additions to these specifications for the city to consider, but the costs associated with these additions shall be stated separately.

If the work is not complete on or before the date set for completion or any extension, the Contractor shall pay the city liquidated damages of *(\$500.00)* a calendar day until the work is satisfactorily completed. Liquidated damages for delay may be deducted from payments due the contractor or may be collected from the Contractor or the Contractor's surety.

The undersigned agrees that if the city accepts this proposal, Contractor will, within 10 consecutive calendar days after receiving notice of this acceptance, enter into a contract to furnish all labor, equipment and tools necessary to execute the work at the unit prices named in the bid proposal. Contractor will furnish the surety for performance, for 100% of this bid, which shall be accepted and approved by the city.

The undersigned agrees that if the city accepts this proposal, Contractor will substantially complete the entire work under this contract within 500 days of the Notice to Proceed. This schedule may be extended for rain days or cold weather only as approved by the city of Owosso.

**SIGNATURE PAGE AND LEGAL STATUS**

The undersigned certifies that he is an official legally authorized to bind his firm and to enter into a contract should the city accept this proposal.

**Bid proposal by (Name of Firm):** \_\_\_\_\_

**Legal status of bidder.**

**Please check the appropriate box and USE CORRECT LEGAL NAME.**

Corporation

State of Incorporation: \_\_\_\_\_

Partnership

List of names: \_\_\_\_\_

DBA

State full name: \_\_\_\_\_

Other

Explain: \_\_\_\_\_

**Signature of Bidder:** \_\_\_\_\_

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

**Signature of Bidder:** \_\_\_\_\_

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

**Address:** \_\_\_\_\_

**City, Zip:** \_\_\_\_\_

**Telephone:** \_\_\_\_\_

**Email Address:** \_\_\_\_\_

**Signed this** \_\_\_\_\_

**Day of** \_\_\_\_\_

**2021**

**Bidder acknowledges receipt of the following Addenda:**

**ADDENDUM NO:** \_\_\_\_\_

**BIDDER'S INITIALS:** \_\_\_\_\_

## GENERAL CONDITIONS

### 1. LOCAL PREFERENCE POLICY

The city of Owosso has a local preference policy for the purchase of goods and services. The policy in part states: *A business located within the city limits and paying real or personal property taxes to the city of Owosso will be granted a 6% bid advantage or \$2,500, whichever is less, over a business located outside Shiawassee County. A business located outside the city limits but within Shiawassee County and paying property taxes to the county will be granted a 3% bid advantage or \$2,500, whichever is less, over a business located outside Shiawassee County. The preference also applies to subcontractors performing 25% or more of the work of a general contract.*

### 2. BID ACCEPTANCE

The city reserves the right to reject any or all proposals. Unless otherwise specified, the city reserves the right to accept any item in the proposal. In case of error in extending the total amount of the bid, the unit prices shall govern. The city objects to any additional terms stated in any documents submitted by the contractor. Performance pursuant to our Purchase Order/Equipment Agreement constitutes a course of conduct consisting of Contractor's Agreement to the terms of our Purchase Order/Equipment Agreement.

### 3. PAYMENT

Unless otherwise stated by the bidder, time, concerning discount offered, will be computed from date of delivery and acceptance at destination or from date correct bill or claim voucher properly certified by the contractor is received. When so stated herein, partial payments, based on a certified approved estimate by the city of materials, supplies or equipment delivered or work done, may be made upon presentation of a properly-executed claim voucher. The final payment will be made by the city when materials, supplies, equipment or the work done have been fully delivered or completed to the full satisfaction of the city.

### 4. BID DEFAULT

In case of default by the bidder or contractor, the city of Owosso may procure the articles or services from other sources and hold the bidder or contractor responsible for any excess cost occasioned thereby.

### 5. UNIT PRICES

Prices should be stated in units of quantity specified.

### 6. QUOTED PRICES

Unless otherwise stated by the bidder, prices quoted will be considered as being based on delivery to a designated destination and to include all charges for packing, crating, containers, shipping, etc., and being in strict accordance with specifications and standards as shown.

### 7. SUBSTITUTIONS

Wherever a reference is made in the specifications or description of the materials, supplies, equipment, or services required, to a particular trade name, manufacturer's catalog, or model number, the bidder, if awarded a contract or order, will be required to furnish the particular item referred to in strict accordance with the specifications or description unless a departure or substitution is clearly noted and described in the proposal.

### 8. HOLD CITY HARMLESS

The bidder, if awarded an order or contract, agrees to protect, defend, and save the city harmless against any demand for payment for the use of any patented material, process, article, or device that may enter into the manufacture, construction, or form a part of the work covered by either order or contract. Bidder further agrees to indemnify and save the city harmless from suits or action of every nature and description brought against it, for or on account of any injuries or damages received or sustained by any party or parties, by or from any of the acts of the contractor, his employees, subcontractors, or agents.

## 9. COMPETITIVE BIDDING STATUTES

The laws of the state of Michigan, the charter and ordinances of the city of Owosso, as far as they apply to the laws of competitive bidding, contracts and purchases, are made a part hereof.

## 10. SAMPLES

Samples, when requested, must be furnished free of expense to the city and, if not destroyed, will upon request be returned at the bidder's expense.

## 11. BONDS

A certified check or bid bond may be required, payable to the City of Owosso. If so required in the bid documents, a performance bond and labor and material bond in the amounts stated in the bid documents, shall be on file with the city before work commences. The city will determine the amount and sufficiency of the sureties.

## 12. PROPOSAL GUARANTEE

All checks or bid bonds, except those of the three lowest bidders, will be returned when the bids have been opened and tabulated. The certified checks or bid bonds of the three lowest bidders will be held until the contract documents have been signed, after which remaining certified checks or bid bonds will be returned to the respective bidders.

## 13. BIDDERS

The city may demand that the contractor file a sworn experience and financial statement setting forth the financial resources, adequacy of plant and equipment, organization, experience and other pertinent and material facts as may be desirable.

## 14. INSURANCE AND HOLD HARMLESS

To the fullest extent permitted by law the Contractor agrees to defend, pay on behalf of, indemnify, and hold harmless the City of Owosso, its elected and appointed officials, employees, agents and volunteers, and others working on behalf of the City of Owosso against any and all claims, demands, suits, or loss, including all costs connected therewith, and for any damages which may be asserted, claimed, or recovered against or from the City of Owosso, by reason of personal injury, including bodily injury or death and/or property damage, including loss of use thereof, for all actions of the Contractor.

Contractor shall not commence work under this contract until they have obtained the insurance required under this paragraph, and shall keep such insurance in force during the entire life of this contract. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to the City of Owosso. The requirements below should not be interpreted to limit the liability of Contractor. All deductibles and SIR's are the responsibility of Contractor. Contractor shall procure and maintain the following insurance coverage:

- a. Worker's Compensation Insurance including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.
- b. Commercial General Liability Insurance on an "Occurrence Basis" with limits of liability not less than \$3,000,000 per occurrence and aggregate. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included. (E) Explosion, Collapse, and Underground (XCU) coverage, if applicable. Limits may be obtained by the use of primary and excess/umbrella liability policies.
- c. Automobile Liability including Michigan No-Fault Coverages, with limits of liability not less than \$1,000,000 per occurrence, combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.

- d. Owners' and Contractor Protective Liability: The Contractor shall procure and maintain during the life of this contract, a separate Owners' and Contractor's Protective Liability Policy with limits of liability not less than \$3,000,000 per occurrence and aggregate for Personal Injury, Bodily Injury, and Property Damage. The City of Owosso shall be the "Named Insured" on said coverage.
- e. Additional Insured: Commercial General Liability and Automobile Liability as described above shall include an endorsement stating the City of Owosso shall be listed as additional insured. It is understood and agreed by naming the City of Owosso as additional insured, coverage afforded is considered to be primary and any other insurance the City of Owosso may have in effect shall be considered secondary and/or excess.
- f. Cancellation Notice: All policies, as described above, shall include an endorsement stating that it is understood and agreed Thirty (30) days, Ten (10) days for non-payment of premium, Advance Written Notice of Cancellation, shall be sent to: (The City of Owosso, Contact Name, Title, Address).
- g. Proof of Insurance Coverage: Contractor shall provide the City of Owosso at the time that the contracts are returned by him/her for execution, a Certificate of Insurance as well as the required endorsements. In lieu of required endorsements, if applicable, a copy of the policy sections where coverage is provided for additional insured and cancellation notice would be acceptable.

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and endorsements to the City of Owosso at least ten (10) days prior to the expiration date.

#### 15. PROTECTION OF LAND MONUMENTS AND PROPERTY STAKES

Land monuments or stakes marking property corners shall not be moved or otherwise disturbed except as directed by the city. If any land monuments or lot stakes are moved or disturbed by the contractor, the cost of replacing each land monument or lot stake so moved or disturbed shall be deducted from any money due the contractor, as payment to the city for the cost of replacing said land monument or lot stakes.

#### 16. CONTRACTOR'S RESPONSIBILITY FOR WORK

The contractor shall be responsible for any damages that the work may sustain before its acceptance, and shall rebuild, repair, restore and make good, at its own expense, all injuries and damages to any portion of the work by the action of the elements or from any cause whatsoever before its acceptance. Neither the final payment nor any provision in the contract documents shall relieve the contractor of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law, and, upon written notice, the contractor shall remove any defects due therefrom and pay for any damaged due to other work resulting therefrom, which shall appear within one year after the date of completion and acceptance.

#### 17. PAYMENT

At monthly intervals commencing after construction has been started, the city will make partial payment to the contractor based on a duly-certified estimate prepared by the city of the work done by the contractor during the preceding four-week period. Each estimate will be submitted to the city council for approval on either the first or third Monday of each month. The city will retain ten percent (10%) of the amount of each such estimate until final completion and acceptance of all work covered by this contract.

Before the contractor shall demand final estimates or payment, contractor will furnish to the city, supported by sworn statements, satisfactory evidence that all persons that have supplied labor, materials, or equipment for the work embraced under this contract have been fully paid for the same; and that, in case such evidence be not furnished as aforesaid, such sums as the city may deem necessary to meet the lawful claims of such persons may be retained by the city from any monies that may be due or become due to the contractor under this contract until such liabilities shall be fully discharged and the evidence thereof be furnished to the city.

#### 18. CITY'S RIGHT TO WITHHOLD CERTAIN AMOUNTS AND MAKE APPLICATION THEREOF

Besides the payment to be retained by the city under the preceding provisions of these general conditions, the city may withhold a sufficient amount of any payment otherwise due to the contractor to cover a) payments earned or due for just claims for furnish labor or materials on the project under this contract, b) for defective work not remedied and c) for failure of the contractor to make proper payments to subcontractors. The city shall disburse and shall have the right to act as agent for the contractor in disbursing such funds as have been previously withheld pursuant to this paragraph to the party or parties who are entitled to payment from it. The city will pay to the contractor a proper accounting of all such funds disbursed for the contractor.

#### 19. OWNER'S RIGHT TO DO WORK

If the contractor should neglect to prosecute the work properly or fail to perform any provisions of this contract, the city, after three (3) days' written notice to the contractor and contractor's surety, may without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost of it from the payment due the contractor.

#### 20. DEFINITION OF NOTICE

Where in any of the contract documents there is any provision in respect to the giving of notice, such notice shall be deemed given to the owner, when written notice is delivered to the city manager, or placed in the United States mail addressed to the city clerk; as to the contractor, when a written notice shall be delivered to contractor's representative at the project site or by mailing such written notice in the United States mail addressed to the contractor at the place stated in the bid proposal as the business address; as to the surety on the performance bond, when a written notice is placed in the United States mail addressed to the surety at the surety's home office or to its agent or agents who executed such performance bond on behalf of the surety.

#### 21. SUBCONTRACTS

The contractor shall not subcontract any work in the execution of this contract without the written consent of the city. The contractor shall be responsible for the acts or omissions of any subcontractor and of anyone employed directly or indirectly by such subcontractor.

#### 22. ASSIGNMENT OF CONTRACT

The contractor shall not assign this contract or any part hereof without the written consent of the city. No assignment shall be valid unless it shall contain a provision that any funds to be paid to the assignee under this agreement are subject to a prior lien for services rendered or materials or supplies for the performance of the work specified in the contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

#### 23. MAINTAINING TRAFFIC

The contractor shall provide flares, signs, barricades, traffic regulators, etc., to conform to the current *Michigan Manual of Uniform Traffic Control Devices* or as directed by the city. The contractor shall not close any road or street without the permission of the city. If any street or road is to be closed by the contractor, it shall be the responsibility of the contractor to notify the Owosso fire department when the street will be closed and again when the street is open to traffic. Traffic control devices for any detours deemed necessary by the city shall be provided by the contractor. Cost of maintaining shall be incidental to the cost of the project unless otherwise provided.

#### 24. ORDER OF COMPLETION

The contractor shall submit, whenever requested by the city, a schedule of the work showing completion dates. The city may request that certain portions of the work be done before other portions. If so requested, the contractor shall arrange to schedule to meet the request by the owner.

#### 25. USE OF COMPLETED PORTIONS

The city shall have the right to take possession and use any completed or partially completed portions of the work; but such taking possession and use shall not be deemed acceptance. Pending final completion and acceptance of the work, all necessary repairs and adjustments on any section of the work due to

defective material, workmanship, natural causes, or other operations of the contractor, other than normal wear and tear, shall be done by and at the expense of the contractor.

#### 26. WATER SUPPLY

The contractor shall secure an adequate water supply for use in construction and for drinking water for his employees. If the city's water is used on the work, the contractor shall make the necessary application and shall pay all costs involved. Connections, piping and fittings for conveying water shall be furnished and maintained by the contractor. Contractor shall pay for water according to the city's established rates.

#### 27. CLEANUP

The contractor shall keep the project free from waste materials or rubbish caused by its employees or work. This includes as a minimum excess excavation or backfill material, broken or rejected materials, empty containers or general debris. The owner may require complete cleanup of certain areas as construction is completed.

#### 28. SUPERVISION

The contractor shall have a superintendent on the job site to coordinate and expedite the various construction activities for the duration of this contract.

#### 29. EQUAL EMPLOYMENT OPPORTUNITY AND OTHER CLAUSES

The contractor shall agree not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability as defined by Michigan Compiled Statutes, or national origin. This provision shall include but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rate of pay or other forms of compensation, and selection for training including apprenticeship. The contractor further agrees to take affirmative action to ensure equal employment opportunities for persons with disabilities. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provision of the non-discrimination clause.

## LOCAL PREFERENCE POLICY

The following affidavit should be completed if a bidder is located within Shiawassee County or intends to sub-contract more than twenty-five percent (25%) to a Shiawassee County based business: The city of Owosso has a local preference policy for the purchase of goods and services as recorded in the city ordinance in section 2-348. "Lowest qualified bidder" defined.

1. The term "lowest qualified bidder," as used in this division, shall mean the lowest bidder having qualifications to perform the work which are satisfactory to the council. The lowest bidder shall be determined based on an adjusted bid tabulation which shall be prepared in the following manner: To the bid of any bidder which is neither a city-based business nor a county-based business shall be added an amount equal to six (6) percent of the bid or two thousand five hundred dollars (\$2,500.00), whichever is less.
2. To the bid of any bidder which is a county-based business shall be added an amount equal to three (3) percent of the bid or two thousand five hundred dollars (\$2,500.00), whichever is less; provided, however, that if no bid is received from a city-based business, no additional amount shall be added to the bid of a county-based business.
3. "Owosso-based business" shall be interpreted to mean a business registered with the county clerk or a corporation registered with the state having a business address within the city limits which pays real and/or personal property taxes levied by the city.

The term "county-based business" shall be interpreted to mean a business other than a city-based business registered with the county clerk or a corporation registered with the state having a business address within the county which pays real and/or personal property taxes levied by the county.

4. If twenty-five (25) percent or more of a contract for construction or other services is to be subcontracted by a city-based business bidder to a non-city-based business or businesses, or by a county-based business bidder to a non-county-based business or businesses, the adjusted bid shall be calculated by applying the provisions of this section separately to each portion of the contract based on the status of the contractor or subcontractor performing that portion of the contract as a city-based or county-based business.

**AFFIDAVIT**

In accordance with Section 2-348 of the Owosso city code, the bid from a business located in Shiawassee County shall be adjusted to reflect a preference. In order for the city to calculate the adjustment, the bidder hereby deposes and states that their business address is registered, and is currently paying real and/or personal property taxes in Shiawassee County at the following address:

\_\_\_\_\_  
Registered business address

The affiant further deposes and states that a sub-contract with a business registered, and paying real and/or personal property taxes in Shiawassee County will be executed for a percentage equal to or greater than twenty-five percent (25%) as stated below:

\_\_\_\_\_  
Business name and address of sub-contractor

\_\_\_\_\_  
Percentage of contract

\_\_\_\_\_  
Authorized signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

\_\_\_\_\_  
Company name

## W-9 INFORMATION FOR LEGAL STATUS

**Sole proprietor.** Enter your individual name as shown on your income tax return on the “Name” line. You may enter your business, trade, or “doing business as (DBA)” name on the “Business name/disregarded entity name” line.

**Partnership, C Corporation, or S Corporation.** Enter the entity's name on the “Name” line and any business, trade, or “doing business as (DBA) name” on the “Business name/disregarded entity name” line.

**Disregarded entity.** Enter the owner's name on the “Name” line. The name of the entity entered on the “Name” line should never be a disregarded entity. The name on the “Name” line must be the name shown on the income tax return on which the income will be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a domestic owner, the domestic owner's name is required to be provided on the “Name” line. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on the “Business name/disregarded entity name” line. If the owner of the disregarded entity is a foreign person, you must complete an appropriate Form W-8.

**Note.** Check the appropriate box for the federal tax classification of the person whose name is entered on the “Name” line (Individual/sole proprietor, Partnership, C Corporation, S Corporation, Trust/estate).

**Limited Liability Company (LLC).** If the person identified on the “Name” line is an LLC, check the “Limited liability company” box only and enter the appropriate code for the tax classification in the space provided. If you are an LLC that is treated as a partnership for federal tax purposes, enter “P” for partnership. If you are an LLC that has filed a Form 8832 or a Form 2553 to be taxed as a corporation, enter “C” for C corporation or “S” for S corporation. If you are an LLC that is disregarded as an entity separate from its owner under Regulation section 301.7701-3 (except for employment and excise tax), do not check the LLC box unless the owner of the LLC (required to be identified on the “Name” line) is another LLC that is not disregarded for federal tax purposes. If the LLC is disregarded as an entity separate from its owner, enter the appropriate tax classification of the owner identified on the “Name” line.

**Other entities.** Enter your business name as shown on required federal tax documents on the “Name” line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the “Business name/disregarded entity name” line.

Please see attached W-9 Request for Taxpayer Identification Number and Certification form for a detailed explanation on filling out the W-9 form.

# Request for Taxpayer Identification Number and Certification

**Give Form to the  
 requester. Do not  
 send to the IRS.**

▶ Go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9) for instructions and the latest information.

<b>Print or type.</b> See Specific Instructions on page 3.	<b>1</b> Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	<b>2</b> Business name/disregarded entity name, if different from above	
	<b>3</b> Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only <b>one</b> of the following seven boxes.	<b>4</b> Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
	<input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> C Corporation <input type="checkbox"/> S Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate	Exempt payee code (if any) _____
	<input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ <b>Note:</b> Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is <b>not</b> disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.	Exemption from FATCA reporting code (if any) _____
	<input type="checkbox"/> Other (see instructions) ▶ _____	<small>(Applies to accounts maintained outside the U.S.)</small>
	<b>5</b> Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)
<b>6</b> City, state, and ZIP code		
<b>7</b> List account number(s) here (optional)		

## Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

**Note:** If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

<b>Social security number</b>											
				-			-				
<b>or</b>											
<b>Employer identification number</b>											
				-							

## Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

<b>Sign Here</b>	Signature of U.S. person ▶	Date ▶
------------------	----------------------------	--------

## General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9).

### Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

*If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.*

**PROOF OF INSURANCE**

This is to certify that the following endorsement is part of the policy(ies) described below:

<b>NAMED INSURED (CONTRACTOR)</b>	<b><u>COMPANIES AFFORDING COVERAGE</u></b>
ADDRESS	A. B. C.

It is hereby understood and agreed that the city of Owosso, its city council and each member thereof and every officer and employee of the city shall be named as joint and several assureds with respect to claims arising out of the following project:

**WATER TREATMENT PLANT SCADA UPGRADES**

It is further agreed that the following indemnity agreement between the city of Owosso and the named insured is covered under this policy: Contractor agrees to indemnify, hold harmless and defend city, its city council and each member thereof and every officer and employee of city from any and all liability or financial loss resulting from any suits, claims, losses or actions brought against and from all costs and expenses of litigation brought against city, its city council and each member thereof and any officer or employee of city which results directly or indirectly from the wrongful or negligent actions of contractor's officers, employees, agents or others employed by Contractor while engaged by contractor in the (performance of this agreement) construction of this project.

It is further agreed that the inclusion of more than one assured shall not operate to increase the limit of the company's liability and that insurer waives any right on contribution with insurance which may be available to the city of Owosso.

The contractor, or any of their subcontractors, shall not commence work under this contract until they have attained the insurance required below, and shall keep such insurance in force during the entire life of this contract. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to the city of Owosso. The requirements below should not be interpreted to limit the liability of the Contractor. All deductibles and SIR's are the responsibility of the Contractor.

The Contractor shall procure and maintain the following insurance coverage:

- 1. Worker's Compensation Insurance** including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.
- 2. Commercial General Liability Insurance** on an "Occurrence Basis" with limits of liability not less than \$3,000,000 per occurrence and aggregate. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included.
- 3. Automobile Liability** including Michigan No-Fault Coverages, with limits of liability not less than \$1,000,000 per occurrence, combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.
- 4. Additional Insured:** Commercial General Liability and Automobile Liability, as described above, shall include an endorsement stating the following shall be **Additional Insureds:** City of Owosso, all elected and appointed officials, all employees and volunteers, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof. It is understood and agreed by naming City of Owosso as additional insured, coverage afforded is considered to be primary and any other insurance the city of Owosso may have in effect shall be considered secondary and/or excess.
- 5. Cancellation Notice:** All policies, as described above, shall include an endorsement stating that it is understood and agreed that a Ten (10) days notice for non-payment of premium is required and a Thirty (30) days notice is required for Non-Renewal, Reduction, and/or Material Change, shall be sent to: City of Owosso, Bid Coordinator, 301 W. Main Street, Owosso, Michigan 48867.

6. **Proof of Insurance Coverage:** The Contractor shall provide the city of Owosso, at the time that the contracts are returned by him/her for execution, a Certificate of Insurance as well as the required endorsements. In lieu of required endorsements, if applicable, a copy of the policy sections where coverage is provided for additional insured and cancellation notice would be acceptable. Copies or certified copies of all policies mentioned above shall be furnished, if so requested.

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and endorsements to the city of Owosso at least ten (10) days prior to the expiration date.

Please include a copy of insurance declaration verifying amounts of coverage. The verification of insurance is not an insurance policy and does not amend, extend or alter the coverage afforded by the policies listed herein. Notwithstanding any requirement, term, or condition of any contract or other document with respect to which this certificate or verification of insurance may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

DATE \_\_\_\_\_

BY \_\_\_\_\_  
Authorized Insurance Agent

AGENCY \_\_\_\_\_

TITLE \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

## **American Iron and Steel Contract Language**

The Contractor acknowledges to and for the benefit of the City of Owosso ("Purchaser") and the Michigan Department of Environment, Great Lakes, and Energy (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or the Drinking Water State Revolving Fund and such laws contain provisions commonly known as "American Iron and Steel (AIS)," that requires all iron and steel products used in the project be produced in the United States ("AIS Requirements") including iron and steel provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the AIS Requirements, (b) all iron and steel used in the project will be and/or have been produced in the United States in a manner that complies with the AIS Requirements, unless a waiver of the requirements is approved or the State made the determination in writing that the AIS Requirements do not apply to the project, and (c) the Contractor will provide any further verified information, certification, or assurance of compliance with this paragraph, or information necessary to support a waiver of the AIS requirements, as may be requested by the Purchaser.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

## **Davis-Bacon and Related Acts/Prevailing Federal Wages**

P.L. 111-88 requires compliance with the Davis Bacon Act and adherence to the current U.S. Department of Labor Wage Decision. Attention is called to the fact that not less than the minimum salaries and wages as set forth in the Contract Documents (see Wage Decision included herein) must be paid on this project. The Wage Decision, including modifications, must be posted by the Contractor on the job site. The "Contracting Agency" or "Contracting Officer" for Davis-Bacon Wage Decision posters on jobsites is the loan applicant/bond issuer. A copy of the Labor Standards Provisions for Federally Assisted Projects is included and is hereby a part of this contract.

## Wage Decision

"General Decision Number: MI20220044 10/21/2022

Superseded General Decision Number: MI20210044

State: Michigan

Construction Type: Heavy

Counties: Arenac, Branch, Gladwin, Hillsdale, Huron, Lenawee, Mecosta, Midland, Osceola, Shiawassee and Tuscola Counties in Michigan.

Heavy, Includes Water, Sewer Lines and Excavation (Excludes Hazardous Waste Removal; Coal, Oil, Gas, Duct and other similar Pipeline Construction)

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract.  . The contractor must pay all covered workers at least \$15.00 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract.  . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on

that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Modification Number	Publication Date
0	01/07/2022
1	02/25/2022
2	06/24/2022
3	07/01/2022
4	07/08/2022
5	07/15/2022
6	08/05/2022
7	08/12/2022
8	09/16/2022
9	09/23/2022
10	10/21/2022

CARP0100-005 06/01/2021

MECOSTA & OSCEOLA COUNTIES

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 25.24	20.31

-----  
CARP0525-008 06/01/2021

BRANCH & HILLSDALE COUNTIES

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 25.94	20.59

-----  
CARP0706-014 06/01/2020

ARENAC, GLADWIN, HURON, MIDLAND & TUSCOLA COUNTIES

Rates	Fringes
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CARPENTER (Form Work Only).....\$ 27.61                    21.84

-----  
CARP0706-018 06/01/2021

SHIAWASSEE COUNTY

Rates                    Fringes

CARPENTER (Form Work Only).....\$ 29.48                    22.00

-----  
CARP1004-013 06/01/2021

LENAWEE COUNTY

Rates                    Fringes

CARPENTER (Form Work Only).....\$ 27.39                    20.73

-----  
ELEC0008-012 05/25/2022

HILLSDALE & LENAWE COUNTY

Rates                    Fringes

ELECTRICIAN.....\$ 44.79                    1.5%+15.61

-----  
ELEC0058-008 06/28/2021

HURON COUNTY

Rates                    Fringes

ELECTRICIAN.....\$ 45.17                    26.01

-----  
ELEC0275-009 06/01/2021

MECOSTA COUNTY

Rates                    Fringes

ELECTRICIAN.....\$ 33.06                    8.94+38%

-----  
ELEC0275-014 06/01/2022

OSCEOLA COUNTY (Townships of Richmond, Hersey, Ewart & Orient)

Rates                    Fringes

ELECTRICIAN.....\$ 34.41                    9.27+28%

ELEC0445-008 06/01/2022

BRANCH COUNTY

	Rates	Fringes
ELECTRICIAN.....	\$ 35.40	23.29

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\* ELEC0498-012 06/01/2022

OSCEOLA COUNTY (does not include the townships of Ewart, Hersey, Orient and Richmond)

	Rates	Fringes
ELECTRICIAN.....	\$ 33.44	21.05

---

ELEC0557-008 06/01/2020

MIDLAND (Townships of Ingersoll, Jasper, Mount Haley and Porter) & TUSCOLA (Townships of Almer, Arbela, Columbia, Dayton, Denmark, Elkland, Ellington, Elmwood, Fairgrove, Fremont, Gilford, Indianfields, Juniata, Kingston, Koylon, Novesta, Tuscola, Vassar, Watertown and Wells) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 34.25	23.13

---

ELEC0665-018 05/31/2021

SHIAWASSEE COUNTY (Townships of Perry & Woodhull)

	Rates	Fringes
ELECTRICIAN.....	\$ 37.50	24.04+5.5%

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ELEC0692-017 06/01/2022

ARENAC & GLADWIN COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 35.31	38.03%+9.25

---

ELEC0692-018 06/01/2022

MIDLAND (All townships except Mount Haley, Jasper, Porter &

Ingersoll) & TUSCOLA (Townships of Wisner & Akron) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 35.31	38.03%+9.25
-----		
ELEC0948-008 06/01/2020		

SHIAWASSEE (All townships except Perry & Woodhull) & TUSCOLA (Township of Millington) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 39.17	23.51
-----		
* ENGI0325-021 09/01/2022		

POWER EQUIPMENT OPERATORS: Underground Construction (Including Sewer)

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 37.67	24.85
GROUP 2.....	\$ 32.78	24.85
GROUP 3.....	\$ 32.28	24.85
GROUP 4.....	\$ 32.00	24.85

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Backhoe/ Excavator, Boring Machine, Bulldozer, Crane, Scraper, Loader, Trencher (over 8 ft. digging capacity)

GROUP 2: Trencher (8-ft digging capacity and smaller)

GROUP 3: Boom Truck (non-swinging, non- powered type boom)

GROUP 4: Broom/ Sweeper, Fork Truck, Tractor

-----  
ENGI0326-014 06/01/2022

EXCLUDES UNDERGROUND CONSTRUCTION

AREA 1: BRANCH, HILLSDALE, MECOSTA & OSCEOLA COUNTIES

AREA 2: ARENAC, GLADWIN, HURON, MIDLAND, SHIAWASSEE & TUSCOLA COUNTIES

	Rates	Fringes
Operating Engineer:		
AREA 1		
Group 1.....	\$ 44.13	24.85
Group 2.....	\$ 40.83	24.85
Group 3.....	\$ 38.18	24.85
Group 4.....	\$ 36.47	24.85
Group 5.....	\$ 28.13	24.85
Operating Engineers:		
AREA 2		
Group 1.....	\$ 42.38	24.85
Group 2.....	\$ 39.08	24.85
Group 3.....	\$ 36.43	24.85
Group 4.....	\$ 34.72	24.85
Group 5.....	\$ 26.38	24.85

FOOTNOTES:

Crane operator with main boom and jib 300' or longer: \$1.50 per hour above the group 1 rate.  
 Crane operator with main boom and jib 400' or longer: \$3.00 per hour above the group 1 rate.

PAID HOLIDAYS: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas Day.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane operator with main boom and jib 400', 300', or 220' or longer.

GROUP 2: Crane operator with main boom and jib 140' or longer, tower crane, gantry crane, whirley derrick

GROUP 3: Backhoe/Excavator; Bulldozer; Compactor; Crane; Scraper; Loader

GROUP 4: Boom truck (non-swinging)

GROUP 5: Oiler

-----  
 ENGI0326-024 06/01/2022

EXCLUDES UNDERGROUND CONSTRUCTION

LENAWEE COUNTY

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1.....	\$ 46.44	24.95
GROUP 2.....	\$ 44.94	24.95
GROUP 3.....	\$ 43.44	24.95
GROUP 4.....	\$ 43.14	24.95
GROUP 5.....	\$ 42.32	24.95
GROUP 6.....	\$ 41.46	24.95
GROUP 7.....	\$ 40.49	24.95
GROUP 8.....	\$ 38.78	24.95

FOOTNOTES: Tower cranes: to be paid the crane operator rate determined by the combined length of the mast and the boom.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

GROUP 1: Crane with boom & jib or leads 400' or longer

GROUP 2: Crane with boom & jib or leads 300' or longer

GROUP 3: Crane with boom & jib or leads 220' or longer

GROUP 4: Crane with boom & jib or leads 140' or longer

GROUP 5: Crane with boom & jib or leads 120' or longer

GROUP 6: Regular crane operator

GROUP 7: Backhoe/Excavator, Bulldozer, Compactor, Scraper, Loader

GROUP 8: Oiler

-----  
IRON0025-007 06/01/2019

ARENAC, GLADWIN, HURON, MIDLAND, SHIAWASSEE & TUSCOLA COUNTIES

	Rates	Fringes
IRONWORKER		
Reinforcing.....	\$ 30.98	27.99
Structural.....	\$ 36.77	29.03

-----  
IRON0055-011 07/01/2022

LENAWEE COUNTY

	Rates	Fringes
IRONWORKER, STRUCTURAL AND REINFORCING.....	\$ 33.00	27.20
-----		
IRON0340-012 06/19/2017		

BRANCH, HILLSDALE, MECOSTA & OSCEOLA COUNTIES

	Rates	Fringes
IRONWORKER, STRUCTURAL AND REINFORCING.....	\$ 24.43	24.67
-----		
LAB00334-008 09/01/2018		

SCOPE OF WORK:  
 OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

ARENAC, BRANCH, GLADWIN, HURON, MECOSTA, MIDLAND, OSCEOLA, TUSCOLA

	Rates	Fringes
LABORER		
(1) Common or General.....	\$ 20.97	12.85
(4) Grade Checker.....	\$ 21.28	12.85
-----		
LAB00334-019 09/01/2018		

SCOPE OF WORK:  
 OPEN CUT CONSTRUCTION: Excavation of earth and sewer, utilities, and improvements, including underground piping/conduit (including inspection, cleaning, restoration, and relining)

HILLSDALE, LENAWE, SHIAWASSEE

	Rates	Fringes
LABORER		
(1) Common or General.....	\$ 20.97	12.85

(4) Grade Checker.....\$ 21.28 12.85

-----  
LAB00355-007 06/01/2022

EXCLUDES OPEN CUT CONSTRUCTION

BRANCH COUNTY

Rates Fringes

LABORER  
Common or General.....\$ 26.70 12.95

-----  
LAB00355-015 06/01/2022

EXCLUDES OPEN CUT CONSTRUCTION

MECOSTA & OSCEOLA COUNTIES

Rates Fringes

LABORER  
Common or General.....\$ 26.70 12.95

-----  
LAB00499-014 06/01/2022

EXCLUDES OPEN CUT CONSTRUCTION

HILLSDALE & LENAWEЕ COUNTIES

Rates Fringes

LABORER  
Common or General.....\$ 27.45 13.20

-----  
LAB01075-011 06/01/2022

EXCLUDES OPEN CUT CONSTRUCTION

SHIAWASSEE COUNTY

Rates Fringes

LABORER  
Common or General.....\$ 26.41 14.05

-----  
LAB01098-022 07/01/2022

EXCLUDES OPEN CUT CONSTRUCTION

ARENAC, GLADWIN, HURON, MIDLAND & TUSCOLA COUNTIES

	Rates	Fringes
LABORER		
Common or General.....	\$ 23.44	12.95
-----		
PLAS0016-009	04/01/2014	

MECOSTA & OSCEOLA COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 22.02	12.38
-----		
PLAS0016-021	04/01/2014	

SHIAWASSEE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 25.58	12.88
-----		
PLAS0016-023	04/01/2014	

BRANCH COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 24.63	12.88
-----		
PLAS0016-031	04/01/2014	

ARENAC, GLADWIN, HURON, MIDLAND & TUSCOLA COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 25.47	12.38
-----		
PLAS0886-013	08/01/2011	

HILLSDALE & LENAWEЕ COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 27.19	16.00
-----		
PLUM0085-017	05/04/2020	

ARENAC, GLADWIN, HURON (West of M-53), MIDLAND & TUSCOLA

COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 38.25	21.07
-----		
PLUM0098-008 06/01/2019		

HURON COUNTY (East of M-53)

	Rates	Fringes
PLUMBER.....	\$ 35.77	35.13
-----		
PLUM0174-015 07/01/2020		

MECOSTA & OSCEOLA COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 39.89	23.82
-----		
PLUM0190-012 06/01/2021		

LENAWEE COUNTY (Townships of Clinton, Macon & Tecumseh)

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 44.31	23.70
-----		
PLUM0333-021 06/01/2020		

BRANCH & HILLSDALE COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 38.79	23.08
-----		
PLUM0333-022 06/01/2020		

LENAWEE COUNTY (Remainder of County)

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 38.79	23.08
-----		
PLUM0370-007 06/01/2020		

SHIAWASSEE COUNTY

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 39.81	20.95

-----  
 PLUM0636-008 06/05/2017

HURON COUNTY (East of M-53)

	Rates	Fringes
PIPEFITTER.....	\$ 40.41	29.35

-----  
 TEAM0007-010 06/01/2020

	Rates	Fringes
TRUCK DRIVER Lowboy/Semi-Trailer Truck...	\$ 28.15	.50 + a+b

FOOTNOTE:

- a. \$470.70 per week.
- b. \$68.70 daily.

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 \* SUMI2010-042 11/09/2010

	Rates	Fringes
CARPENTER, Excludes Form Work....	\$ 23.97	6.29
LABORER: Landscape.....	\$ 10.89 **	1.74
LABORER: Mason Tender - Cement/Concrete.....	\$ 15.97	3.51
LABORER: Pipelayer.....	\$ 15.28	3.99
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 12.98 **	6.12
OPERATOR: Grader/Blade.....	\$ 15.50	3.62
OPERATOR: Roller.....	\$ 13.74 **	7.93
TRUCK DRIVER: Dump Truck.....	\$ 14.06 **	1.25

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 WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$15.00) or 13658 (\$11.25). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example:

PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative

Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"

## Labor Standards Provisions for Federally Assisted Projects - 29 CFR Part 5

### §5.5 Contract provisions and related matters.

(a) The Agency head shall cause or require the contracting officer to insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in Sec. 5.1, the following clauses (or any modifications thereof to meet the particular needs of the agency, *Provided*, That such modifications are first approved by the Department of Labor):

(1) *Minimum wages.* (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in Sec. 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination, and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (C) In the event the contractor, the laborers, or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside, in a separate account, assets for the meeting of obligations under the plan or program.
- (2) *Withholding.* The **City of Owosso** shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action

as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) *Payrolls and basic records.* (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead, the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at [dol.gov/agencies/whd/government-contracts/construction/forms](http://dol.gov/agencies/whd/government-contracts/construction/forms) or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance", signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under Sec. 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
  - (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
  - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.
- (D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Michigan Department of Environment, Great Lakes, and Energy or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as maybe necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
- (4) *Apprentices and trainees-* (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the jobsite in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates

(expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
- (iii) **Equal employment opportunity.** The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- (5) **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
- (6) **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

- (7) *Contract termination: debarment.* A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
- (8) *Compliance with Davis-Bacon and Related Act requirements.* All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
- (9) *Disputes concerning labor standards.* Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
- (10) *Certification of eligibility.* (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C.1001.
- (b) *Contract Work Hours and Safety Standards Act.* The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Sec. 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.
- (1) *Overtime requirements.* No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- (c) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible there for shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

- (3) Withholding for unpaid wages and liquidated damages. The **City of Owosso** shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally- assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
- (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.
- (5) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in Sec.5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Michigan Department of Environment, Great Lakes, and Energy and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

# MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

## Certification Regarding Debarment, Suspension, and Other Responsibility Matters

The prime contractor must provide a completed *Certification Regarding Debarment, Suspension, and Other Responsibility Matters Form* with its bid or proposal package to the owner.

The prospective participant certifies, to the best of its knowledge and belief, that it and its principals:

- (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in transactions under federal nonprocurement programs by any federal department or agency;
- (2) Have not, within the three-year period preceding the proposal, had one or more public transactions (federal, state, or local) terminated for cause or default; and
- (3) Are not presently indicted or otherwise criminally or civilly charged by a government entity (federal, state, or local) and have not, within the three-year period preceding the proposal, been convicted of or had a civil judgment rendered against it:
  - (a) For the commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public transaction (federal, state, or local) or a procurement contract under such a public transaction;
  - (b) For the violation of federal or state antitrust statutes, including those proscribing price fixing between competitors, the allocation of customers between competitors, or bid rigging; or
  - (c) For the commission of embezzlement, theft, forgery, bribery, falsification, or destruction of records, making false statements, or receiving stolen property.

I understand that a false statement on this certification may be grounds for the rejection of this proposal or the termination of the award. In addition, under 18 U.S.C. §1001, a false statement may result in a fine of up to \$10,000 or imprisonment for up to five years, or both.

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Name and Title of Authorized Representative

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Name of Participant Agency or Firm

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Signature of Authorized Representative

Date

I am unable to certify to the above statement. Attached is my explanation.

**DIVISION 0**

**BIDDING AND CONTRACT REQUIREMENTS**

**SECTION 00430**

**BID BOND**

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

---

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

City of Owosso  
301 W. Main Street  
Owosso, Michigan 48867

BID

Bid Due Date:  
Description (*Project Name— Include Location*):

BOND

Bond Number:  
Date:  
Penal sum \_\_\_\_\_

\$

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

**BIDDER**

**SURETY**

(Seal)

(Seal)

\_\_\_\_\_  
Bidder's Name and Corporate Seal

\_\_\_\_\_  
Surety's Name and Corporate Seal

By:

By:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature (Attach Power of Attorney)

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

Attest:

Attest:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

*Note: Addresses are to be used for giving any required notice.*

*Provide execution by any additional parties, such as joint venturers, if necessary.*

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
  - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
  - 3.2 All Bids are rejected by Owner, or
  - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

# Performance Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place  
of Business):

OWNER (Name and Address):

City of Owosso  
301 W. Main Street  
Owosso, Michigan 48867

CONTRACT

Date:  
Amount:  
Description (Name and Location):

BOND

Date (Not earlier than Contract Date):  
Amount:  
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: \_\_\_\_\_ (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: \_\_\_\_\_ (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: \_\_\_\_\_ (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

SURETY

Company: \_\_\_\_\_ (Corp. Seal)

Signature: \_\_\_\_\_  
Name and Title:

1. The CONTRACTOR and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Contract, which is incorporated herein by reference.

2. If the CONTRACTOR performs the Contract, the Surety and the CONTRACTOR have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no OWNER Default, the Surety's obligation under this Bond shall arise after:

3.1. The OWNER has notified the CONTRACTOR and the Surety at the addresses described in Paragraph 10 below, that the OWNER is considering declaring a CONTRACTOR Default and has requested and attempted to arrange a conference with the CONTRACTOR and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Contract. If the OWNER, the CONTRACTOR and the Surety agree, the CONTRACTOR shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive the OWNER's right, if any, subsequently to declare a CONTRACTOR Default; and

3.2. The OWNER has declared a CONTRACTOR Default and formally terminated the CONTRACTOR's right to complete the Contract. Such CONTRACTOR Default shall not be declared earlier than twenty days after the CONTRACTOR and the Surety have received notice as provided in Paragraph 3.1; and

3.3. The OWNER has agreed to pay the Balance of the Contract Price to:

3.3.1. The Surety in accordance with the terms of the Contract;

3.3.2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

4. When the OWNER has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1. Arrange for the CONTRACTOR, with consent of the OWNER, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the OWNER for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by the OWNER and the contractor selected with the OWNER's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the Bonds issued on the Contract, and pay to the OWNER the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the OWNER resulting from the CONTRACTOR Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances;

4.4.1. After investigation, determine the amount for which it may be liable to the OWNER and, as soon as practicable after the amount is determined, tender payment therefor to the OWNER; or

4.4.2. Deny liability in whole or in part and notify the OWNER citing reasons therefor.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the OWNER to the Surety demanding that the Surety perform its obligations under this Bond, and the OWNER shall be entitled to enforce any remedy available to the OWNER. If the Surety proceeds as provided in Paragraph 4.4, and the OWNER refuses the payment tendered or the Surety has denied p liability, in whole or in part, without further notice the OWNER shall be entitled to enforce any remedy available to the OWNER.

6. After the OWNER has terminated the CONTRACTOR's right to complete the Contract, and if the Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the OWNER shall not be greater than those of the CONTRACTOR under the Contract, and the responsibilities of the OWNER to the Surety shall not be greater than those of the OWNER under the Contract. To a limit of the amount of this Bond, but subject to commitment by the OWNER of the Balance of the Contract Price to mitigation of costs and damages on the Contract, the Surety is obligated without duplication for:

6.1. The responsibilities of the CONTRACTOR for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional and delay costs resulting from the CONTRACTOR's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the CONTRACTOR.

7. The Surety shall not be liable to the OWNER or others for obligations of the CONTRACTOR that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the OWNER or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after CONTRACTOR Default or within two years after the CONTRACTOR ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the OWNER or the CONTRACTOR shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the Contract was performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1. Balance of the Contract Price: The total amount payable by the OWNER to the CONTRACTOR under the Contract after all proper adjustments have been made, including allowance to the CONTRACTOR of any amounts received or to be received by the OWNER in settlement of insurance or other Claims for damages to which the CONTRACTOR is entitled, reduced by all valid and proper payments made to or on behalf of the CONTRACTOR under the Contract.

12.2. Contract: The agreement between the OWNER and the CONTRACTOR identified on the signature page, including all Contract Documents and changes thereto.

12.3. CONTRACTOR Default: Failure of the CONTRACTOR, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. OWNER Default: Failure of the OWNER, which has neither been remedied nor waived, to pay the CONTRACTOR as required by the Contract or to perform and complete or comply with the other terms thereof.

**PAYMENT BOND**

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

City of Owosso  
301 W. Main Street  
Owosso, Michigan 48867

CONTRACT

Date:  
Amount:  
Description (Name and Location):

BOND

Date (Not earlier than Contract Date):  
Amount:  
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

CONTRACTOR AS PRINCIPAL

Company: \_\_\_\_\_ (Corp. Seal)  
Seal)

SURETY

Company: \_\_\_\_\_ (Corp.

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:  
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

CONTRACTOR AS PRINCIPAL

Company: \_\_\_\_\_ (Corp. Seal)  
Seal)

SURETY

Company: \_\_\_\_\_ (Corp.

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:

**Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.**

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
  - 5.1 Claimants who do not have a direct contract with the Contractor,
    - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
    - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
  - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
  - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
  - 7.2 Pay or arrange for payment of any undisputed amounts.
  - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or

(2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor

of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

SECTION 00620

APPLICATION FOR PAYMENT CERTIFICATE

CONTRACTOR'S APPLICATION FOR PAYMENT NO. \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_ TITLE: \_\_\_\_\_

OWNER: \_\_\_\_\_ CONTRACT NO.: \_\_\_\_\_

Substantial Completion Date: \_\_\_\_\_ Final Completion Date: \_\_\_\_\_

Milestone Completion Date: \_\_\_\_\_

Application is made for payment for the Work shown below, accomplished through the date of \_\_\_\_\_

1. Original Contract Sum		\$	_____
2. Net Change by Change Order		\$	_____
3. Current Contract Amount (line 1 + line 2)		\$	_____
4. Work Complete (from summary sheet) _____ %		\$	_____
5. Stored Materials (from summary sheet, if applicable)		\$	_____
6. Less _____ % Retainage	\$	_____	
7. Less 10% Retainage - Stored Materials	\$	_____	
8. Total Retainage (line 6 + 7)		\$	_____
9. Amount Due to Date (line 4 + 5 - 8)		\$	_____
10. Less Previous Payments (from summary sheet)		\$	_____
<b>11. Amount Due This Application (line 9-10)</b>		<b>\$</b>	<b>_____</b>

CONTRACTOR's Certification:

The undersigned CONTRACTOR certifies that: (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment; (2) title to all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all liens, claims, security interest and encumbrances (except such as are covered by Bond acceptable to OWNER indemnifying OWNER against any such lien, claim, security interest or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not *defective* as that term is defined in the Contract Documents.

ATTACHMENTS TO THIS CERTIFICATION:

\_\_\_\_ Summary Sheet      \_\_\_\_ Change Order Summary      \_\_\_\_ Stored Material Summary  
\_\_\_\_ Other \_\_\_\_\_

CONTRACTOR:

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

Payment to CONTRACTOR of the amount shown in line 11 above is recommended by ENGINEER, Tetra Tech, Inc.

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

APPROVED: OWNER



**Stored Material Summary**

Invoice No.	Stored Material	Material Location	Insurance Certificates on File	Stored Previous		Stored This Month		Incorporated This Month		Materials remaining in storage (\$)
				Date (MO/YR)	Amount (\$)	Date (MO/YR)	Amount (\$)	Date (MO/YR)	Amount (\$)	
		On-Site Off-Site	Yes / No							
		On-Site Off-Site	Yes / No							
		On-Site Off-Site	Yes / No							

SECTION 00626

CERTIFICATE OF SUBSTANTIAL COMPLETION

Contract \_\_\_\_\_  
 Contract No. \_\_\_\_\_  
 Date Issued: \_\_\_\_\_  
 OWNER \_\_\_\_\_  
 CONTRACTOR \_\_\_\_\_

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto as Attachment No. A. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within \_\_\_\_\_ days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees pending final payment shall be as follows:

OWNER: Shall perform and/or maintain insurances, if any, in accordance with Article 5 of the General Conditions, and allow CONTRACTOR reasonable access to complete or correct items on the tentative list. Additional responsibilities are:

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

CONTRACTOR: Shall perform and/or maintain Site security, temporary facilities, Bonds and insurances in accordance with Article 5 of the General Conditions, and protect the Work. Additional responsibilities are:

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The following documents are attached to and made a part of this Certificate:

Attachment A: Tentative List of Items to be completed prior to Final Payment (Pages 1 to \_\_, inclusive).

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on \_\_\_\_\_  
Date

\_\_\_\_\_  
ENGINEER

By: \_\_\_\_\_  
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on \_\_\_\_\_  
Date

\_\_\_\_\_  
CONTRACTOR

By: \_\_\_\_\_  
(Authorized Signature)

OWNER accepts this Certificate of Substantial Completion on \_\_\_\_\_  
Date

\_\_\_\_\_  
OWNER

By: \_\_\_\_\_  
(Authorized Signature)

SECTION 00627

CERTIFICATE OF FINAL COMPLETION

Contract \_\_\_\_\_  
Contract No. \_\_\_\_\_  
Date Issued: \_\_\_\_\_  
OWNER \_\_\_\_\_  
CONTRACTOR \_\_\_\_\_

This Certificate of Final Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, in accordance with Paragraph 14.06 of the General Conditions, and that Work is hereby declared to be finally complete in accordance with the Contract Documents on

\_\_\_\_\_  
DATE OF FINAL COMPLETION

CONTRACTOR's general warranty and guarantee period commences on \_\_\_\_\_ and terminates on \_\_\_\_\_.

CONTRACTOR's special warranty and guarantee are:

\_\_\_\_\_ warranty and guarantee period commences on \_\_\_\_\_ and terminates on \_\_\_\_\_.

\_\_\_\_\_ warranty and guarantee period commences on \_\_\_\_\_ and terminates on \_\_\_\_\_.

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to correct defective Work in accordance with the General Conditions of the Contract Documents.

Executed by ENGINEER on \_\_\_\_\_  
Date

\_\_\_\_\_  
ENGINEER

By: \_\_\_\_\_  
(Authorized Signature)

CONTRACTOR accepts this Certificate of Final Completion on \_\_\_\_\_  
Date

\_\_\_\_\_  
CONTRACTOR

By: \_\_\_\_\_  
(Authorized Signature)

OWNER accepts this Certificate of Final Completion on \_\_\_\_\_  
Date

\_\_\_\_\_  
OWNER

By: \_\_\_\_\_  
(Authorized Signature)



SECTION 00931

REQUEST FOR INFORMATION

From: \_\_\_\_\_ RFI Number: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_ Project: \_\_\_\_\_  
\_\_\_\_\_

Submitted to: \_\_\_\_\_  
\_\_\_\_\_ Contract: \_\_\_\_\_  
ENGINEER - Tetra Tech, Inc.

Specification Section: \_\_\_\_\_ Paragraph: \_\_\_\_\_ Drawing Reference: \_\_\_\_\_ Detail: \_\_\_\_\_

Request:

Attachments

Signed by: \_\_\_\_\_

Response:

Attachments

Follow-up:  Contract Clarification  Field Order  Work Change Directive  .Proposal Request

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_  
ENGINEER - Tetra Tech, Inc.

Copy:  OWNER  CONTRACTOR  RPR  CPM  Shop Dwg. File

END OF SECTION

SECTION 00942

FIELD ORDER

CONTRACTOR: \_\_\_\_\_ F.O. Number: \_\_\_\_\_  
\_\_\_\_\_  
Date: \_\_\_\_\_  
\_\_\_\_\_  
Project: \_\_\_\_\_  
From: \_\_\_\_\_  
ENGINEER - Tetra Tech, Inc. Contract: \_\_\_\_\_

You are hereby directed to promptly execute this Field Order, which interprets the Contract Documents or orders minor changes in the Work without change in Contract Price or Time. If you consider that a change in Contract Price or Time is warranted, notify us immediately and prior to proceeding with this Work.3

Specification Section: \_\_\_\_\_ Paragraph: \_\_\_\_\_  
Drawing Reference: \_\_\_\_\_ Detail: \_\_\_\_\_

Description of Interpretation or Change:

Attachments

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_  
ENGINEER - Tetra Tech, Inc.

Copy:  OWNER  CONTRACTOR  RPR  CPM  Shop Dwg. File

END OF SECTION

SECTION 00943

WORK CHANGE DIRECTIVE

CONTRACTOR: \_\_\_\_\_ W.C.D. Number: \_\_\_\_\_  
 \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Project: \_\_\_\_\_  
 From: \_\_\_\_\_  
 \_\_\_\_\_ Contract: \_\_\_\_\_  
 ENGINEER - Tetra Tech, Inc.

To prevent a possible delay in the Work you are directed to proceed with the following changes:

Reason:

The Contract Price and/or Contract Times will be adjusted by a future Change Order based on:

- \_\_\_\_\_ Extension of Unit Prices as indicated in Agreement.
- \_\_\_\_\_ Actual time and material costs plus OH&P.
- \_\_\_\_\_ Actual time and material costs plus OH&P, not to exceed. \$ \_\_\_\_\_
- \_\_\_\_\_ An agreed sum to be added. \$ \_\_\_\_\_
- \_\_\_\_\_ An agreed sum to be deducted. \$ \_\_\_\_\_
- \_\_\_\_\_ No change in Contract Price.
- \_\_\_\_\_ No change in Contract Time.

A detailed breakdown \_\_\_\_\_ is needed.  
 \_\_\_\_\_ has been received.

ENGINEER: Tetra Tech, Inc. \_\_\_\_\_

Recommended by: \_\_\_\_\_ Date \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

Accepted by: \_\_\_\_\_ Date \_\_\_\_\_

OWNER: \_\_\_\_\_

Approved by: \_\_\_\_\_ Date \_\_\_\_\_

Copy:  OWNER  CONTRACTOR  RPR  CPM  Shop Dwg. File

SECTION 00943

WORK CHANGE DIRECTIVE - SUBSTITUTION

CONTRACTOR: \_\_\_\_\_ W.C.D. Number: \_\_\_\_\_  
 \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Project: \_\_\_\_\_  
 From: \_\_\_\_\_  
 \_\_\_\_\_ Contract: \_\_\_\_\_  
 ENGINEER - Tetra Tech, Inc.

CONTRACTOR has submitted the following material or equipment to ENGINEER for review as a Substitute item in accordance with Paragraph 6.05 of the General Conditions and as supplemented by the Supplementary Conditions.

Opinion of probable ENGINEER's costs for Substitution Review:  
 Minimum review fee \$200  
 Hours to review \_\_\_\_\_ hours at \$120 per hour \$ \_\_\_\_\_  
 Opinion of Probable costs for Substitute review \$ \_\_\_\_\_

The Contract Price and/or Contract Times will be adjusted by a future Change Order based on:  
 \_\_\_\_\_ Actual time and material costs to be deducted

ENGINEER will notify CONTRACTOR if review hours are to exceed those listed above.

Section 01630, Substitution Request Application \_\_\_\_\_ is needed.  
 \_\_\_\_\_ has been received.

ENGINEER: Tetra Tech, Inc. \_\_\_\_\_

Recommended by: \_\_\_\_\_ Date \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

Accepted by: \_\_\_\_\_ Date \_\_\_\_\_

OWNER: \_\_\_\_\_

Approved by: \_\_\_\_\_ Date \_\_\_\_\_

Copy:  OWNER  CONTRACTOR  RPR  CPM  Shop Dwg. File

END OF SECTION

SECTION 00946

CHANGE ORDER

CONTRACTOR: \_\_\_\_\_ C.O. Number: \_\_\_\_\_  
 \_\_\_\_\_ Date: \_\_\_\_\_  
 \_\_\_\_\_ Project: \_\_\_\_\_  
 \_\_\_\_\_  
 OWNER: \_\_\_\_\_ Contract: \_\_\_\_\_

**TO THE CONTRACTOR NAMED ABOVE:  
 Under the terms of this Agreement, and upon acceptance of CONTRACTOR and approval of OWNER,  
 ENGINEER recommends the following changes to the Agreement:**

No.	Description	Add/ Deduct	Amount
			\$
			\$
	<b>TOTAL THIS CHANGE ORDER</b>		<b>\$</b>

**REASON FOR CHANGE:**

Current Contract Price	\$ _____
This Change Order Add/Deduct	\$ _____
<b>Revised Contract Price</b>	<b>\$ _____</b>
Current Substantial Completion Date	_____
Current Final Completion Date	_____
Contract Time Extension	_____ <b>Days</b>
<b>Revised Substantial Completion Date</b>	_____
<b>Revised Final Completion Date</b>	_____

**The above is agreed to as full and complete compensation for the Work listed in this Change Order.**

**RECOMMENDED BY:** Tetra Tech, Inc.

\_\_\_\_\_ DATE \_\_\_\_\_

**ACCEPTED BY:** CONTRACTOR: \_\_\_\_\_

\_\_\_\_\_ DATE \_\_\_\_\_

**APPROVED BY:** OWNER: \_\_\_\_\_

\_\_\_\_\_ DATE \_\_\_\_\_

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**DIVISION 1**  
**GENERAL REQUIREMENTS**

## SECTION 01005

### PROJECT REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

###### A. Scope of Work:

1. The Work to be done consists of the furnishing of all labor, materials, and equipment, and the performance of all Work included in this Contract. The summary of the Work is presented in Section 01110: Summary of Work.
2. Work Included:
  - a. The Contractor shall furnish all labor, superintendence, materials, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the Work. The Contractor shall obtain and pay for all necessary construction permits except as provided for in Section 01065 – Permits and Fees. The Contractor shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.
  - b. The cost of incidental work described in these Project Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the Work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.
  - c. The Contractor shall provide and maintain tools and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the Work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials, and equipment, prior approval of the Engineer notwithstanding.
3. Public Utility Installations and Structures:
  - a. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies, or privately owned by individuals, firms, or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water, or other public or private property which may be affected by the Work shall be deemed included hereunder.
  - b. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition, and extent of all such installations and structures as may be encountered and as may affect the construction operations.

- c. The Contractor shall protect all public utility installations and structures from damage during the Work. Access across any buried public utility installation or structure shall be made to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense. No separate payment shall be made for such protection or repairs to public utility installations or structures.
- d. Public utility installations or structures owned or controlled by the Owner or other governmental body which are shown on the Drawings to be removed, relocated, replaced, or rebuilt by the Contractor shall be considered as a part of the general cost of doing the Work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefore.
- e. Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the Work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement, or rebuilding is necessary to complete the Work under this Contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously, and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement, or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
- f. The Contractor shall, at all times in performance of the Work, employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage, or destruction of public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.
- g. The maintenance, repair, removal, relocation, or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the owners of such utilities.

## 1.02 DRAWINGS AND PROJECT MANUAL

- A. Drawings: When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.
- B. Supplementary Drawings:
  - 1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done or to illustrate the Work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer, and the Contractor will be furnished one (1) complete set of reproducible drawings (24 inches by 36 inches) and one (1) reproducible copy of the specifications.
  - 2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of Work, credit to the Owner or compensation therefore to the Contractor shall be subject to the terms of the Agreement.

- C. Contractor to Check Drawings and Data:
1. The Contractor shall verify all dimensions, quantities, and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting therefrom, nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered.
  2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.
- D. Specifications: The Technical Specifications consist of three (3) parts: General, Products, and Execution. The General part of a Specification contains General Requirements which govern the Work. The Products and Execution parts modify and supplement the General Requirements by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.
- E. Intent:
1. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the Work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
  2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, the interpretation of these Specifications shall be made upon that basis.

### 1.03 MATERIALS AND EQUIPMENT

- A. Manufacturer:
1. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request and at the Engineer's option, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
  2. Any two (2) or more pieces of material or equipment of the same kind, type, or classification, and being used for identical types of service, shall be made by the same manufacturer.
- B. Delivery:
1. The Contractor shall deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.
  2. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.
- C. Tools and Accessories:

1. The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind, or size of equipment, one (1) complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.
2. Spare parts shall be furnished as specified herein and as recommended by the manufacturer necessary for the operation of the equipment, not including materials required for routine maintenance.
3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight, and principal rate data.

D. Service of Manufacturer's Engineer:

1. The Contract Prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test, and place in operation, the equipment in conformity with the Contract Documents.
2. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

#### 1.04 INSPECTION AND TESTING

A. General:

1. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests, and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five (5) copies of the reports shall be submitted, and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.
2. If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract Documents, the Contractor will be notified thereof, and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the Work and replace it with acceptable material, without cost to the Owner.
3. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with the recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.
4. The Contractor shall be fully responsible for the proper operation of equipment during testing and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

B. Costs:

1. All costs for inspections required under the Building Permit shall be provided by the Contractor, unless otherwise expressly specified.
2. The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor, and such costs shall be deemed to be included in the Contract Price.

3. Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests of materials and equipment which are rejected for non-compliance.

C. Certificate of Manufacture:

1. Contractor shall furnish to Engineer authoritative evidence in the form of a certificate of manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents.
2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

D. Shop Tests:

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. Shop tests where specified shall be witnessed by the Engineer.
2. Five (5) copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company and/or independent laboratory, shall be submitted to the Engineer for approval.
3. The cost of shop tests, travel expenses of the Engineer, and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

E. Start-up Tests:

1. As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make start-up tests of equipment.
2. If the start-up tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to demonstration tests, make all changes, adjustments, and replacements required. The furnishing Contractor shall assist in the start-up tests as applicable.

F. Demonstration Tests:

1. Prior to Contractor's request for a Substantial Completion inspection, all equipment and piping installed under this Contract shall be subjected to demonstration tests as specified or required to prove compliance with the Contract Documents.
2. The Contractor shall furnish labor, fuel, energy, water, and all other materials, equipment, and instruments necessary for all demonstration tests, at no additional cost to the Owner. Contractor shall assist in the demonstration tests as applicable.

## 1.05 LINES AND GRADES

A. Grade:

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

2. The Engineer will establish benchmarks and baseline controlling points. Reference marks for lines and grades as the Work progresses will be located by the Contractor to cause as little inconvenience to the prosecution of the Work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

B. Surveys:

1. The Contractor shall furnish and maintain, at his own expense, stakes and other such materials.
2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.
3. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review by the Engineer.

C. Safeguarding Marks:

1. The Contractor shall safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, bear the cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes, and marks.
2. The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent to but not related to the Work and shall bear the cost of re-establishing them if disturbed or destroyed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01065

PERMITS AND FEES

PART 1 -- GENERAL

- A. The Contractor shall secure and pay for **all** permits and licenses related to his work, including but not limited to, necessary construction permits as provided for in Section 00100: General Conditions except as otherwise provided herein.
- B. The Contractor shall procure all necessary permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the work. The Contractor shall determine what permits are required for construction of the Work and procure them.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

## SECTION 01070

### STANDARDS AND ABBREVIATIONS

#### PART 1 - GENERAL

##### 1.01 STANDARDS AND ABBREVIATIONS

- A. Referenced Standards: Any reference to published specifications or standards of any organization or association shall comply with the requirements of the specification or standard which is current on the date of Advertisement for Bids. In case of a conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.
- B. Reference in the specifications to MDOT Standards shall mean the “MDOT 2012 Standard Specifications for Construction”.
- C. In case of conflict between the referenced specifications or standards and the Contract Documents, the Contract Documents shall govern.
- D. Abbreviations:

AA	Aluminum Association
AAA	American Arbitration Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	The American Association of State Highway and Transportation Officials
ABA	American Bar Association
ABMA	American Boiler Manufacturers Association
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIEE	American Institute of Electrical Engineers (Now IEEE)
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standard Institute

APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ARI	American Refrigeration Institute
ASA	American Standards Association (Now ANSI)
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASSHTO	American Association of State Highway Transportation Officials
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CFR	Code of Federal Regulations
CFS	Cubic Feet Per Second
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
CSA	Canadian Standards Association
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOT Spec	Standard Specification for Road and Bridge Construction Florida Department of Transportation
E/A	Engineer and/or Architect
EDA	Economic Development Association
EEI	Edison Electric Institute
EPA	Environmental Protection Agency
FCI	Fluid Control Institute
Fed Spec	Federal Specification
FM	Factory Mutual Engineering and Research
FPS	Feet Per Second
FS	Federal Standards
GPM	Gallons Per Minute
HMI	Hoist Manufacturers Institute
HI	Hydraulic Institute
HP	Horsepower
HSBII	Hartford Steam Boiler Inspection and Insurance Co.

ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
ISA	Instrument Society of America
MBMA	Metal Building Manufacturers Association
MDEQ	Michigan Department of Environmental Quality
MDOT	Michigan Department of Transportation
MGD	Million Gallons Per Day
MHI	Materials Handling Institute
MMA	Monorail Manufacturers Association
MIOSHA	Michigan Occupational Safety and Health Administration
NAPA	National Asphalt Pavement Association
NBFU	National Board of Fire Underwriters
NBHA	National Builders' Hardware Association
NBS	National Bureau of Standards
NCPI	National Clay Pipe Institute
NCSA	National Crushed Stone Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NPC	National Plumbing Code
NPCA	National Precast Concrete Association
NPT	National Pipe Threads
NSC	National Safety Council
NSF	National Sanitation Foundation
OD	Outside Diameter
OSHA	U.S. Department of Labor, Occupational Safety and Health Act
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSIG	Pounds per Square Inch Gauge
PTI	Post Tensioning Institute
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPC	Structural Steel Painting Council
STA	Station (100 feet)

TDH	Total Dynamic Head
TH	Total Head
TPI	Truss Plate Institute
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
USACE	United States Army Corps of Engineers
USASI or	United States of America Standards Institute

C. Additional abbreviations and symbols are shown on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01110

SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. The Work to be performed shall consist of furnishing plant, tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including but not limited to fuel, power, water, essential communications, and performing all Work or other operations required in strict accordance with the Drawings and these specifications. The Work shall be complete, and all Work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the City.
  
- B. The Project is located at various locations around and near the City of Owosso Michigan, see list of site addresses below. Work is shown on contract drawings and generally consists of Control Panel replacements, electrical upgrades including variable frequency drive for High Service pump No. 2, network equipment and wiring upgrades, SCADA equipment upgrades, radio communication upgrades including installation of a new direct buried monopole at the WTP and wood poles at the remote sites and mounting, configuration and commissioning of related radio equipment. In addition, a new security camera system will be installed at the WTP and remote site locations. Related work includes all other work shown on contract drawings. Note that all site work shown on drawings for Palmer Well No. 2, Palmer Well No. 3 and Juniper Well will be completed outside of this contract. The Contractor is still required to provide and deliver to Owner all materials shown for Palmer No. 2, Palmer No. 4, and Juniper wells. Three deductible alternate options exist as follows:

Deductible Alternate Options (see bid form):

- 1. Variable Frequency Drive for High Service Pump No. 2 and related work.
- 2. Security camera system for WTP and related WTP site work.
- 3. Security camera system for remote sites and related remote site work.

C. Site Locations:

	<u>Station Name</u>	<u>Station Address</u>
1	Owosso WTP	1111 Allendale Road, Owosso, MI
2	Water Standpipe	1418 Walnut, Owosso, MI
3	West Elevated Water Tank	1890 Dowling Dr., Owosso, MI
4	Hintz Well	(Near) 1260 N. Hintz Rd., Owosso, MI
5	Palmer Well No. 2	(Near) 1520 Palmer Street, Owosso, MI
6	Palmer Well No. 3	(Near) 1520 Palmer Street, Owosso, MI
7	Juniper Well	774 ft SE of Juniper St / 1245 ft E of Gould St
8	Corunna Elevated Tank	(Behind) 729 South Norton St., Corunna, MI

## 1.02 WORK SEQUENCE

- A. CONTRACTOR shall arrange its Work so that at no time shall it cause unnecessary interruption to the operation of existing facilities. In order to meet the overall objective of this Project, certain elements of the Work must be completed in a particular sequence. It may also be necessary to do certain parts of the Work outside normal working hours. CONTRACTOR shall do this Work at such times and at no additional cost to OWNER. CONTRACTOR shall be completely responsible for fines and other enforcement imposed upon the facility resulting from inadvertent or unplanned interruptions caused by CONTRACTOR. A suggested sequence of construction is as follows:
  - 1. The CONTRACTOR shall coordinate all onsite work and installation of components with the City of Owosso WTP Superintendent, David Haut.
  - 2. This work shall be scheduled and approved by City two weeks prior to the work being performed. The work shall be performed from 8:00 A.M. until 4:00 P.M.

## 1.03 CONTRACTOR USE OF PREMISES

- A. Limit use of the premises to construction activities in areas indicated; allow for OWNER occupancy and use by the public. Confine operations to areas within Contract limits indicated. Portions of the Site beyond areas in which construction operations are indicated are not to be disturbed.
- B. Keep driveways and entrances serving the premises clear and available to OWNER, OWNER's employees, and private property owners at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on Site. Areas for CONTRACTOR's trailers, equipment, and material storage, and CONTRACTOR's employee parking shall be as indicated on Drawings or agreed by OWNER prior to the start of construction.

## 1.04 MISCELLANEOUS PROVISIONS

- A. CONTRACTOR shall notify all Owners of public utilities within the right-of-way or easement for the purpose of establishing the approximate locations of the utilities in accordance with the requirements of Act No. 53 Public Acts of 1974 of the State of Michigan. CONTRACTOR shall notify MISS DIG-Utility Communication System, 1-800-482-7171, three working days prior to starting any excavation with power equipment.
- B. CONTRACTOR shall be responsible for verifying the location of all underground utilities by magnetic or other type instruments before beginning excavation Work.
- C. Time and Sequence of Work: In general, it is the intention and understanding that CONTRACTOR shall have control over the sequence or order of execution of the several parts of the Work to be done under the Contract and over the method of accomplishing the required results, except as some particular sequence or method may be distinctly demanded by the Drawings and Project Manual or by the expressed provisions of the Contract. ENGINEER may, however, make such reasonable

requirements as may, in ENGINEER's judgment, be necessary for the proper and effective protection of Work partially or wholly completed, and to these requirements CONTRACTOR shall conform.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 01290

### APPLICATIONS FOR PAYMENT

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements governing CONTRACTOR's Applications for Payment.
- B. Related Sections:
  - 1. CONTRACTOR's Application for Payment form is included in Section 00620.
  - 2. CONTRACTOR's Construction Schedule and Submittal Schedule are included in Section 01330.

##### 1.02 OWNER'S INSTRUCTIONS

- A. Schedule of Values:
  - 1. Coordinate preparation of Schedule of Values with preparation of CONTRACTOR's Construction Schedule.
  - 2. Correlate line items on Schedule of Values with other required administrative schedules and forms, including:
    - a. CONTRACTOR's Construction Schedule.
    - b. Application for Payment form.
    - c. List of subcontractors.
    - d. Schedule of Allowances.
    - e. Schedule of Alternates.
    - f. List of products.
    - g. List of principal suppliers and fabricators.
    - h. Schedule of Submittals.
  - 3. Submit Schedule of Values to ENGINEER at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
  - 4. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for Schedule of Values.
  - 5. Identification: Include the following Project identification on Schedule of Values:
    - a. Project name and location.
    - b. Name of ENGINEER.
    - c. Project number.
    - d. CONTRACTOR's name and address.
    - e. Date of submittal.
  - 6. Arrange Schedule of Values in a tabular form with separate rows for each Specification Section and separate columns for each major structure or area of Work.
  - 7. Provide a breakdown of the Contract Price in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

8. Round off amounts to the nearest whole dollar; the total shall equal the Contract Price.
  9. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  10. Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually on Applications for Payment. Each item on Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
  11. At CONTRACTOR's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items on Schedule of Values or distributed as general overhead expense.
  12. Update and resubmit Schedule of Values when Change Orders or Work Change Directives result in a change in the Contract Price.
- B. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:
1. List of subcontractors.
  2. List of principal suppliers and fabricators.
  3. Schedule of Values.
  4. CONTRACTOR's Construction Schedule (preliminary if not final).
  5. Submittal Schedule (preliminary if not final).
- C. Applications For Payment:
1. Each Application for Payment shall be consistent with previous applications and payments as certified by ENGINEER and paid for by OWNER.
  2. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
  3. The date for each progress payment will be determined at the Pre-Construction Conference. The period of construction Work covered by each Application for Payment is 1 month. Actual start/end dates will be determined at the Pre-Construction Conference.
  4. Use the pay application form included in Section 00620 for Applications for Payment.
  5. Complete every entry on the form, including execution by person authorized to sign legal documents on behalf of CONTRACTOR. Incomplete applications will be returned without action.
  6. Entries shall match data on Schedule of Values and CONTRACTOR's Construction Schedule. Use updated Schedules if revisions have been made.
  7. Include amounts of Change Orders and Work Change Directives issued prior to the last day of the construction period covered by the application.
  8. Submit 3 executed copies of each Application for Payment to ENGINEER; 1 copy shall be complete, including waivers of lien and similar attachments, when required.
  9. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to ENGINEER.
- D. Application for Payment at Substantial Completion:
1. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for OWNER occupancy of designated portions of the Work.

2. Administrative actions and submittals that shall proceed or coincide with this application include:
  - a. Warranties (guarantees) and maintenance agreements.
  - b. Maintenance instructions.
  - c. Meter readings.
  - d. Final cleaning.
  - e. Final progress photographs.
  - f. List of incomplete Work, recognized as exceptions to ENGINEER'S Certificate of Substantial Completion.
  
- E. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
  1. Completion of Project closeout requirements.
  2. Completion of items specified for completion after Substantial Completion.
  3. Assurance that unsettled claims will be settled.
  4. Assurance that Work not complete and accepted will be completed without undue delay.
  5. Transmittal of required Project construction records to OWNER.
  6. Proof that taxes, fees, and similar obligations have been paid.
  7. Removal of surplus materials, rubbish, and similar elements.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 01310

### PROJECT COORDINATION

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
  - 1. Coordination of Work under this Contract.
  - 2. Coordination with other Contractors.
  - 3. Administrative and supervisory personnel.
  - 4. Land survey work.
  - 5. Pre-Construction Conference.
  - 6. Pre-Excavation Conference.
  - 7. Progress meetings.
  - 8. General installation provisions.
  - 9. Cleaning and protection.
  
- B. Related Sections Specified Elsewhere:
  - 1. Requirements for CONTRACTOR's Construction Schedule are included in Section 01330.

##### 1.02 DEFINITIONS

- A. Monument: The term "monument" shall be considered as any object defining the location of a property corner, street location, section line, fractional section line, right-of-way marker, or other delineation of land ownership or division.

##### 1.03 SUBMITTALS

- A. Within 15 days of Notice to Proceed, submit a list of CONTRACTOR's principal staff assignments, including the Superintendent and other personnel in attendance at Site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

##### 1.04 SCHEDULING

- A. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair. Make adequate provisions to accommodate items scheduled for later installation.
  
- B. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or

among employers at Site in accordance with Laws or Regulations. CONTRACTOR shall train CONTRACTOR's employees on use of these sheets and shall keep a master copy on hand at Site.

- C. Coordination with Other Contractors:
  - 1. CONTRACTOR shall so conduct CONTRACTOR's operations as not to interfere with or injure the Work of other Contractors or workmen employed on adjoining or related Work, and CONTRACTOR shall promptly make good any injury or damage which may be done to such Work by CONTRACTOR or CONTRACTOR's employees or agents.
  - 2. Should a contract for adjoining Work be awarded to another CONTRACTOR, and should the Work on one of these contracts interfere with that of the other, ENGINEER shall decide which contract shall cease Work for the time being and which shall continue, or whether Work on both contracts shall continue at the same time and in what manner.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of schedules.
  - 2. Installation and removal of temporary facilities.
  - 3. Delivery and processing of submittals.
  - 4. Progress meetings.
  - 5. Project closeout activities.

#### 1.05 PRE-CONSTRUCTION CONFERENCE

- A. ENGINEER will schedule a Pre-Construction Conference and organizational meeting at the Site or other convenient location prior to commencement of construction activities to review responsibilities and personnel assignments.
- B. Attendees: OWNER, ENGINEER and ENGINEER's consultants, CONTRACTOR and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative Construction Schedule.
  - 2. Critical Work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.
  - 7. Submittal of Shop Drawings, product data, and samples.
  - 8. Preparation of Record Documents.
  - 9. Use of the premises.
  - 10. Office, Work, and storage areas.
  - 11. Equipment deliveries and priorities.
  - 12. Safety procedures.
  - 13. First aid.
  - 14. Security.
  - 15. Housekeeping.

16. Working hours.

1.06 PRE-EXCAVATION CONFERENCE

- A. In addition to the Pre-Construction Conference, ENGINEER may also require a Pre-Excavation Conference in relation to the installation of the direct buried antenna towers. CONTRACTOR and Subcontractors performing excavation Work on Site shall provide written descriptions of their plans for shoring, dewatering, disposal of spoils, protection of existing utilities, and any other particulars of the excavation process, including the technical basis for their selection of the means and methods to be employed. ENGINEER will prepare and distribute minutes.

1.07 PROGRESS MEETINGS

- A. Attendees: In addition to representatives of OWNER and ENGINEER, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- B. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
- C. CONTRACTOR's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to CONTRACTOR's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- D. Reporting: ENGINEER will prepare and distribute copies of minutes of the meeting to each party present and to other parties who should have been present. The minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.
- E. CONTRACTOR shall schedule at least 1 meeting per site (3 total).
- F. Schedule Updating: CONTRACTOR shall revise Construction Schedule after each progress meeting where revisions to Schedule have been made or recognized. Issue revised Schedule no later than 3 days after the progress meeting date to ENGINEER for distribution concurrently with the progress meeting minutes.

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 LAND SURVEY WORK

A. CONTRACTOR Performance:

1. Furnish stakes and such suitable labor and assistance as ENGINEER may require in setting survey work.
2. Be responsible for costs by ENGINEER for providing:
  - a. Additional or replacement staking of original control points established by ENGINEER.
  - b. Replacements of Site benchmarks established by ENGINEER.
3. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks before proceeding to layout the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
  - a. Record benchmark locations, with horizontal and vertical data, on Contract Record Documents.
4. Working from lines and levels established by ENGINEER, establish benchmarks and markers to set lines and levels at each area of Work and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
5. Benchmarks or control points shall not be changed or relocated without prior written approval by ENGINEER. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
6. Promptly replace lost or destroyed Project control points. Base replacements on the original survey control points.
7. Advise entities engaged in construction activities, of marked lines and levels provided for their use.
8. As construction proceeds, check every major element for line, level and plumb.
9. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations by instrumentation and similar appropriate means.
10. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical Work.
11. Existing Utilities and Equipment:
  - a. The existence and location of underground and other utilities and construction as shown on Drawings as existing are not guaranteed. Before beginning Site Work, CONTRACTOR shall investigate and verify the existence and location of underground utilities and other construction.
  - b. Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.
  - c. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping.

### 3.02 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

## PIPE LOCATIONS

- A. All pipes shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

### 3.03 OPEN EXCAVATIONS

- A. Contractor shall adequately safeguard all open excavations by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen. All open excavations shall comply with applicable OSHA Standards.

### 3.04 TEST PITS

- A. Test pits for the purpose of locating underground pipelines or structures in advance of the construction shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the Engineer. The costs for such test pits shall be borne by the Contractor.

### 3.05 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.

### 3.06 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at no additional expense to the Owner.
- B. Protect all structures in a suitable manner to prevent damage. Should any part of a structure become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the satisfaction of the Engineer. If, in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the Contract.

- C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

### 3.07 MAINTENANCE OF TRAFFIC

- A. Unless permission to close a street is received in writing from the proper authority (County, City, MDOT, etc.), all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.
- B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner. All maintenance of traffic plans required for construction shall be approved by the local governmental entity having jurisdiction.
- C. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

### 3.08 PRIVATE LAND

- A. The Contractor shall not enter or occupy private land outside the site, except by written permission of the appropriate Owners. Contractor shall provide Owner a copy of such written permission prior to entering private land.

### 3.9 COOPERATION WITHIN THIS CONTRACT

- A. The Contractor shall, prior to interrupting a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the Owner and make arrangements for the interruption, which will be satisfactory to the Owner.

### 3.10 COOPERATION WITH OTHER CONTRACTS

- A. This Contract may require a portion of the work to be connected to work done under other contract(s). It will be necessary for the Contractor to plan his work and cooperate with other contractors insofar as possible to prevent any interference and delay.

END OF SECTION

## SECTION 01330

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals, including, but not necessarily limited to, the following:
  - 1. CONTRACTOR's Construction Schedule.
  - 2. Submittal Schedule.
  - 3. Shop Drawings.
  - 4. Product data.
  - 5. Samples.
  - 6. Progress photographs.
  - 7. Record photographs.
  
- B. Topics covered elsewhere include, but are not limited to:
  - 1. Permits.
  - 2. Applications for payment.
  - 3. Performance and payment bonds.
  - 4. Insurance certificates.
  - 5. List of subcontractors.

##### 1.02 SUBMITTALS

- A. Bonds and Insurance Certificates shall be submitted to and approved by OWNER and ENGINEER prior to the initiation of any construction on Site.
  
- B. Permits, Licenses, and Certificates: For OWNER's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents; correspondence and records established in conjunction with compliance with standards; and regulations bearing upon performance of the Work.

##### 1.03 SUBMITTAL PROCEDURES

- A. Coordination:
  - 1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  - 2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 3. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
  - 4. ENGINEER reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing:

1. Allow sufficient review time so that installation shall not be delayed as a result of the time required to process submittals, including time for resubmittals.
2. ENGINEER will review and return submittals with reasonable promptness, or advise CONTRACTOR when a submittal being processed must be delayed for coordination or receipt of additional information by putting the submittal "On Hold" and returning a transmittal identifying the reasons for the delay.
3. No extension of Contract Time will be authorized because of failure to transmit submittals to ENGINEER sufficiently in advance of the Work to permit processing.

C. Submittal Preparation:

1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
2. Provide a space approximately 4 inches by 5 inches on the label or beside the title block on submittals not originating from CONTRACTOR to record CONTRACTOR's review and approval markings and the action taken.
3. Include the following information on the label for processing and recording action taken.
  - a. Project name.
  - b. Date.
  - c. Name and address of ENGINEER.
  - d. Name and address of CONTRACTOR.
  - e. Name and address of subcontractor.
  - f. Name and address of supplier.
  - g. Name of manufacturer.
  - h. Number and title of appropriate Specification Section.
  - i. Drawing number and detail references, as appropriate.
4. Any markings done by CONTRACTOR shall be done in a color other than red. Red is reserved for ENGINEER's marking.
5. The number of copies to be submitted will be determined at the pre-construction conference. Reproducibles may be submitted and will be marked and returned to CONTRACTOR. Blue or black line prints shall be submitted in sufficient quantity for distribution to ENGINEER and OWNER recipients.

D. Submittal Transmittal:

1. Package each submittal appropriately for shipping and handling. This shall include an index either on the transmittal or within the submittal itself. Transmit each submittal from CONTRACTOR to ENGINEER using a transmittal form. Submittals received from sources other than CONTRACTOR will be returned without action. Use separate transmittals for items from different specification sections. Number each submittal consecutively. Resubmittals should have the same number as the original, plus a letter designation for each resubmittal (i.e., 7-A, 7-B, etc.).
2. Indicate on the transmittal relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include CONTRACTOR's certification that information complies with Contract Document requirements. On resubmittal, all changes shall be clearly identified for ease of review. Resubmittals shall be reviewed for the clearly identified changes only. Any changes not clearly identified will not be reviewed and original submittal shall govern.

#### 1.04 CONSTRUCTION SCHEDULE

##### A. Bar Chart Schedule:

1. Prepare a fully developed, horizontal bar chart type Construction Schedule. Submit within 30 days of the date established for "Commencement of the Work."
2. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated on Schedule of Values.
3. Prepare Schedule on a sheet, or series of sheets, of stable transparency or other reproducible media, of sufficient width to show data for the entire construction period.
4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on Schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
5. Coordinate Construction Schedule with Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on Schedule to allow time for ENGINEER's procedures necessary for certification of Substantial Completion.

- B. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 2 weeks following the meeting or activity.

#### 1.05 SUBMITTAL SCHEDULE

- A. After development and acceptance of Construction Schedule, prepare a complete Schedule of Submittals. Submit Schedule within 10 days of the date required for establishment of Construction Schedule.
- B. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products, as well as Construction Schedule.
- C. Prepare Schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
1. Scheduled date for the first submittal.
  2. Related Section number.
  3. Submittal category.
  4. Name of subcontractor.
  5. Description of the part of the Work covered.
  6. Scheduled date for resubmittal.
  7. Scheduled date ENGINEER's final release or approval.
- D. Following response to initial submittal, print and distribute copies to ENGINEER, OWNER, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

- E. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- F. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 2 weeks following the meeting or activity.

#### 1.06 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
  - 1. Dimensions.
  - 2. Identification of products and materials included.
  - 3. Compliance with specified standards.
  - 4. Notation of coordination requirements.
  - 5. Notation of dimensions established by field measurement.
- C. Nameplate data for equipment including electric motors shall be included on Shop Drawings. Electric motor data shall state the manufacturer, horsepower, service factor, voltage, enclosure type, oversize wiring box, etc.
- D. Shop Drawings shall indicate shop painting requirements to include type of paint and manufacturer.
- E. Manufacturer's catalog sheets, brochures, diagrams, illustrations, and other standard descriptive data shall be clearly marked to identify pertinent materials, products, or models. Delete information which is not applicable to the Work by striking or cross-hatching.
- F. Measurements given on Shop Drawings or standard catalog sheets, as established from Contract Drawings and as approved by ENGINEER, shall be followed. When it is necessary to verify field measurements, they shall be checked and established by CONTRACTOR. The field measurements so established shall be followed by CONTRACTOR and by all affected trades.
- G. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 36 inches by 48 inches.
- H. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

#### 1.07 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance

curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.

- B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
  - 1. Manufacturer's printed recommendations.
  - 2. Compliance with recognized trade association standards.
  - 3. Compliance with recognized testing agency standards.
  - 4. Application of testing agency labels and seals.
  - 5. Notation of dimensions verified by field measurement.
  - 6. Notation of coordination requirements.
- C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

#### 1.08 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
- B. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match ENGINEER's Sample. Include the following:
  - 1. Generic description of the Sample.
  - 2. Sample source.
  - 3. Product name or name of manufacturer.
  - 4. Compliance with recognized standards.
  - 5. Availability and delivery time.
- C. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
- D. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.
- E. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- F. Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
  - 1. Preliminary submittals will be reviewed and returned with ENGINEER's mark indicating selection and other action.

- G. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; 1 will be returned marked with the action taken.
- H. Maintain sets of Samples, as returned, at the Site, for quality comparisons throughout the course of construction.
- I. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
- J. Sample sets may be used to obtain final acceptance of the construction associated with each set.

#### 1.09 ENGINEER'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, ENGINEER will review each submittal, mark to indicate action taken, and return promptly.
  - 1. Compliance with specified characteristics is CONTRACTOR's responsibility.
- B. Action Stamp: ENGINEER will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
  - 1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  - 2. Final-But-Restricted Release: When submittals are marked "Furnish as Corrected," that part of the Work covered by the submittal may proceed, provided it complies with notation or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
  - 3. Returned for Resubmittal: When submittal is marked "Rejected" or "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at Site, or elsewhere where Work is in progress.
  - 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Acknowledge Receipt."
  - 5. The approval of ENGINEER shall not relieve CONTRACTOR of responsibility for errors on Drawings or submittals as ENGINEER's checking is intended to cover compliance with Drawings and Specifications and not enter into every detail of the shop work.

#### PART 2 - PRODUCTS

NOT USED

#### PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 01600

### GENERAL EQUIPMENT STIPULATIONS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. These General Equipment Stipulations apply, in general, to all equipment provided under other Specification Sections. They shall supplement the detailed equipment specifications, but in cases of conflict the equipment specifications shall govern.

##### 1.02 OPERATION AND MAINTENANCE

- A. All equipment suppliers shall submit to ENGINEER, through CONTRACTOR, 4 bound copies and 1 electronic/digital format copy of a manual containing specifications, Drawings, and descriptions of equipment; installation instructions; operation, maintenance, and lubrication manuals; parts lists; emergency instructions; and where applicable, test data with curves, wiring diagrams, PLC programs, VFD configuration, Valve actuator configuration on CD and schematics. This information shall be submitted for each item of equipment furnished under this Contract and shall be specific to the exact equipment models complete with all appurtenances provided. It shall also include detailed, comprehensive directions for all required maintenance activities and for the repair or replacement of all wearing parts. Special attention shall be paid to necessary safety precautions that OWNER's staff should take when operating, maintaining, or repairing the equipment.
  1. Bound copies of O&M Manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.
  2. Electronic Copy of O&M Manuals: Each equipment O&M manual shall be provided with an electronic disk, matching the content of the final approved printed O&M Manual. The information shall be saved in a single ".pdf" file, with bookmarks for each chapter, section, appendices, etc., as well as each piece of equipment. Where numerous pieces of equipment may be addressed within a section, a second tier of bookmarks shall be provided to allow quick access to each piece of equipment or key piece of information.
  3. "Sample" Table of Contents:
    - Bookmarks
    - Table of Contents
    - Section 1 - Approved Shop Drawings
    - Section 2 - Installation Instructions and Parts Identification
    - Section 3 - Operations and Maintenance Information
    - Section 4 - Troubleshooting (If not included in Section 3.)
    - Section 5 - Parts List (If not included in Section 3.)

## Section 6 - Lubrication Instructions (If not included in Section 3.)

4. These manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.

### 1.03 QUALITY ASSURANCE

- A. Compliance with OSHA: All equipment provided under this Contract shall meet all the requirements of the Federal and/or State Occupational Safety and Health Acts. Each equipment supplier shall submit to ENGINEER certification that the equipment furnished is in compliance with OSHA.
- B. Electrical Codes, Ordinances, and Industrial Standards: The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable State and local requirements. UL listing and labeling shall be adhered to under this Contract. Any equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electrical Code and OSHA requirements. Any additional cost resulting from any deviation from codes or local requirements shall be borne by CONTRACTOR.

### 1.04 SHIPPING AND HANDLING EQUIPMENT

- A. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment and handling.

### 1.05 SPARE MATERIALS

- A. All V-belt driven equipment shall be furnished with a complete set of spare belts per each piece of equipment. When two or more similar pieces of equipment are furnished, replacement belt assemblies shall be furnished for every other drive assembly.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Anchor Bolts: Anchor bolts, nuts, and washers shall be hot-dipped galvanized in conformity with ASTM A 385 and be supplied with sleeves.
- B. Shop Painting:

1. Non-submerged Applications: Tnemec Series 37H, Chem-Prime.
2. Submerged, Non-potable Applications: Tnemec Series 66, Hi-Build Epoxoline.
3. Submerged, Potable Applications: Tnemec Series 139, Pota-Pox II.
4. Rust preventive compound shall be:
  - a. Dearborn Chemical, No-Ox-ID2W.
  - b. Houghton, Rust Veto 344.
  - c. Rust-Oleum R-9.

## 2.02 MANUFACTURED UNITS

- A. Wall and Slab Sleeves and Castings: Where water- or gas-tightness is essential and at other locations where indicated, wall castings and sleeves shall be provided with an intermediate flange located approximately at the center of the wall or slab.
  1. All sleeves and casting shall be flush with walls and underside of slabs but shall extend 2 inches above finished floors.

## 2.03 COMPONENTS

- A. Lubrication: Equipment shall be adequately lubricated by systems which require attention no more often than weekly during continuous operation. Lubrication system shall not require attention during start-up or shutdown and shall not waste lubricants.
  1. Lubrication point shall be easily accessible with all points of application provided with standard fittings for greasing or placing oil.
  2. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity for all consumption prior to completion of required testing and acceptance of equipment by OWNER.
- B. Safety Guards: All belt or chain drives, fan blades, couplings, vertical or horizontal drive shafts, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 gauge or heavier stainless steel or aluminum-clad sheet steel or 1/2-inch mesh stainless steel expanded metal. Each guard shall be designed for easy installation and removal and painted safety yellow.
  1. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be stainless steel.
  2. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.
- C. Anchor Bolts: All necessary anchor bolts shall be provided as per the manufacturer's recommendations for size, strength, and location and shall meet the requirements of Standard Details on Drawings. Substantial templates and working drawings for installation shall be provided. Two nuts shall be furnished.
  1. Unless otherwise shown or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.
- D. Seals: Mercury seals will not be acceptable.

- E. Bearings: All antifriction bearings shall be designed per the Anti-Friction Bearing Manufacturers Association (AFBMA) recommendations with a rating life of B-10, 30,000 hours.
- F. Equipment Bases: A cast iron or welded steel baseplate shall be provided for all equipment and motor assemblies. Each baseplate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have a threaded drain connection. Bases shall be fully braced to withstand shock loads and resist buckling. Necessary safety guard mounting shall be provided as part of the equipment base.
- G. Motor Starters and Control Panels: Motor starters 480 volt or less shall be size one or larger and have 120 volt AC contactor coils. All control circuits and indicating lights associated with the starter shall be 120 volt. The control transformer shall be sized to have 100 VA minimum spare capacity for future use. A terminal strip shall be provided for all control wires entering the starter with spare terminals for future use. The terminal strip and wires shall be identified. One spare normally open auxiliary starter contact, wired to the terminal strip, shall be provided for future use. Indicating lights shall be 120 volt LED Lamps, oiltight, push-to-test type. Explosion-proof units shall meet NEC Class I, Division I, Group D requirements.
  - 1. Provide equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction, such as NEMA 4, 4X, 7, or 9 if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.

## 2.04 FABRICATION

- A. Shop Painting: All iron and steel surfaces shall be protected by suitable paint or coatings applied in the shop or at point of fabrication. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment.
  - 1. All iron and steel surfaces which will be totally or partially submerged or located in a continuously or intermittently moist atmosphere during normal operation shall be shop blast cleaned to a near-white finish, removing all dirt, rust-scale, and foreign matter by any of the recommended methods outlined in the Steel Structures Painting Council Specification SP-10.
  - 2. The cleaned surfaces shall be shop primed before any rust bloom forms. All other exposed surface shall be properly filed, scraped, sanded, etched, brushed, sandblasted, and/or cleaned to provide surfaces free from dirt, loose crystals, rust, scale, oil, and grease and shop primed.
  - 3. Shop primed surfaces shall be painted with one or more coats of a primer which meets the requirements of this Section and is compatible with the finish painting system specified in Section 09900. Minimum shop coat thickness shall be 1.5 dry mills.
- B. Sluice gates shall be factory painted with coal tar.
- C. The exterior surfaces of all ground-buried valves shall receive a coal tar or bituminous coating in accordance with manufacturer's standards. The inside surfaces of all valves shall be coated with coal-tar pitch varnish in accordance with the latest AWWA Specifications.
- D. Electric motors, speed reducers, starters, pumps, motor control centers, control panels, and other self-contained or enclosed components shall be shop finished with 2 coats of an enamel paint as per manufacturer's recommendations.

- E. Where specified, steel and iron surfaces shall be hot-dipped galvanized in conformity with ASTM A 153 and A 385.
- F. Machined, polished, and nonferrous surfaces which are not to be painted or galvanized shall be coated with rust preventive compound.

## PART 3 - EXECUTION

### 3.01 EQUIPMENT BASES

- A. The baseplate shall be installed on a concrete base. Baseplates shall be anchored to the concrete base with suitable anchor bolts and grouted in place.

### 3.02 WALL AND SLAB SLEEVES AND CASTINGS

- A. Unless otherwise shown on Drawings or specified, at all points where pipes or conduit pass through walls, slabs or roofs, suitable sleeves or castings shall be furnished and installed. Sleeves and castings shall not be painted in areas to be embedded in the concrete. All loose rust, scale, grease, or oil shall be removed prior to pouring the concrete.
- B. Unless otherwise shown or approved by ENGINEER, the space between the pipe and the sleeve shall be caulked. All ground buried and water or gas retaining wall or slab sleeves or castings shall be caulked with lead and oakum or be mechanical joint.

### 3.03 EQUIPMENT INSTALLATION CHECK

- A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment shall visit Site of Work a minimum of 2 times, once prior to installation to review installation procedures with CONTRACTOR and once after installation to inspect, check, adjust if necessary, and approve the equipment's installation. The equipment supplier's representative shall revisit Site as often as necessary until all trouble is corrected and the equipment installation and operation is satisfactory to ENGINEER.
- B. Manufacturer's representative shall provide all necessary tools and testing equipment required including noise level and vibration sensing equipment.
- C. Each equipment supplier's representative shall furnish to OWNER, through ENGINEER, a written report certifying that the equipment:
  1. Has been properly installed and lubricated;
  2. Is in accurate alignment;
  3. Is free from any undue stress imposed by connecting piping or anchor bolts;
  4. Has been operated under full load condition and that it operated satisfactorily to ENGINEER;
  5. That OWNER's Representative has been instructed in the proper maintenance and operation of the equipment; and
  6. Furnish OWNER a copy of all test data recorded during the installation check including noise level and vibration readings.

### 3.04 OPERATION AND MAINTENANCE TRAINING

- A. Provide services of manufacturer's service representative to instruct OWNER's personnel in operation and maintenance of equipment. Training shall include start-up and shutdown, servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance.
  - 1. Manufacturer's representative shall provide a minimum of 2 on-Site training sessions.
    - a. Two sessions for Maintenance personnel
  - 2. Review operating and maintenance data contained in the final approved operating and maintenance manuals.
  - 3. Schedule training with OWNER, provide at least 10-day prior written notice to ENGINEER and OWNER.

END OF SECTION

## SECTION 01650

### START-UP AND DEMONSTRATION

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. Scope of Work: Demonstrate to Owner and Engineer that the Work functions as a complete and operable system under normal and emergency operating conditions for each of the constructed sites of this contract. Each site shall undergo a separate start-up and demonstration period.
- B. Contractor shall provide all materials, personnel, equipment and expendables as needed and as specified to perform the required start-up and demonstration tests.
- C. Related Work Described Elsewhere:
  - 1. Progress Schedules: Section 01310.
  - 2. Instrumentation: Division 13.
  - 4. Electrical: Division 16.

#### PART 2 - PRODUCTS

##### 2.01 START-UP PLAN

- A. Submit for approval by the Engineer a detailed start-up plan outlining the schedule and sequence of all tests and start-up activities, including submittal of checkout forms, submittal of demonstration test procedures, start-up, demonstration and testing, submittal of certification of completed demonstration and training. Start-up and commissioning may not begin until the plan is approved by the Engineer.

#### PART 3 - EXECUTION

##### 3.01 COMPONENT TEST AND CHECK-OUT

- A. Start-up Certification: Prior to system start-up, successfully complete all the testing required of the individual components of the Work. Submit six (6) copies of check out forms for each individual component or piece of equipment, signed by the Contractor or the subcontractor and the manufacturer's representative. All copies of the Operation and Maintenance Manuals must be provided before start-up may begin. These forms shall be completed and submitted before Instruction in Operation to Owner or a request for initiating any final inspections. Insert one (1) copy of this form into the applicable section of each Operation and Maintenance Manual.
- B. Demonstrate to the Engineer and the Owner's representative, that all temporary jumpers and/or bypasses have been removed and that all of the components are operating under their own controls as designated.

- C. Coordinate start-up activities with the Owner's operating personnel and with the Engineer prior to commencing system start-up.

### 3.02 START-UP

- A. Confirm that all equipment is properly energized.
- B. Initiate start-up and training in accordance with the use of the operation and maintenance manuals.
- C. Observe the component operation and make adjustments as necessary to optimize the performance of the Work.
- D. Coordinate with Owner for any adjustments desired or operational problems requiring debugging.
- E. Make adjustments as necessary.

### 3.03 START-UP DEMONSTRATION AND TESTING (PER SITE, 3 TOTAL SITES)

- A. After all Work components have been constructed, field tested, and started up in accordance with the individual Specifications and manufacturer requirements, and after all Check-Out Forms have been completed and submitted, perform the Start-Up Demonstration and Testing. The demonstration period shall be held upon completion of all systems at a starting date to be agreed upon in writing by the Owner or his representative. Prior to beginning the start-up demonstration testing, the Contractor shall submit a detailed schedule of operational circumstances for approval by the Engineer. The schedule of operational circumstances shall describe, in detail, the proposed test procedures for each piece of equipment. Provide similar test procedure forms for each piece of equipment or section of the Work to include all particular aspects and features of that equipment or section of the Work and as specified in the Technical Sections of the Specifications.
- B. The Start-Up Demonstration Testing will be conducted for three (3) consecutive days. The Work must operate successfully during the three (3) day testing period in the manner intended. If the Work does not operate successfully, or if the start-up is interrupted due to other contracts, the problems shall be corrected and the test shall start over from day one. The party causing the interruption shall be subject to the assessment of actual damages due to delay.
- C. During the start-up demonstration period, operate the Work, instruct designated personnel in the function and operation of the Work, and cause various operational circumstances to occur. As a minimum, these circumstances will include performance standards, random equipment or process failures, interlocks and bypasses. Demonstrate the essential features of the equipment and its relationship to other equipment. The approved schedule of operational circumstances and demonstration test procedures will be used as the agenda during the Start-Up Demonstration Testing period for all equipment and sections of the Work. Coordination of the demonstration test schedule will be accomplished through the Engineer.
- D. Acceptability of the Work's performance will be based on the Work performing as specified under these actual and simulated operating conditions functioning as intended and as defined in the Contract Documents. The intent of the start-up demonstration and testing is for the Contractor to

demonstrate to the Owner and the Engineer that the Work will function as a complete and operable system under normal, as well as emergency operating conditions, and is ready for final acceptance.

- E. Demonstrate the essential features of all electrical and instrumentation systems including, but not limited to, the following as they apply to the work:
  - 1. Electrical system controls and equipment.
  - 2. Mechanical systems.
  - 3. Communications systems.
  - 4. Wiring devices.
    - a. Outlets: convenience, special purpose.
    - b. Switches: regular, time.
- F. Upon successful completion of the Start-up, Demonstration and Testing, the Owner's personnel will receive the specified training for each system. Training of the Owner's personnel will not be considered valid unless it takes place using a system that has successfully passed the Start-up, Demonstration and Testing.
- G. Upon completion of all specified operator training, the Contractor shall submit to the Engineer six (6) copies of the Certificate of Completed Demonstration Form, for each item of equipment or system in the Work, signed by the Contractor, Subcontractor, Engineer, and the Owner. Insert one (1) copy of this form in the applicable section of each Operation and Maintenance Manual. Samples of the Check Out Form and Certificate of Completed Demonstration Form are provided at the end of this Section.



Manufacturer's Representative Notations: Exceptions noted at time of check were:

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Manufacturer's Representative to note adequacy of related equipment that directly affects operation, performance or function of equipment checked. (No comment presented herein will indicate adequacy of related systems or equipment):

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**CERTIFICATE OF COMPLETED DEMONSTRATION FORM**

<input type="checkbox"/>	OWNER	<u>City of Owosso</u>	No. Copies	_____	CERTIFICATE OF COMPLETED DEMONSTRATION MEMO NO. _____
<input type="checkbox"/>	ENGINEER:	<u>Tetra Tech</u>	No. Copies	_____	
<input type="checkbox"/>	ARCHITECT:	_____	No. Copies	_____	
<input type="checkbox"/>	CONTRACTOR:	_____	No. Copies	_____	
<input type="checkbox"/>	FIELD:	_____	No. Copies	_____	
<input type="checkbox"/>	OTHER:	_____	No. Copies	_____	

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**PROJECT DATA**

**CONTRACT DATA**

NAME: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_  
 OWNER: \_\_\_\_\_  
 OTHER: \_\_\_\_\_

NUMBER: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 DRAWING NO: \_\_\_\_\_  
 SPECIFICATION  
 SECTION: \_\_\_\_\_

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**NOTE TO CONTRACTOR:**

Submit five (5) copies of all information listed below for checking at least one (1) week before scheduled demonstration of the Work. After all information has been approved by the Engineer, give the Owner a Demonstration of Completed Systems as specified and have the Owner sign five (5) copies of this form. After this has been done, a written request for a final inspection of the system shall be made.

**MEMORANDUM:**

This memo is for the information of all concerned that the Owner has been given a Demonstration of Completed Systems on the work covered under this Specification Section. This conference consisted of the system operation, a tour on which all major items of equipment were explained and demonstrated, and the following items were given to the Owner:

- (a) Owner's copy of Operation and Maintenance Manual for equipment or systems specified under this Section containing approved submittal sheets on all items, including the following:
  - (1) Maintenance information published by manufacturer on equipment items.
  - (2) Printed warranties by manufacturers of equipment items.
  - (3) Performance verification information as recorded by the Contractor.
  - (4) Check-Out Memo on equipment by manufacturer's representative.
  - (5) Written operating instructions on any specialized items.
  - (6) Explanation of guarantees and warranties on the system.
- (b) Prints showing actual "As-Built" conditions.

(c) A demonstration of the system in operation and of the maintenance procedures which will be required.

\_\_\_\_\_  
(Name of General Contractor)

By: \_\_\_\_\_  
(Authorized Signature, Title and Date)

\_\_\_\_\_  
(Name of Subcontractor)

By: \_\_\_\_\_  
(Authorized Signature, Title and Date)

Operation and Maintenance Manuals, Instruction Prints, Demonstration and Instruction in Operation Received:

\_\_\_\_\_  
(Name of Owner)

By: \_\_\_\_\_  
(Authorized Signature/Title/Date)

END OF SECTION

## SECTION 01730

### CUTTING AND PATCHING

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.
- B. Related Sections:
  - 1. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work. Requirements of this Section apply to mechanical and electrical installations. Refer to Division 15 and Division 16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
  - 2. Demolition of selected portions of the building for alterations is included in Section 02225.

##### 1.02 SUBMITTALS

- A. Cutting and Patching Proposed Method: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval from ENGINEER to proceed.

##### 1.03 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in ENGINEER's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance shall equal or surpass that of existing materials.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

### 3.02 PREPARATION

- A. Provide temporary support of Work to be cut.
- B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.03 PERFORMANCE

- A. Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- B. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- C. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
- D. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.
- E. Cap, valve or plug, and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.

- F. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

#### 3.04 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

## SECTION 01770

### CONTRACT CLOSEOUT

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Contract closeout including, but not limited to:
  - 1. Warranties and Bonds.
  - 2. Requirements for Substantial Completion.
  - 3. Project record document submittal.
  - 4. Equipment acceptance.
  - 5. Operating and maintenance manual submittal.
  - 6. Final cleaning.
- B. Refer to the General Conditions for terms of CONTRACTOR's special warranty of workmanship and materials.
- C. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.
- D. Certifications and other commitments and agreements for continuing services to OWNER are specified elsewhere in the Contract Documents.

##### 1.02 WARRANTY REQUIREMENTS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve CONTRACTOR of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with CONTRACTOR.
- B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.

- E. OWNER's Recourse: Written warranties made to OWNER are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which OWNER can enforce such other duties, obligations, rights, or remedies.
- F. Rejection of Warranties: OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- G. OWNER reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

### 1.03 SUBSTANTIAL COMPLETION

- A. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
  - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Price.
  - 2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
  - 3. Advise OWNER of pending insurance changeover requirements.
  - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
  - 5. Obtain and submit releases enabling OWNER unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
  - 6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, ENGINEER will either proceed with inspection or advise CONTRACTOR of unfilled requirements.
  - 1. ENGINEER will prepare the Certificate of Substantial Completion following inspection, or advise CONTRACTOR of construction that must be completed or corrected before the certificate will be issued.
  - 2. ENGINEER will repeat inspection when requested and assured that the Work has been substantially completed.
  - 3. Results of the completed inspection will form the basis of requirements for final acceptance.
- C. The warranty period for specific portions of the Work will begin on the date established on Component Acceptance Form or at such other date as agreed by OWNER, ENGINEER, and CONTRACTOR.

### 1.04 FINAL ACCEPTANCE

- A. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
  2. Submit an updated final statement, accounting for final additional changes to the Contract Price.
  3. Submit a copy of ENGINEER's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by ENGINEER.
  4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when OWNER took possession of and responsibility for corresponding elements of the Work.
  5. Submit consent of surety to final payment.
  6. Submit a final liquidated damages settlement statement.
  7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  8. Submit record drawings, maintenance manuals, final Project photographs, damage or settlement survey, property survey, and similar final record information.
  9. Deliver tools, spare parts, extra stock, and similar items.
  10. Make final changeover of permanent locks and transmit keys to OWNER. Advise OWNER's personnel of changeover in security provisions.
  11. Complete start-up testing of systems, and instruction of OWNER's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
- B. Reinspection Procedure: ENGINEER will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to ENGINEER.
1. Upon completion of reinspection, ENGINEER will prepare a certificate of final acceptance, or advise CONTRACTOR of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
  2. If necessary, reinspection will be repeated.

#### 1.05 REINSPECTION FEES

- A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
1. Contractor will compensate the Owner for such additional services.
  2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

#### 1.06 SUBMITTALS

- A. Submit written warranties to ENGINEER prior to the date certified for Substantial Completion. If ENGINEER's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of ENGINEER.
- B. When a designated portion of the Work is completed and occupied or used by OWNER, by separate agreement with CONTRACTOR during the construction period, submit properly executed warranties to ENGINEER within 15 days of completion of that designated portion of the Work.

- C. When a special warranty is required to be executed by CONTRACTOR, or CONTRACTOR and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to OWNER through ENGINEER for approval prior to final execution.
- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

#### 1.07 RECORD DOCUMENT SUBMITTALS

- A. Record Drawings:
  - 1. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown.
  - 2. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Drawings. The Record Drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master Record Drawings are the Contractor's representation of as-built conditions, including all revisions made necessary by addenda, change orders, RFIs, or other changes, and shall be maintained up-to-date during the progress of the Work.
  - 3. Mark whichever Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
  - 4. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the Record Drawings shall be updated indicating any portions which are superseded by change order drawings or final shop drawings including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.
  - 5. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
  - 6. Mark new information that is important to OWNER, but was not shown on Contract Drawings or Shop Drawings.
  - 7. Note related Change Order numbers where applicable.
  - 8. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.
- B. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work.
  - 1. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to ENGINEER for OWNER's records.
- C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section.

## PART 2 - PRODUCTS

NOT USED

## PART 3 - EXECUTION

### 3.01 COMPONENT ACCEPTANCE

- A. Component Acceptance Certificate: For each item of equipment incorporated into the Project, ENGINEER will issue a Component Acceptance Certificate as shown in Section 00625.
- B. The certificate will certify that the equipment installation is complete, that manufacturer-provided inspection and start-up services and training have taken place, and that OWNER has beneficial use of the equipment.
- C. The data on the Component Acceptance Certificate may be used to establish the time of beginning for the warranty period for that piece of equipment, if OWNER begins to use it at that time.

### 3.02 FINAL CLEANING

- A. General cleaning during construction is required by the General Conditions.
- B. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- C. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
  - 1. Remove labels that are not permanent labels.
  - 2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
  - 3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
  - 4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
  - 5. Clean Site, including landscape development areas, of rubbish, litter, and foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth even-textured surface.
- D. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
  - 1. Do not burn waste materials. Do not bury debris or excess materials on OWNER's property.
  - 2. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
  - 3. Remove waste materials from Site and dispose of in a lawful manner.

- E. Where extra materials of value remaining after completion of associated Work have become OWNER's property, arrange for disposition of these materials as directed.

END OF SECTION

**DIVISION 2**  
**SITE WORK**

## SECTION 02225

### SELECTIVE DEMOLITION

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Selective Demolition Work requires selective removal and off-Site disposal of following:
  - 1. Portions of building structure shown on Drawings or required to accommodate new construction.
  - 2. Removal of interior partitions marked "remove" on Drawings.
  - 3. Removal of doors and frames marked "remove" on Drawings. Removal of built-in casework marked "remove" on Drawings. Removal of existing windows shown as "bricked-in."
  - 4. Removal and protection of existing fixtures and equipment items shown or marked as "remove and salvage."
  - 5. Removal, protection, and reinstallation of existing fixtures and equipment items shown or marked as "remove and reinstall."
- B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections, apply to Work of this Section.

##### 1.02 DEFINITIONS

- A. Remove: Remove and dispose of items shown or scheduled. Discard demolished or removed items except for those shown to remain, those shown as reinstalled, those shown as salvaged, and historical items that are to remain OWNER's property.
  - 1. When equipment items are indicated for removal, all ancillary utilities, electrical items, concrete supports, and structural steel supports shall be completely removed unless indicated otherwise.
- B. Remove and Salvage: Items shown as "remove and salvage" remain OWNER's property. Carefully remove and clean salvage items; pack or crate to protect against damage.
- C. Remove and Reinstall: Remove items shown; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in same location or in location shown.
- D. Existing to Remain: Protect construction or items shown to remain against damage during selective demolition operations. When permitted by ENGINEER, CONTRACTOR may elect to remove items to suitable, protected storage location during selective demolition and properly clean and reinstall items in their original locations.

##### 1.03 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Proposed dust control measures.

2. Proposed noise control measures.
  3. Proposed haul routes between Site and disposal areas before commencing this Work.
- B. Submit Schedules listed below to OWNER.
1. Detailed sequence of selective demolition and removal Work, with starting and ending dates for each activity.
  2. Inventory list of removed existing equipment not reused in Contract Work. Submit lists to OWNER. OWNER to determine or select items for retention by OWNER.
  3. Inventory list of removed and salvaged items.
  4. Inventory list of OWNER-removed items.
  5. Interruption of utility service.
  6. Coordination for shutoff, capping, and continuation of utility services.
  7. Use of elevator and stairs.
  8. Detailed sequence of selective demolition and removal Work to ensure uninterrupted progress of OWNER's on-Site operations.
  9. Coordination of OWNER's continuing occupancy of portions of existing building and of OWNER's partial occupancy of completed Work.
  10. Locations of temporary partitions and means of egress.
- C. Inventory list of existing equipment to be removed and not reused in Work. OWNER to determine or select items for retention by OWNER.

#### 1.04 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Demolition operations shall comply with OSHA and EPA requirements and EPA notification regulations insofar as they apply to selective demolition Work under this Contract.
  2. Comply with hauling and disposal regulations of authorities having jurisdiction.
  3. If hazardous materials are found during selective demolition operations, comply with applicable paragraphs of General Conditions.
- B. Pre-Installation Meetings:
1. Do not close, block, or obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction.
    - a. Use alternative routes around closed or obstructed routes if required by governing regulations.
  2. Coordinate with OWNER's continuing occupation of portions of existing building, with OWNER's partial occupancy of completed new addition, and with OWNER's reduced usage during summer months.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Disassemble or cut large equipment items into smaller pieces to promote safe removal and transportation.
1. Transport and unload items requested by OWNER at designated Site within distance of 5 miles.
  2. Haul away and dispose of debris and materials neither retained by OWNER, nor reused or reinstalled.
  3. Arrange for disposal areas.

4. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
- B. Unloading Salvage Items: Where shown on Drawings as "Remove and Salvage," carefully remove shown items, clean, store, and turn over to OWNER and obtain receipt. OWNER will designate site for receiving items.
  - C. Handling: CONTRACTOR shall take every precaution to prevent spillage of materials being hauled in public streets.
    1. It shall be CONTRACTOR's responsibility to immediately clean spillage that may accidentally occur.
    2. Do not burn removed material on or within Project Site.

#### 1.06 PROJECT CONDITIONS

- A. Materials Ownership:
  1. Salvage Materials: Demolished materials shall become CONTRACTOR's property, except for items or materials shown as reused, salvaged, reinstalled, or otherwise shown to remain OWNER's property. Remove demolished material promptly from Site with further disposition at CONTRACTOR's option.
  2. Historical artifacts, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other articles of historical significance remain property of OWNER. Notify OWNER's Representative when these items are found and obtain method of removal and salvage from OWNER.
  3. Transport items of salvageable value to CONTRACTOR (CONTRACTOR's area) as they are removed. Storage or sale of demolition items on-Site is not allowed.
- B. Environmental Requirements: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations relating to environmental protection. Do not use water when it may create hazardous or objectionable conditions including ice, flooding, and pollution.
- C. Existing Conditions: OWNER will be continuously occupying building areas immediately adjacent to selective demolition areas.
- D. OWNER assumes no responsibility for actual condition of items or structures scheduled for selective demolition.
- E. OWNER will maintain conditions existing at Contract commencement insofar as practical. However, variations within structure may occur by OWNER's removal and salvage operation before selective demolition Work begins.
- F. Asbestos presence is unknown within buildings to be selectively demolished. If asbestos presence is suspected or confirmed, notify OWNER's Representative prior to disturbing suspected material.
  1. Do not disturb asbestos or any material suspected of containing asbestos except under procedures specified in General Conditions.

#### 1.07 SEQUENCING

- A. Conduct selective demolition Work in manner that minimizes need for disruption or interference of OWNER's normal on-Site operations.
  - 1. Existing sodium hexametaphosphate system shall remain operational until new chemical system is tested and approved and coordinated with OWNER.
- B. Coordinate with OWNER's continuing occupation of portions of existing building, with OWNER's partial occupancy of completed new addition and OWNER's reduced usage during summer months.
- C. Include coordination for shutoff, capping, and continuation of utility services together with details for dust and noise control protection to ensure uninterrupted on-Site operations by OWNER.

#### 1.08 SCHEDULING

- A. Schedule: Submit schedule showing proposed methods and sequence of operations for selective demolition Work to OWNER's Representative for review before commencement of Work.
- B. Arrange selective demolition schedule so as not to interfere with OWNER's on-Site operations.
- C. Give minimum of 72 hours advance notice to OWNER of demolition activities which affect OWNER's normal operations.
- D. Give minimum of 72 hours advance notice to OWNER if shutdown of service is necessary during changeover.

#### PART 2 - PRODUCTS

NOT USED

#### PART 3 - EXECUTION

##### 3.01 EXAMINATION

- A. Site Verification of Conditions: Before beginning selective demolition Work, inspect areas of Work. Survey existing conditions and correlate with requirements shown to determine extent of selective demolition required. Photograph existing structure surfaces, equipment, or surrounding properties which could be misconstrued as damage resulting from selective demolition Work. File with OWNER's Representative before starting Work.
- B. Inventory and record condition of items scheduled as "remove and re-install" or items scheduled as "remove and salvage."
- C. Verify disconnection and capping of utilities within the affected area of Work.
- D. If unanticipated mechanical, electrical, or structural elements conflict with intended function or design, investigate and measure nature and extent of conflicts. Promptly submit detailed written

reports to OWNER's Representative. Pending receipt of the directive from OWNER's Representative, rearrange selective demolition schedule to continue general job progress without delay.

### 3.02 UTILITY SERVICES

- A. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
- B. Maintain existing utilities shown as remaining. Keep in service and protect existing utilities against damage during selective demolition operations.

### 3.03 PREPARATION

- A. Drain, purge, or remove, collect and dispose of chemicals, gases, explosives, acids, flammable, or other dangerous material before proceeding with selective demolition operations.
  - 1. Existing chemical storage and feed systems shall remain operational until startup of new system. OWNER will feed as much stored liquid phosphate product as possible prior to startup of new system. Remaining liquid sodium hexametaphosphate and liquid poly-orthophosphate product may be landfill disposed. Under no circumstances shall any chemical be disposed to surface waters, sanitary sewer, or wastewater treatment plant.
  - 2. OWNER will remove existing solid sodium hexametaphosphate.
- B. Cover and protect furniture, equipment, and permanent fixtures from soiling or damage while demolition Work is done in rooms or areas where items remain in place.
- C. Protect existing finish Work that remains in place and becomes exposed during selective demolition operations.
- D. Protect floors with suitable coverings when necessary.
- E. Where selective demolition occurs immediately adjacent to occupied portions of building, or to separate areas of noisy or extensive dirt or dust operations, construct and maintain temporary, insulated, fire-rated solid dustproof partitions.
  - 1. Construct dustproof partitions of minimum 4-inch studs, 5/8-inch-thick drywall (joints taped on occupied side), 1/2-inch fire-retardant plywood on demolition side, and fill partition cavity with sound-deadening insulation.
  - 2. Equip partitions with dustproof doors and security locks if required.
- F. Provide weatherproof closures for exterior openings resulting from selective demolition Work. Provide temporary weather protection during interval between selective demolition and removal of existing construction on exterior surfaces, and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
- G. Provide and ensure free and safe passage of OWNER's personnel and general public to and from occupied portions of building around selective demolition areas.
  - 1. Provide temporary barricades and other forms of protection to protect OWNER's personnel and general public from injury.
  - 2. Build temporary covered passageways required by authorities having jurisdiction.

- H. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of demolished structures or elements, or adjacent facilities or Work to remain.
- I. Cease operations and notify OWNER's Representative immediately if safety of structure seems endangered. Take precautions to support structure until determination is made for continuing operations.
- J. Remove protection at completion of Work.

### 3.04 DEMOLITION

- A. Special Techniques: Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- B. Demolish foundation walls to depth of not less than 12 inches below proposed ground surface. Demolish and remove below-grade wood or metal construction. Break up below-grade concrete slabs.
- C. For interior slabs on grade, use power saw or removal methods that do not crack or structurally disturb adjacent slabs or partitions.
- D. Completely fill below-grade areas and voids resulting from selective demolition Work. Either:
  - 1. Provide fill consisting of approved earth, gravel, or sand.
  - 2. Fill shall be free of trash, debris, stones over 6-inch diameter, roots, or other organic matter.OR
  - 3. Fill below-grade areas and voids with Class F concrete.
- E. Explosives: Use of explosives is not allowed.
- F. Interface with Other Work: Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
- G. Site Tolerances: Provide services for effective air and water pollution controls required by local authorities having jurisdiction.

### 3.05 REPAIR\RESTORATION

- A. Repair damages caused by demolition that was more extensive than required.
- B. Return structures and surfaces to condition existing before commencement of selective demolition Work.
- C. Repair adjacent construction or surfaces soiled or damaged by selective demolition Work.

- D. Promptly repair damages caused to adjacent facilities by selective demolition Work at no cost to OWNER.

### 3.06 CLEANING

- A. CONTRACTOR shall maintain an order of neatness and good housekeeping comparable to that observed by OWNER.
- B. Keep tools, scaffolding, and other demolition equipment in neat and orderly arrangement.
- C. Remove dirt and debris resulting from CONTRACTOR's demolition operations from Site daily. Dirt and debris shall not collect or interfere with OWNER's facility operations.
- D. Upon completion of selective demolition Work, remove tools, equipment, and demolished materials from Site. Remove protection and leave interior areas broom clean.

END OF SECTION

**DIVISION 3**  
**(NOT USED)**

**DIVISION 4**  
**(NOT USED)**

**DIVISION 5**  
**(NOT USED)**

**DIVISION 6**  
**(NOT USED)**

**DIVISION 7**  
**(NOT USED)**

**DIVISION 8**  
**(NOT USED)**

**DIVISION 9**  
**(NOT USED)**

**DIVISION 10**  
**(NOT USED)**

**DIVISION 11**  
**(NOT USED)**

**DIVISION 12**  
**(NOT USED)**

**DIVISION 13**  
**SPECIAL CONSTRUCTION**

## SECTION 13410

### BASIC INSTRUMENTATION REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: General administrative and procedural requirements for instrumentation installations. Administrative and procedural requirements are included in this Section to expand on requirements specified in Division 1.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Sections 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product data for each product specified.
  - 2. Wiring diagrams, both elementary and schematic, differentiating between manufacturer installed and field-installed wiring.
  - 3. Digital Systems: Provide the following:
    - a. Digital equipment layouts of input and output racks showing complete module model number and addressing assignment. Layouts of port pin assignment, connection schematic indicating cable types and port addresses.
- B. Record Drawings: At Project closeout, submit record drawings of installed products, in accordance with requirements of Section 01770.
  - 1. Where Drawings are drafted by computer equipment, CONTRACTOR shall furnish files on a disk. These Drawings shall include changes made by Field Orders, Change Orders, Addenda, and errors discovered during start-up and acceptance.
  - 2. Drawings shall include terminal numbers at each wiring termination and piping termination. A complete system diagram shall be included.
- C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section.
  - 1. Instructions shall be short, easy-to-understand directions specifically written for this Project describing various possible methods of operating equipment. Instructions shall include procedures for tests required, adjustments to be made, and safety precautions to be taken with equipment. These documents are to be submitted to ENGINEER's office.
  - 2. Provide 1 complete set of manufacturer's documentation covering programmable equipment supplied. Include hardware manuals and prints as manufacturer normally ships with programmable equipment.
- D. Warranty: Submit in accordance with requirements of Section 01770, warranties covering the items included under this Section.

### 1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment, of types and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Codes and Standards:
  - 1. National Electric Code.
  - 2. Applicable State and local requirements.
  - 3. UL listing and labeling shall be adhered to.
- C. Equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that equipment furnished has been manufactured in accordance with National Electric Code and OSHA requirements.
- D. CONTRACTOR shall provide permits and licenses, observe and abide by applicable laws, regulations, ordinances, and rules of State, territory or political subdivision thereof, wherein the Work is done. CONTRACTOR shall pay fees for permits, inspections, licenses, and certifications when such fees are required.
- E. Calibration Equipment and Testing Apparatus: Equipment supplier shall have available test and calibration equipment for factory panel tests, installation, start-up, service contract, and maintenance or troubleshooting purposes.
  - 1. The equipment required for these tests is as follows:
    - a. Two - Digital Multimeters with an accuracy of plus or minus 0.1 percent.
- F. Component Requirements: For the purposes of uniformity and conformance to industry standards, signal transmission modes shall be either electronic 4-20 mA DC or pneumatic 3-15 psi only. No other signal characteristics are acceptable, except for remote temperature detector (RTD) and thermocouple (TC) sensing circuits; 4-20 mA DC signals shall be such that devices may be wired in parallel for 1-5 volt DC as required. 1-5 volt DC mode shall be employed only within control panel enclosures.
- G. Responsibility and Coordination: Drawings and Specifications are intended to include details of a complete equipment installation for purposes specified. CONTRACTOR shall be responsible for details which may be necessary to properly install, adjust, and place in operation complete installation. Any error on Drawings or in Specifications which prevents proper operation of supplied system shall be shown correct at time of Shop Drawing submittal for approval or brought to attention of ENGINEER with or prior to submittal.
- H. CONTRACTOR shall be responsible for costs incurred to correct aforementioned errors brought to ENGINEER's attention. CONTRACTOR shall assume full responsibility for additional costs which may result from unauthorized deviations from Specifications.

## 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Manufactured material shall be adequately packed to prevent damage during shipping, handling, storage, and erection. Material shipped to Site shall be packed in a container properly marked for identification. Blocks and padding shall be used to prevent movement.
- B. CONTRACTOR shall inspect the material prior to removing it from carrier. If damage is observed, CONTRACTOR shall immediately notify carrier so that a claim can be made. If no such notice is given, material shall be assumed to be in undamaged condition; any subsequent damage that occurs to the equipment shall be the responsibility of CONTRACTOR. Repair and replacement of damaged parts will be done at no expense to OWNER.
- C. CONTRACTOR shall be responsible for any damage charges resulting from handling of materials.

## PART 2 - PRODUCTS

### 2.01 EQUIPMENT SUPPLIERS

- A. Subject to compliance with specified requirements, equipment suppliers shall be the following (no "or equals"):
  - 1. Commerce Controls Inc.
  - 2. West Michigan Instrumentation Systems Inc.
- B. References made in these Specifications to specific manufacturer's products are intended to serve as a guide to type, construction, and materials. Listing of a manufacturer does not imply acceptance by ENGINEER of a manufacturer's particular product, product line, or latest product revision if it does not meet Specifications.
- C. Equipment Supplier: Equipment specified under Sections 13413 through 13899 and shown on Drawings shall be designed as a system, fabricated or purchased, shipped to Site, and started up by one of the qualified and approved equipment suppliers listed under this Section. Intent is for unit responsibility.
  - 1. Equipment supplier shall not assign any of its rights or delegate any of its obligations under these Sections without prior written acceptance by ENGINEER.
  - 2. Direct purchase of any items in these Sections by CONTRACTOR is not in compliance with this Specification and will not be permitted.
    - a. Project Engineer/Project Manager's name shall be forwarded to CONTRACTOR and ENGINEER within 30 days after receipt of a purchase order by equipment supplier.
    - b. Project Engineer/Project Manager shall be focal point for design, fabrication, Contract communications, and shall be responsible for start-up and acceptance. Project Engineer/Project Manager shall be at factory test at Site for start-up and at the Site during entire acceptance procedure. Only qualified and approved equipment suppliers shall be accepted as meeting this Specification.

### 2.02 EQUIPMENT

- A. Transmitted electronic signals to equipment of other vendors and between control panels shall be a separate isolated-floating output for each item of equipment and shall conform to ISA Standard S50.1.
- B. Enclosures shall be NEMA 1, 4, 4X, or 7 as indicated on Drawings. Intrinsically safe systems, as approved by Factory Mutual, shall be furnished when called for.
- C. No external power connections shall be allowed unless specifically called for in Specification. Where an external power source is called for, unit shall accept 120 VAC, plus or minus 10 percent power.
- D. Current-to-current converters shall be used as power boosters to provide sufficient signal power as required. It is equipment supplier's responsibility to determine under what circumstances and locations power boosters are required, provide them, and integrate them into the instrumentation system to make system function properly.
- E. Separate power supplies shall be totally enclosed with solderless terminals for connections. They shall be short circuit current limiting type that will automatically resume regulation after removal of short circuit. They shall operate from 120 volt AC, plus or minus 10 percent power. Regulated voltage shall be fixed. Units with internal trim potentiometers will be accepted.
  - 1. Pneumatic instruments shall have an input and output range of 3-15 psig. Units shall require a 20 psi supply. Provide an air set for each pneumatic unit or for each 20 psi manifold. Bubbler air sets, regulators, valves, etc., must be factory assembled on a subplate as specified and detailed.
  - 2. Instruments shall be panel-mounted or enclosed for wall mounting as shown on Drawings.
- F. Size and style of instruments are defined in Specifications. Pneumatic panel-mounted units shall match in appearance similar electronic components.
- G. Charts and scales are shown on Drawings. Standard scales shall not be accepted without ENGINEER's approval if it differs from those shown. Ratio station scales and other scales shall be graduated such that major graduations fall on whole numbers (i.e., 1, 2, 3, or 5, 10, 15, etc.) and minor graduations fall on 0.1 or 0.2 intervals (i.e., 1.1, 1.2 or 11, 12, etc.). If two scales are called for on ratio stations, each scale shall be indexed to meet Specification. Drawing of each scale for ratio stations shall be submitted with Shop Drawings for approval.
- H. Solid-state output switches, where used, shall be overvoltage transient protected and not be damaged by  $di/dt$  or  $dv/dt$  for their design application under this Contract.
- I. Instruments shall be equipped with permanently attached identification tag. Tag shall be included on field- and panel-mounted devices. Tags shall include ENGINEER's tag identification and manufacturer's tag identification if different from ENGINEER's.
  - 1. Tags shall be either stamped metal or laminated phenolic with white letters engraved on a black background. Field-mounted devices shall have tags fastened with screws. Devices mounted in panels will be tagged inside panel on subplates or on device itself where it can be easily read.
- J. Finish on instruments and accessories shall provide protection against corrosion by elements in environment in which they are to be installed. Both the interior and exterior of enclosures shall be

finished. Extra paint of each color used on material shall be provided by manufacturer for touch-up purposes.

- K. Provide equipment identification nameplates complying with Section 16075. Nameplates shall contain ENGINEER's item designation and, for indicators and transmitters, design range and units of device shown.

## 2.03 SOURCE QUALITY CONTROL

- A. PLCs, operator interface computers, touch screen computers, and associated control panels shall be tested at the factory prior to shipment to the Site. ENGINEER is to be given 6 weeks notice before the factory test date; ENGINEER will witness the tests. The purpose of factory testing is to verify correct functioning of equipment and conformity to Project requirements before shipment
- B. Once the PLCs, etc., are connected at the equipment supplier's factory, and it has been demonstrated that the equipment properly communicates, the panels shall remain at the supplier's facility for 5 weeks to allow ENGINEER to check out the ENGINEER developed plc software and operator interface software.
- C. Test Procedures:
  - 1. Hardware testing to verify system wiring, layout, workmanship, and appearance. Demonstrate correct function of inputs and outputs using a switch and lamp "mimic board." Perform a PLC load test to verify that outputs can be driven at full load simultaneously.
  - 2. Control logic tests begin with loading ENGINEER-developed ladder logic software. Control logic and sequences shall be tested and verified using a switch and lamp "mimic board."
  - 3. Operator interface integration test builds upon previously completed phases by exercising entire system from the operator interface computer(s).
- D. At completion of tests, system shall remain intact for a period of at least 2 weeks for ENGINEER's use correcting software errors found during the course of test.
- E. Schedule factory test not before 12 weeks after Shop Drawing status of deliverable items under this Section is either N.E.T. or F.A.C.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Equipment provided under this Section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations of equipment manufacturer as approved by ENGINEER.
- B. Install equipment as indicated, in accordance with manufacturer's written instruction, and in compliance with recognized industry practices to ensure that products fulfill requirements.

- C. Elements that are supported by plumbing or piping, or that have only plumbing or piping connections shall be installed under those Sections.
- D. Plumbing, piping, or pneumatic signal connections to elements requiring such connections shall be made under those Sections. Control panels shall be installed in accordance with Division 16 Sections, with piping connections to control panels installed under Division 15 Sections.
- E. Drawings are not intended to show every detail of construction or location of piping, ductwork, or equipment. Where proper operation or construction makes it necessary or advisable to change location of piping, instrumentation equipment, air ducts, or other equipment, CONTRACTOR shall so inform ENGINEER for his approval and permission.

### 3.02 FIELD QUALITY CONTROL

- A. Calibrate equipment in accordance with manufacturer's instructions to ranges or set points indicated on Drawings.
- B. Installation and Start-up: Equipment supplier shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call. Such a service facility shall be no more than 6 hours travel time from Site.
  - 1. Equipment supplier shall provide an experienced, factory-trained, competent, and authorized service representative for a minimum of 3 times at Site, including once during installation and start-up and once during acceptance to inspect, check, and calibrate any part of system. Supplier's service representative shall revisit Site for 8 hours per day as often as necessary after installation until trouble is corrected and equipment has passed acceptance test and is operating satisfactorily to ENGINEER.
  - 2. Third trip is after equipment has been accepted and shall be used to instruct OWNER's personnel in aspects of operation and maintenance, such as fuse locations, use of controls, instruction manuals, etc. Third trip shall be for duration of two, 8-hour days at OWNER's facility.
- C. Equipment supplier shall provide two, 8-hour days of training for OWNER's personnel in aspects of operation and maintenance such as use of controls, fuse locations, instruction manuals, etc.
  - 1. Training and instructions at the plant shall be given by the Project Engineer assigned to the Project by the equipment supplier or other personnel as approved by ENGINEER.

### 3.03 DEMONSTRATION

- A. Upon completion of installation and calibration, demonstrate functioning of equipment in accordance with requirements. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new or repaired units, and retest to demonstrate compliance.

END OF SECTION

## SECTION 13430

### CONTROL PANELS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes:
1. Control panels and consoles.
  2. Switches, push-buttons, lights.
  3. Relays.
  4. Intrinsically safe isolator relays.
  5. Timing devices.
  6. Terminal blocks.
  7. Control power transformers.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Sections 01330 and 13410, Shop Drawings covering the items included under this Section.

##### 1.03 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Codes, Ordinances, and Industrial Standards: Design, testing, assembly, and methods of installation for materials, electrical equipment, and accessories proposed under this Section shall conform to National Electric Code and to applicable State and local requirements.
  2. UL listing and labeling of custom-built panels (UL 508) shall be adhered to under this Contract.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
1. Switches, Push-Buttons, Lights:
    - a. Allen-Bradley (Type 800MR).
    - b. American Solenoid Company.
    - c. Arrow Hart (Type OB).
    - d. Electroswitch.
    - e. Microswitch (Series PW).
  2. Relays:
    - a. Potter-Brumfield (Type KUP).
    - b. Schrack North America, Inc. (Type CAD).
    - c. Square D Co. (Type KU).
    - d. Rockwell.
  3. Intrinsically Safe Isolator Relay:

- a. B/W Controls, Inc.
- b. MTL, Inc.
- c. R. Stahl, Inc.
- d. Symcom, Inc.
- e. Warrick Controls.
- 4. Solid-State Timers:
  - a. ATC (Series 306D).
  - b. Eagle Signal (Type DG100).
- 5. Terminal Blocks:
  - a. Allen-Bradley (Type 1492F1 or Type 1492CA1).
  - b. Altech (Type CTS4U-N).
  - c. Square D Co. (Class 9080, Type KCA-1).
  - d. Thomas & Betts (100 series or 200 series).
  - e. Weidmueller (SAKD2.5N or SAK2.5).
- 6. Fusible Terminal Blocks:
  - a. Allen-Bradley (Type 1492-H6)
- 7. Textured Polyurethane Enamel:
  - a. Sherwin-Williams, Polane T and/or Polane HST.
- 8. Wire Markers:
  - a. Brady.
  - b. T&B.
  - c. Westline.
- 9. Control Power Transformers:
  - a. Acme
  - b. Sola MCR

## 2.02 CONTROL PANELS

### A. Sheet Metal Construction:

1. Panels shall be fabricated from sheet steel welded and bolted into a rigid self-supporting structure a maximum of 90 inches high and a minimum of 20 inches deep or as shown on drawings. Overall length shall be coordinated with space requirements as indicated by Drawings. Changes in length from that shown on Drawings must be brought to attention of ENGINEER within 90 days of Contract Award. Cost to modify floor plan or wall opening shall be at CONTRACTOR's expense after this 90-day period. Panel face layouts shown on Drawings are intended to indicate relative position of all components. Supplier shall fix exact locations and overall dimensions to meet requirements of its equipment.
2. Panel and console bodies shall be 12 gauge minimum steel for panels up to 42 inches in width, and 10 gauge minimum steel for panels exceeding 42 inches in width. Panel subplates shall be same gauge as enclosure. Stiffening members shall be provided for strength and stiffness as required.
3. A minimum of 3 inches shall be provided between edge of panel subplate and outside walls of panel body to ensure adequate wire-way space for external wires entering panel. Panel subplate shall be mounted on collar studs for easy removal. Print pockets shall be provided on each panel. Brackets welded to inside of panel, complete with lights, shall be provided on panels where indicated by Drawings.
4. Identification plates shall be laminated phenolic with white letters engraved on a black background and mounted with screws or double-back adhesive foam tape.
5. All components inside panel shall have identification plates. This includes instruments, relays, switches, circuit boards in plug-in racks, etc. Identification plates shall include engineering

symbols (FBQ-1, SW-3, FIC-4, CR-1, etc.). Switches and circuit breakers inside panel shall have names (Horn, Audio Tone, Panel Power, etc.) on identification plates as well as engineering symbol.

6. Identification plates shall be located on or adjacent to device they are identifying and shall be readable without looking around, under, or on top of device to find identification plate.

B. Access:

1. Wall- and/or floor-mounted control panels shall have continuous piano-hinged doors for ease of access. Door openings shall expose a minimum of 80 percent of panel interior. Door openings shall be sealed with a 0.125-inch thick minimum cellular neoprene gasket cemented with oil-resistant adhesive and held in place with a retaining strip. Print pockets shall be provided on each door. Two door enclosures shall have a removable center post. Panel doors less than 40 inches high shall be equipped with a 2-point latching mechanism. Panel doors 40 inches high or more shall be equipped with a 3-point latching mechanism.
2. Components and terminals shall be accessible without removing another component except covers. Swing out sections shall be used if mounting space is required that is not normally accessible.
3. Panels shall have open bottoms except where structural members are required.

C. Finish:

1. Panel face openings for mounting equipment shall be smoothly finished cut with counterboring and trim strips provided as required to give a neat finished appearance. Bezels shall be used on all front panel-mounted devices to cover panel cutouts. A chrome-plated or stainless steel bezel shall be used at parting line of panels that have shipping splits or at parting line of panels placed end to end.
2. Graphic plates, when used, shall be fastened to panel frame with fasteners not visible from front of graphic.
3. After fabrication, panel surfaces shall be given a phosphatizing treatment inside and out, and then finished with 2 coats of textured polyurethane enamel. Panel interior shall be painted white, ANSI No. 51. Exterior color will be selected by ENGINEER.
4. Panels shall have identical exterior finishes as selected by ENGINEER. Panel finishes on matching colored panels shall be identical. It is supplier's responsibility to achieve this result, especially for panels fabricated in different shops.

D. Pneumatics:

1. Interior panel piping shall be grouped, supported, and terminated at bottom of panel at bulkhead fittings unless indicated otherwise. Terminations shall be clearly tagged.
2. Tubing shall be color-coded per ISA RP7.2. Pneumatic systems shall be tested per ISA RP7.1.

E. Electrical:

1. Internal panel wiring shall be 19 strand No. 16 AWG, 90°C MTW, Class C stranded, or THHN/THWN approved as 90°C MTW. All panel wiring not run in wire ducts shall be bundled and tied. Each wire shall be identified at both ends with same exclusive number. Number shall be same number shown on control schematic. Number shall not be used again for any other purpose. Wires marked differently on each end will not be accepted. Wire markers shall be provided on end of each wire at termination point.
2. Control wiring associated with control circuits de-energized when main disconnect is opened shall be color-coded red. Control wiring associated with control circuits which remains "hot" when main disconnect is opened shall be color-coded yellow. DC control wiring shall be color-

coded blue. Ground wires shall be color-coded green. Terminal blocks shall be numbered in numerical order. Yellow wiring leaving panel shall be brought to an isolated set of terminal blocks.

3. Provide an instrument common bus 0.1 by 0.5 by 6-inch minimum in enclosure and isolated from enclosure. A separate instrument common wire shall be run from each common terminal on an instrument to instrument common bus. Instrument common wires looped from one terminal to another and then to instrument common bus will not be accepted.
4. Instrument common bus shall be connected to power supply common with a wire or wire braid strap as short as practical and of sufficient capacity to prevent troublesome voltage drop. Common terminals and common bus for instrument common shall be tagged "Instrument Common." Instrument signal wires of 4-20 mA or 1-5V shall be shielded wire. Telephone wires and telemetry equipment interconnection wires shall be shielded wires.
5. Provide a copper ground bus 0.1 by 0.5 by 6-inch minimum in enclosure to which all instrument grounds and panel enclosure are tied. Separate ground wire shall be run from instrument enclosure ground terminal directly to ground bus. Instrument ground wires looped from one instrument to another will not be accepted. Under no circumstances shall neutral side of power source or any other terminals used for grounding power circuits be used as an instrument common.
6. Wires to internal components shall be connected to inside of terminal strip. Wires to external components shall be connected to outside of terminal strip. No more than 2 wires shall be connected to one terminal point.
7. Panel wire duct shall be provided between each row of components and adjacent to each terminal strip. Wire ducts shall be a minimum of 1-inch wide and 3 inches deep with removable snap-on covers and perforated walls for easy wire entrance. Wire ducts shall be constructed of nonmetallic materials with a voltage insulation in excess of maximum voltage carried therein.
8. Floor-standing panels and consoles shall be equipped with a flange mounted 600V rated main non-automatic trip circuit breaker or disconnect switch. Single phase, 60 hertz power at voltage shown on Drawings shall be supplied to main disconnect. Panel fabricator shall provide any additional voltages and power requirements at control panel to meet requirements of equipment contained therein.
9. Disconnect and transformer shall have enclosed protected terminations to prevent accidental shock.
10. Relays, timers, etc., installed on panel subplate shall be provided with a minimum spacing between component and wire duct of 1.5 inches above and 1 inch below. Minimum spacing between adjacent components shall be 0.25 inch. Relays, timers, etc., shown in schematics are intended to show function. Additional relays may be required in conjunction with items shown to provide total number of contacts required. Where limit, pressure, float switches, etc., are used and more than SPDT contacts are indicated by schematics, provide additional contacts required by using auxiliary relays. However, if a DPDT switch is called for, using a SPDT with a relay will not be accepted. All control and pilot devices such as relays, timers, etc., shall be 120V, 3 amp rated except where noted with coil voltage as required. One N.O. spare contact shall be provided on each relay.

F. Panel/Subplate Layout:

1. Panel face-mounted equipment shall consist of pilot lights, push-buttons, selector switches, meters, indicating timer, etc. Spacing between horizontal rows of components shall be 1.5 inches minimum; spacing between vertical columns of components shall be 1.875 inches minimum. Components shall be grouped and/or located as indicated on Drawings. Distance from bottom row of components to floor shall be not less than 36 inches. Top row of recording and indicating instruments shall be centered approximately 60 inches above floor. Maximum

height for annunciator windows shall be 85 inches above floor. In general, indicating lights, push-buttons, etc., shall be mounted in accordance with sequence of operation from left to right and top to bottom.

2. A minimum of 2 inches shall be provided between terminal strips and wire ducts or terminal strips and terminal strips. In general, terminal strips shall be mounted on vertical edges of subplate. Where terminal strips are mounted side-by-side, terminals shall be elevated 1.5 inches above subplate to allow wires to pass underneath.
3. Subplates shall have a minimum of 15 percent spare mounting space, and terminal strips shall have a minimum of 20 percent spare terminal blocks.

### 2.03 SWITCH, PUSH BUTTONS, LIGHTS

- A. Selector switches shall be 120 VAC rated, oil-tight construction with standard operator knob.
- B. Start push buttons shall be 120 VAC rated, oil-tight construction with extended guard and black color insert.
- C. Stop push-buttons shall have a half-guard with red color insert. Contacts shall be rated NEMA B-150 and P-150.
- D. Pilot lights shall be push-to-test oil-tight construction with cap colors and voltages as required. Nameplates for each switch and light shall conform to manufacturer's series and type with engraving as called for on Drawings.

### 2.04 RELAYS

- A. Control Relays: Switching and output relays shall be plug-in type with contacts rated 120 VAC, 3 amp with 120 VAC or 24 VDC coil, indicating light, manual operator, and plastic transparent cover. Relays shall have a retainer mechanism to prevent loosening from vibration. Relays shall not be used for switching 1-5 VDC or 4-20 mA signals associated with instruments.
- B. Intrinsically Safe Isolator Relay:
  1. Intrinsically safe relay shall be provided between raw sewage floats and control circuits or where shown on Drawings.
  2. Relay shall operate at 120 VAC plus 10 percent with a switch rating of 1 amp rms and maximum holding current of 20 milliamp for solid-state devices. Relay shall be rated for ambient temperatures of 32 degrees F to 120 degrees F.
  3. Output shall be N.O. or N.C. Equipment supplier is responsible for choosing proper output for float specified and circuits specified. If float and circuit are not defined, intrinsically safe relay shall be of such a polarity as to fail in a safe condition for function being performed.
  4. When intrinsically safe relay is required in panels exposed to outdoor temperatures, relays shall be rated for ambient temperatures of -40 to 120 degrees F, or thermostatically controlled heaters must be added to panel to maintain an ambient in panel of 32 to 120 degrees F.

### 2.05 TIMING DEVICES

- A. Solid-state timers shall be plug-in type.

- B. Solid-state timers with ON or OFF delay cycles shall operate at 120 VAC, 60 hertz. Solid-state device may be analog or digital in operation. Time interval shall be as shown on Drawings or as required.
- C. Solid-state repeat cycle timers with adjustable ON-OFF cycles shall operate at 120 VAC, 60 hertz. Solid-state device may be analog or digital in operation. Time interval shall be as shown on Drawings or as required.

## 2.06 TERMINAL BLOCKS

- A. Terminal blocks shall be 300 or 600 volt rated, channel-mounted box lug with pressure plate type or binding head screw type with pressure plate, and shall have a white marking strip. Terminal blocks shall be color-coded according to the following coloring scheme:
  - Black 120V power circuits de-energized when main disconnect is opened.
  - White 120V neutral conductors.
  - Red 120V control circuits de-energized when main disconnect is opened.
  - Yellow 120V control circuits which remain hot when main disconnect is opened.
  - Blue Terminal blocks for DC wiring.
  - Gray Terminal blocks for shields in DC wiring.
  - Green Ground terminal blocks.
- B. For terminals associated with 120V nonisolated input cards, individually fused terminal blocks shall be used for 120V power to field devices.
- C. Provide a minimum of 20 percent spare terminals for each type and color of terminal used. All terminals of a given color shall be grouped with other terminals of the same color.

## 2.07 CONTROL POWER TRANSFORMERS

- A. Control power transformers shall be sized to handle in-rush currents and to accommodate continuous load of circuits plus 25 percent future load with 5 percent or less voltage drop. Transformer primary voltage shall be as indicated on Drawings.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Examination, Installation, Field Quality Control, Demonstration: In accordance with Section 13410.

END OF SECTION

**DIVISION 14**  
**(NOT USED)**

**DIVISION 15**  
**(NOT USED)**

**DIVISION 16**  
**ELECTRICAL**

## SECTION 16050

### BASIC ELECTRICAL REQUIREMENTS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: General administrative, procedural requirements, and installation methods for electrical installations specified in Division 16.
- B. The Drawings are schematic and are not intended to show every detail of construction.
  - 1. In general, conduits/raceways, transitions and offsets shown on Drawings indicate approximate locations in plan and elevation where the systems are intended to be run.
  - 2. CONTRACTOR shall fully coordinate electrical Work with other trades to avoid interferences.
  - 3. In the event of interferences, CONTRACTOR shall request clarification from ENGINEER in writing.
- B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections, apply to Work of this Section.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with requirements of Section 01330, Shop Drawings covering the items included under this Section of Work. Shop Drawing submittals shall include:
  - 1. Submit product data covering the items included under this Section of Work.
- B. Conforming to Construction Drawings: Submit a complete set of Drawings showing the locations of the piping, ductwork, etc., as actually installed. Such Drawings shall be submitted to ENGINEER on tracing cloth, Mylar, or sepia paper from which blueprints can be obtained.
- C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section. Include following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.

### 1.03 RECORD DOCUMENTS

- A. Prepare Record Documents in accordance with requirements in Section 01770. In addition, CONTRACTOR shall submit, prior to final payment, Drawings conforming to construction records of systems it has installed. Vendor drawings shall be sized as manufacturers' standard.
- B. Provide typewritten data sheets on motor control circuits with following information on each branch feeder: Load name, horsepower or KVA (transformer), fuse size, starter size, service factor of motor, motor nameplate currents, power factor correction capacitor size (if used), and thermal overload part number.

### 1.04 QUALITY ASSURANCE

- A. National Electrical Code: Comply with NFPA 70, National Electrical Code.
- B. UL Compliance and Labeling: Use products and components labeled by UL.

### 1.05 PERMITS, INSPECTIONS, AND LICENSES

- A. CONTRACTOR shall procure all necessary permits and licenses, observe and abide by all applicable laws, codes, regulations, ordinances, and rules of the State, territory, or political subdivision thereof, wherein Work is done, or any other duly constituted public authority, and further agrees to hold OWNER harmless from liability or penalty which might be imposed by reason of an asserted violation of such laws, codes, regulations, ordinances, or other rules.
  - 1. Upon completion of Work, CONTRACTOR shall secure certificates of inspection from the inspector having jurisdiction and shall submit 3 copies of the certificates to OWNER. CONTRACTOR shall pay the fees for the permits, inspections, licenses, and certifications when such fees are required.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification. Equipment shall be packaged to prevent damage during shipment, storage, and handling. Do not install damaged units; replace, and remove damaged units from Site.

## PART 2 - PRODUCTS

### 2.01 NOT USED.

## PART 3 - EXECUTION

### 3.01 GENERAL ELECTRICAL INSTALLATION

- A. Provide electrical materials and equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction such as NEMA 4, 4X, 7 or 9 if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.

1. Exception: Provide manufacturer's standard construction for indoor or outdoor application where equipment is not manufactured to NEMA specifications (e.g., switchgear, transformers, high voltage capacitors, bus duct, and light fixtures; materials and equipment used in finished areas such as offices, laboratories, etc.).
- B. Provide nonmetallic electrical materials and equipment enclosures in NEMA 4X areas; watertight NEMA 4 and equipment enclosures for outdoor applications and indoor applications below grade; explosion-proof NEC Class I, Division 1, Group C and D equipment for NEMA 7 areas; explosion-proof NEC Class II, Division 2, Group F equipment for NEMA 9 areas.
- C. Coordinate with power company high voltage and/or low voltage metering requirements. Furnish, install, and connect metering equipment not furnished, installed or connected by power company.
- D. Coordinate with telephone company the communication service requirements. Furnish, install, and connect cable and terminal equipment not furnished, installed, or connected by telephone company. Furnish and install a 4-foot by 8-foot by 3/4-inch plywood backboard painted white, raceway from backboard to property line, and cross-connect base and blocks which utilize punchdown wiring methodology.
- E. Provide chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
- F. Supporting devices and sleeves shall be set in poured-in-place concrete and other structural components as they are constructed.
- G. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom possible. Locate light fixtures at approximately 8 feet above floor and where fixtures may be readily serviced.
- H. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
- I. Install systems, materials, and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by Drawings recognizing that portions of Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to ENGINEER.
- J. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components where installed exposed in finished spaces.
- K. As much as practical, connect equipment for ease of disconnecting with minimum of interference with other installations.
- L. Install access panel or doors where units are concealed behind finished surfaces.
- M. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

### 3.02 RACEWAY INSTALLATION

- A. Outdoors, use the following materials:
  - 1. Exposed Conduit: PVC externally coated rigid metal conduit and fittings.
  - 2. Underground Direct Buried Conduit: PVC externally coated rigid metal conduit.
  - 3. Underground Concrete Encased Conduit: Fiberglass-reinforced conduit or rigid nonmetallic conduit if the conductors are used for power or 120 VAC; otherwise, use rigid metal conduit.
  - 4. Conduit Used to Connect to Vibrating Equipment including transformers and hydraulic, pneumatic or electric solenoid or motor-driven equipment: Liquidtight flexible metal conduit.
- B. Indoors, use the following wiring materials:
  - 1. Connection to Vibrating Equipment, including transformers and hydraulic, pneumatic or electric solenoid or motor-operated equipment: Liquidtight flexible metal conduit.
    - a. Exception: NEMA 7 or 9 areas require explosion-proof flexible conduit.
  - 2. Exposed Conduit: Rigid metal conduit or intermediate metal conduit.
    - a. Exceptions:
      - 1) Areas indicated as NEMA 4X, use rigid Schedule 40 PVC conduit.
      - 2) Areas indicated as NEMA 7 or NEMA 9 (such as grit and raw sewage rooms), use PVC externally coated rigid steel conduit.
  - 3. Concealed Conduit: Rigid metal conduit or intermediate metal conduit unless indicated otherwise.
- C. Minimum size conduit shall be 3/4 inch unless shown otherwise.
- D. Instrument Signal Conduit Requirements: Shielded signal wires for 4-20 mA type instruments or thermocouple wires assigned to the same control panel may be run in the same conduit. Shielded instrument signal wires, thermocouple wires, and shielded 2-wire intercom wires may be run in the same conduit. No other wires will be permitted in an instrument signal/2-wire intercom conduit. Conduit shall be RMC or PVC-coated RMC.
- E. Conduit Thread Paint: Make threaded conduit joints watertight by coating threaded portions with a spray-on or brush-on zinc-bearing paint. Provide paint containing 90 percent minimum by weight of metallic zinc powder in the dried film. Clean field-cut threads of oil using the recommended solvent prior to coating threads.
- F. Install expansion fittings in all exposed rigid nonmetallic conduit runs of 20 feet or more.
- G. Install expansion/deflection fittings where conduit passes a building expansion joint or where conduits are attached to two structures joined by a concrete expansion joint.
- H. Exposed or Concealed Construction: Install conduit exposed inside buildings except for areas with finished walls (e.g., offices, laboratories, lavatories, locker rooms, etc.) unless otherwise indicated.
- I. Concealed Raceways: Raceways embedded in slabs shall be installed in the middle third of the slab thickness where practical and leave at least 1-inch concrete cover. Tie raceways to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Space raceways laterally to prevent voids in the concrete. Run 1-inch and smaller raceways with a minimum of bends in the shortest practical distance. Run larger conduit parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the

supports of the slab. Where nonmetallic conduit or fiberglass-reinforced conduit is used, raceways must be converted to PVC externally coated rigid metal conduit before rising above floor.

- J. Exposed Raceways: Install parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. Make bends and offsets so the inside diameter is not effectively reduced. Keep the legs of a bend in the same plane and the straight legs of offsets parallel. Conduits shall slope away from loads to keep moisture from entering the load. Run parallel or banked raceways together. Make bends in parallel or banked runs from the same centerline so that the bends are parallel. Factory elbows may be used in banked runs only where they can be installed parallel. This requires that there be a change in the plane of the run, such as from wall to ceiling and that the raceways be of the same size. In other cases, provide field bends for parallel raceways. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.
- K. Space raceways, fittings, and boxes 0.25 inch from mounting surface in NEMA 4 and NEMA 7 areas. Spacers shall be one-piece construction of stainless steel, galvanized steel, PVC, ABS, or other noncorrosive material.
- L. Sleeves: Install in concrete floor slabs except where conduit passes through a housekeeping pad. Install in exterior walls below grade.
- M. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid metal conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this Contract, install screwdriver-operated threaded flush plugs with floor.
- N. Flexible Connections: Use short length (maximum 6 feet for lighting fixtures; maximum 3 feet for all other equipment) of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement, and all motors. Use liquidtight flexible conduit in wet locations and rated flexible connections for hazardous locations. Install separate ground conductor across flexible connections.
- O. Join raceways with fittings designed and approved for the purpose and make joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.
- P. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate metal conduit, use threaded rigid metal conduit fittings. For PVC externally coated rigid metal conduit, use only factory-coated fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduit.
- Q. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL listed sealing compound. For concealed raceways, install each fitting in a flush metal box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:
  - 1. Where conduits enter or leave hazardous locations.

2. Where conduits enter or leave NEMA 4X areas.
  3. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
  4. Where required by the NEC.
- R. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- S. Install device boxes at the height above the floor as follows for:
1. Light switches, 4 feet.
  2. Receptacles and telephone jacks, 18 inches except in NEMA 4 and 4X areas, 4 feet.
  3. Thermostats, 4'-0".
  4. Clock receptacles, 7'-0".
- T. Avoid installing boxes back-to-back in walls. Provide not less than 6-inch (150 mm) separation.
- U. Position recessed outlet boxes accurately to allow for surface finish thickness.
- V. Fasten electrical boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete masonry.
- W. Provide fire-retardant barriers in all pull and junction boxes containing circuits that are otherwise continuously separated in conduit. Securely fasten these barriers within box. Size barriers so that space between barrier and box wall does not exceed 0.125 inch anywhere around the perimeter of barrier.
- X. Support exposed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
- Y. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from building structure.
- Z. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box and tighten the chase nipples so no threads are exposed.
- AA. Complete installation of electrical raceways before starting installation of conductors within raceways and prevent foreign matter from entering raceways by using temporary closure protection. Cap spare conduit. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- BB. Install pull wires in empty raceways: Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

### 3.03 WIRE AND CABLE INSTALLATION

- A. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant where necessary.
- B. Keep branch circuit conductor splices to minimum. Splice feeders only where indicated. Use a standard kit. No splices are allowed for instrument and telephone cables except at indicated splice points.
- C. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material and are UL listed as pressure type connectors.
- D. Provide adequate length of conductors within electrical enclosures and train conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at terminal.
- E. Terminate power conductors at equipment using pressure-type terminals specifically designed for type of terminations to be made. Terminate no more than 2 conductors No. 8 AWG and smaller within the same pressure-type terminal. These 2 conductors shall be no more than 4 wire gauge sizes apart. Terminate no more than 1 conductor larger than No. 8 AWG within any pressure-type terminal.
  - 1. Exception: Power factor correction capacitor conductors may be terminated at the motor disconnect switch load terminals.
- F. Seal wire and cable ends until ready to splice or terminate.

### 3.04 CUTTING AND PATCHING

- A. Perform cutting and patching in accordance with requirements in Section 01730. In addition, the following requirements apply.
  - 1. Perform cutting, fitting, and patching of electrical equipment and materials required to uncover Work to provide for installation of ill-timed Work, remove and replace Work that is either defective or does not conform to requirements of Drawings.
  - 2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by new Work. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.
  - 3. Patch existing finished surfaces and building components using new materials matching existing materials.

### 3.05 EQUIPMENT CHECKOUT AND TESTING

- A. In addition to testing recommended by equipment or material supplier and called for in equipment or material specification, perform the following.
- B. Motor Testing: Motor insulation shall be tested by using a 500 VDC (minimum) megger and applying test until a constant megohm reading of the following magnitude is obtained:

$R_{\min.} = 4 (KV + 1)$  at 25 degrees C winding temp.

$R_{\min.} = IV + 1$  at 40 degrees C winding temp.

1. If motors do not meet requirements of megger test, blow hot air through motors to dry out and repeat until test is passed. If desirable, drying can be done by applying an electrical potential to equipment. However, in no case, induced or direct, shall voltage or current exceed continuous rating of equipment being dried.
  2. After passing megger test, motors shall be hi-pot tested at 200 percent rated voltage for a minimum of 1 minute.
- C. Equipment Testing: The following tests which are applicable for a particular item of equipment shall be performed:
1. Megger bus work phase-to-phase and phase-to-ground. Minimum acceptable steady-state value is 100 megohms.
  2. Megger power circuit breakers and circuits supplied phase-to-phase and phase-to-ground (100 megohms minimum).
  3. Test current transformer circuits by applying current to secondary wiring at current transformer terminals until contactor trips.
  4. Test, time, and set protective relays. Relays shall be timed at various multiples (minimum of 3 points) of the pick-up value to determine agreement with published curves and adjust as necessary to agree with coordination study required settings. Exact tests to be performed vary with type of relay. Manufacturer's instructions for relay shall be complied with.
  5. After Work has been completed, demonstrate to OWNER's Representative that entire electrical installation is in proper working order and will perform functions for which it was designed by functional testing.
  6. Make any specific tests required by the manufacturer's installation instructions.
- D. Check-out Procedures. In general, check-out procedures (as listed below) which are applicable for a particular item of equipment shall be performed:
1. Vacuum interior of cubicles and remove foreign material.
  2. Wipe clean with a lint-free cloth insulators, bushings, bus supports, etc.
  3. Check and adjust time delay, under-voltage devices, phase relay, over-current relays, etc., as required by coordination study or ENGINEER.
  4. Fill motor bearings requiring oil.
  5. Check and change, as required, thermal overload heater elements to correspond with motor full-load current and service factors of installed motor.
  6. Check direction of rotation of motors and reverse connections if necessary. Check rotation with motor mechanically uncoupled where reverse rotation could damage equipment.
  7. Equipment with two or more sources of power connected by tie breakers, transfer switches, or generator receptacles shall be checked for rotation from each possible combination of power sources. Power sources must have the same phase sequence for each source throughout entire facility.
  8. Check exposed bolted power connections for tightness.
  9. Check operation of breakers, contactors, etc., and control and safety interlocks.
  10. Check tightness of bolted structural connections.
  11. Check leveling and alignment of enclosures.
  12. Check operating parts and linkages for lubrication, freedom from binding, vibration, etc.
  13. Check tightness and correctness of control connections at terminal blocks, relays, meters, switches, etc.

14. Clean auxiliary contacts and exposed relay contacts after vacuuming.
- END OF SECTION

## SECTION 16060

### GROUNDING

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Electrical grounding and bonding Work as follows:
  - 1. Solidly grounded.
  
- B. Applications of electrical grounding and bonding Work in this Section:
  - 1. Underground metal piping.
  - 2. Underground metal water piping.
  - 3. Underground metal structures.
  - 4. Metal building frames.
  - 5. Electrical power systems.
  - 6. Grounding electrodes.
  - 7. Separately derived systems.
  - 8. Raceways.
  - 9. Service equipment.
  - 10. Enclosures.
  - 11. Equipment.
  - 12. Lighting standards.
  - 13. Landscape lighting.
  - 14. Signs.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. UL Compliance: Comply with applicable requirements of UL Standards No. 467, "Electrical Grounding and Bonding Equipment," and No. 869, "Electrical Service Equipment," pertaining to grounding and bonding of systems, circuits, and equipment. In addition, comply with UL Standard 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL listed and labeled for their intended usage.
  - 2. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141, and 142 pertaining to grounding and bonding of systems, circuits, and equipment.

## PART 2 - PRODUCTS

### 2.01 GROUNDING AND BONDING

#### A. Materials and Components:

1. Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Electrical copper grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
3. Ground Bus: 0.25 inch by 1 inch minimum copper ground bus where indicated.
4. Service Arrester: Electrical service arrester, 480 volts, 3-phase, 4-wire, for exterior mounting.
5. Grounding Electrodes: Steel with copper welded exterior, 3/4-inch diameter by 20 feet.
6. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type services indicated.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

- A. Connect grounding conductors to underground grounding electrodes using exothermic weld process or mechanical compression type connectors.
- B. Ground electrical service system neutral at service entrance equipment to grounding electrodes.
- C. Ground each separately derived system neutral to effectively grounded metallic water pipe, effectively grounded structural steel member, and separate grounding electrode.
- D. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
- E. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.
- F. Connect grounding electrode conductors to 1-inch diameter or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping at street side of flange.
- G. Connect building reinforcing steel, building steel beam, building steel roof and walls and duct bank and vault reinforcing steel to ground mat using No. 4/0 AWG bare copper grounding cable.
- H. Bond bare No. 4/0 AWG grounding cable in duct banks to grounding cable in vaults and to power equipment ground bus at ends of each duct bank.

- I. Bond strut and other metal inside of electrical manholes and vaults to bare No. 4/0 AWG grounding cable carried in duct bank.
- J. Bond grounding cables to both ends of metal conduit or sleeves through which such cables pass.
- K. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.
- L. Install braided type bonding jumpers with code-sized ground clamps on water meter piping to electrically bypass water meters.
- M. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible while following building lines to minimize transient voltage rises. Protect exposed cables and straps where subject to mechanical damage.
- N. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed and are subjected to corrosive action.

### 3.02 FIELD QUALITY CONTROL

- A. Upon completion of installation of electrical grounding and bonding systems, test ground resistance with ground resistance tester using the 3-point fall of potential method. Testing shall be performed during normal dry weather conditions with at least 5 non-rain days elapsing prior to test. Where tests show resistance-to-ground is over 5 ohms, take appropriate action to reduce resistance to 5 ohms or less by driving additional ground rods; then retest to demonstrate compliance.
- B. Test ground paths for continuity by applying a low DC voltage source of current, capable of furnishing up to 100 amps, between electrical equipment grounds and ground grid. Grounding path must conduct a 100-amp current at a resistance of 0.010 ohms or less as calculated from circuit voltage.

END OF SECTION

## SECTION 16070

### SUPPORTING DEVICES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product data for each type of product specified.

##### 1.03 QUALITY ASSURANCE

- A. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  - 1. Slotted Metal Angle and U-Channel Systems:
    - a. Allied Tube & Conduit.
    - b. American Electric.
    - c. B-Line Systems, Inc.
    - d. Cinch Clamp Co., Inc.
    - e. GS Metals Corp.
    - f. Haydon Corp.
    - g. Kin-Line, Inc.
    - h. Unistrut Diversified Products.
  - 2. Conduit Sealing Bushings:
    - a. Bridgeport Fittings, Inc.
    - b. Cooper Industries, Inc.
    - c. Elliott Electric Mfg. Corp.
    - d. GS Metals Corp.
    - e. Killark Electric Mfg. Co.
    - f. Madison Equipment Co.
    - g. L.E. Mason Co.
    - h. O-Z/Gedney.
    - i. Producto Electric Corp.
    - j. Racco, Inc.
    - k. Red Seal Electric Corp.

- l. Spring City Electrical Mfg. Co.
- m. Thomas & Betts Corp.

## 2.02 COATINGS

- A. Coating: Supports, support hardware, and fasteners shall be stainless steel. Products for use outdoors, in NEMA 4 areas, or embedded in concrete or in Nema 12 areas indoors shall be stainless steel.

## 2.03 MANUFACTURED SUPPORTING DEVICES

- A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and stainless steel spring clamps.
- B. Fasteners. Types, materials, and construction features as follows:
  1. Expansion Anchors: 304 stainless steel wedge or sleeve type.
  2. Toggle Bolts: 304 stainless steel springhead type.
  3. Hanger Rods: 0.375-inch diameter minimum, 304 stainless steel.
- C. Conduit Sealing Bushings: Factory fabricated, watertight conduit sealing bushing assemblies suitable for sealing around conduit or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
- D. Cable Supports for Vertical Conduit: Factory fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of 304 stainless steel.
- E. U-Channel Systems: 12 gauge or 0.105-inch-thick 304 stainless steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center in top surface. Provide fittings and accessories that mate and match with U-channel and are of same manufacturer.

## 2.04 FABRICATED SUPPORTING DEVICES

- A. Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.
- B. 304 stainless steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.
- C. Pipe Sleeves: Provide a waterstop on pipe sleeves. Provide pipe sleeves of 2 standard sizes larger than conduit/pipe passing through it and of one of the following:
  1. Steel Pipe: Fabricate from Schedule 40 stainless steel pipe.
  2. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe

## PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16075

### ELECTRICAL IDENTIFICATION

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including, but not limited to, the following:
  - 1. Buried electrical line warnings.
  - 2. Identification labeling for cables and conductors.
  - 3. Operational instruction signs.
  - 4. Warning and caution signs.
  - 5. Equipment labels and signs.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product Data for each type of product specified.

#### PART 2 - PRODUCTS

##### 2.01 ELECTRICAL IDENTIFICATION PRODUCTS

- A. Colored Adhesive Marking Tape for Wires and Cables: Self-adhesive, vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- B. Pre-tensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification: Flexible acrylic bands sized to suit raceway diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the cable.
- C. Underground Line Marking Tape: Permanent, bright colored, continuous printed, plastic tape compounded for direct-burial service not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.
- D. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with pre-printed numbers and letter.
- E. Aluminum, Wraparound Cable Marker Bands: Bands cut from 0.014-inch-thick aluminum sheet, fitted with slots or ears for securing permanently around wire or cable jacket or around groups of conductors. Provide for legend application with stamped letters or numbers.
- F. Engraved, Plastic Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16 inch minimum thick for signs up to 20 square inches or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners.

- G. Baked Enamel Warning and Caution Signs for Interior Use: Pre-printed aluminum signs, punched for fasteners, with colors, legend, and size appropriate to the location.
- H. Exterior Metal-Backed Butyrate Warning and Caution Signs: Weather-resistant, nonfading, pre-printed cellulose acetate butyrate signs with 20-gauge galvanized steel backing, with colors, legend, and size appropriate to location. Provide 1/4-inch grommets in corners for mounting.
- I. Fasteners for Plastic Laminated and Metal Signs: Self-tapping stainless steel screws or Number 10/32 stainless steel machine screws with nuts and flat and lock washers.
- J. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18 inch minimum width, 50-pound minimum tensile strength, and suitable for a temperature range from minus 50 to 350 degrees F. Provide ties in specified colors when used for color coding.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification Work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by Code.
- B. Underground Electrical Line Identification: During trench backfilling for exterior nonconcrete encased underground power, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where multiple lines installed in a common trench, do not exceed an overall width of 16 inches; install a single line marker.
- C. Install line marker for underground wiring, both direct buried and in raceway.
- D. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the Project secondary electrical system following OWNER's method of phase identification or as follows:

<u>Phase</u>	<u>480/277 Volts</u>
A	Yellow
B	Brown
C	Orange
Neutral	White
Ground	Green

- E. Wiring Standards:
  - 1. 480/277 Volt, 3-Phase Power:
    - a. Brown.
    - b. Orange.
    - c. Yellow.
    - d. Grey Neutral.

2. 208 Volt, 3-Phase Power:
    - a. Black.
    - b. Red.
    - c. Blue.
  3. 240/120 Volt, 1-Phase Power:
    - a. Black.
    - b. Red.
    - c. White Neutral.
  4. Motor Leads, Control Cabinet/MCC:
    - a. Black, numbered L1-T1, etc.
  5. Control Wiring:
    - a. Red Control circuit wiring that is de-energized when the main disconnect is opened.
    - b. Yellow Control circuit wiring that remains energized when the main disconnect is opened.
    - c. Blue DC.
    - d. Green Ground.
- F. Use conductors with color factory applied entire length of conductors except as follows:
1. The following field applied color coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
    - a. Apply colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last 2 laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.
    - b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply 3 ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.
- G. Power Circuit Identification: Securely fasten identifying metal tags of aluminum wraparound marker bands to cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms with 1/4-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-pound test monofilament line or one-piece self-locking nylon cable ties.
- H. Install wire/cable designation tape markers at termination points, splices, or junctions in each circuit. Circuit designations shall be as indicated on Drawings.

END OF SECTION

## SECTION 16090

### DEMOLITION AND EARTHWORK

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Limited scope general construction materials and methods for application with electrical installations as follows:
  - 1. Selective Demolition including:
    - a. Nondestructive removal of materials and equipment for reuse or salvage as indicated.
    - b. Dismantling electrical materials and equipment made obsolete by these installations.
  - 2. Excavation for underground utilities and services, including underground raceways, vaults, and equipment.

##### 1.02 PROJECT CONDITIONS

- A. Conditions Affecting Selective Demolition: The following Project conditions apply:
  - 1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
  - 2. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. Conditions Affecting Excavations: The following Project conditions apply:
  - 1. Maintain and protect existing building services which transit the area affected by selective demolition.
  - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
  - 3. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. OWNER will not be responsible for interpretations or conclusions drawn from this information.
  - 4. Existing Utilities: Locate existing underground utilities in excavation areas. If utilities are indicated to remain, support and protect services during excavation operations.
  - 5. Remove existing underground utilities indicated to be removed.
    - a. Uncharted or Incorrectly Charted Utilities: Contact utility owner immediately for instructions.
    - b. Provide temporary utility services to affected areas. Provide minimum of 48-hour notice to ENGINEER prior to utility interruption.
  - 6. Use of explosives is not permitted.

##### 1.03 SEQUENCING AND SCHEDULING

- A. Coordinate the shutoff and disconnection of electrical service with OWNER and utility company.

- B. Notify ENGINEER at least 5 days prior to commencing demolition operations.
- C. Perform demolition in phases as indicated.

## PART 2 - PRODUCTS

NOT USED

## PART 3 - EXECUTION

### 3.01 SELECTIVE DEMOLITION

- A. Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed and not indicated to be salvaged or saved.
- B. Materials and Equipment to be Salvaged: Remove, demount, and disconnect existing electrical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to location designated for storage.
- C. Disposal and Clean Up: Remove from Site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- D. Electrical Materials and Equipment: Demolish, remove, demount, and disconnect the following items:
  - 1. Inactive and obsolete raceway systems, controls, and fixtures.
  - 2. Raceways embedded in floors, walls, and ceilings may remain if such materials do not interfere with new installations. Remove materials above accessible ceilings.
- E. Perform cutting and patching required for demolition in accordance with Section 01730.

### 3.02 EXCAVATION

- A. Slope sides of excavations to comply with local codes and ordinances. Shore and brace as required for stability of excavation.
- B. Shoring and Bracing: Establish requirements for trench shoring and bracing to comply with local codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.
- C. Remove and Bracing: Establish requirements for trench shoring and bracing to comply with local codes and authorities. Maintain shoring and bracing in excavations regardless of time period excavations will be open.
- D. Install sediment and erosion control measures in accordance with local codes and ordinances.
- E. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding Project Site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove to prevent softening of bearing materials. Provide and maintain dewatering system components necessary to convey water away from excavations.
  2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey surface water to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.
- F. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
1. Locate and retail soil materials away from edge of excavations. Do not store within drip-line of trees indicated to remain.
  2. Remove and legally dispose of excess excavated materials and materials not acceptable for use as backfill or fill.
- G. Excavation for Underground Vaults and Electrical Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
1. Excavate, by hand, areas within drip line of large trees. Protect the root system from damage and dry-out. Maintain moist conditions for root system and cover exposed roots with burlap. Paint root cuts of 1 inch in diameter and larger with emulsified asphalt tree paint.
  2. Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed.
- H. Trenching: Excavate trenches for electrical installations as follows:
1. Excavate trenches to uniform width, sufficiently wide to provide ample working room and minimum of 6 to 9 inches clearance on both sides of raceways and equipment.
  2. Excavate trenches to depth indicated or required.
  3. Limit length of open trench to that in which installations can be made and trench backfilled within same day.
  4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations.
- I. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F (1 degree C).
- J. Backfilling and Filling. Place soil materials in layers to required subgrade elevations for each area classification listed below:
1. Under walks and pavements, use a combination of subbase materials and excavated or borrowed materials.
  2. Under building slabs, use drainage fill materials.
  3. Under piping and equipment, use subbase materials where required over rock bearing surface and for correction of unauthorized excavation.
  4. For raceway less than 30 inches below surface of roadways, provide 4-inch-thick concrete base slab support. After installation of raceways, provide a 4-inch-thick concrete encasement (sides and top) prior to backfilling and placement of roadway subbase.
  5. Other areas, use excavated or borrowed materials.
- K. Backfill excavations as promptly as work permits, but not until completion of following:
1. Inspection, testing, approval, and locations of underground utilities have been recorded.

2. Removal of concrete formwork.
  3. Removal of shoring and bracing, and backfilling of voids.
  4. Removal of trash and debris.
- L. Placement and Compaction: Place backfill and fill materials in layers of not more than 8 inches in loose depth for material compacted by heavy equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- M. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification specified below. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- N. Place backfill and fill materials evenly adjacent to structures, piping, and equipment to required elevations. Prevent displacement of raceways and equipment by carrying material uniformly around them to approximately same elevation in each lift.
- O. Compaction: Control soil compaction during construction, providing minimum percentage of density specified for each area classification indicated below.
1. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture-density relationship (cohesive soils), determined in accordance with ASTM D 1557 and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).
    - a. Areas Under Structures, Building Slabs and Steps, Pavements: Compact to 12 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
    - b. Areas Under Walkways: Compact top 6 inches of subgrade and each layer of backfill or fill material to 90 percent maximum density for cohesive material, or 95 percent relative density for cohesionless material.
    - c. Other Areas: Compact 6 inches of subgrade and each layer of backfill or fill material to 85 percent maximum density for cohesive soils, and 90 percent relative density for cohesionless soils.
  2. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water. Apply water in minimum quantity necessary to achieve required moisture content and to prevent water appearing on surface during or subsequent to compaction operations.
- P. Subsidence. Where subsidence occurs at electrical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.

END OF SECTION

## SECTION 16120

### WIRES AND CABLES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section includes the following:
  - 1. Low-Voltage Wire and Cable.
  - 2. Medium-Voltage Cable.
  - 3. Instrument Cable.
  - 4. Local Area Network Wiring (LAN).

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Include Shop Drawings of wires, cables, connectors, splice kits, and termination assemblies.
- B. Reports of field tests prepared as noted in Section 01600.

##### 1.03 QUALITY ASSURANCE

- A. UL Compliance: Provide components which are listed and labeled by UL. For cables intended for use in air handling space comply with applicable requirements of UL Standard 710, "Test Method for Fire and Smoke characteristics of cables used in Air Handling Spaces."
- B. NEMA/ICEA Compliance: Provide components which comply with following standards:
  - 1. NEMA WC 70-1999/ICEA S-95-658-1999, Nonshielded Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.
  - 2. NEMA WC 71-1999/ICEA S-96-659-1999, Standard for Nonshielded Cables Rated 2,001-5,000 Volts for use in the Distribution of Electrical Energy.
  - 3. NEMA WC 74-2000/ICEA S-93-639, 5-46 kV Shielded Power Cable for use in the Transmission and Distribution of Electrical Energy.
- C. IEEE Compliance: Provide components which comply with the following standard.
  - 1. Standard 82, Test procedures for Impulse Voltage Tests on Insulated Conductors.
- D. Network Wiring Experience: CONTRACTOR must be able to prove to the satisfaction of OWNER that it has significant experience in the installation of Local Area Network cable systems. Installation must include installation of Network cable, cable termination, knowledge of interconnect equipment, and a thorough knowledge of testing procedures.
- E. Labeling: Handwritten labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or typewritten onto adhesive labels. The font shall be at least 1/8 inch in height, block characters, and legible. The text shall be of a color contrasting with the label such that it may be easily read. If labeling tape is utilized, the font color shall contrast with the background. Patch panels shall exhibit workstation numbers or some type of location identifier, in

sequential order, for all workstations or devices attached. Each Network cable segment shall be labeled at each end with its respective identifier.

- F. Network Wiring Interconnect Equipment (Patch Panels): Interconnect equipment shall be used in all Local Area Network cable installations. Patch panels shall be mounted in the equipment racks or panel mounted. Interconnect equipment mounted in racks shall be affixed to the rack by at least 4 screws. All interconnect devices shall be assembled and installed in accordance with the manufacturer's instructions and recommendations.
- G. Patch Cords: Patch cords shall be provided for each Local Area Network port on the patch panel. Patch cords shall meet or exceed technical specifications of all installed Local Area Network cable. Patch cord connectors shall be matched with patch panel connector type and network module connector type as required.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  - 1. Low-Voltage Wire and Cable:
    - a. American Insulated Wire Corp.
    - b. General Cable.
    - c. The Okonite Co.
    - d. Southwire Co.
  - 2. Connectors for Low-Voltage Wires and Cable Conductors:
    - a. AMP.
    - b. O-Z/Gedney Co.
    - c. Square D Company.
    - d. 3M Company.
  - 3. Medium-Voltage Cable:
    - a. American Insulated Wire Corp.
    - b. General Cable.
    - c. Kerite Co.
    - d. The Okonite Co.
    - e. Prysmian Cables & Systems.
    - f. Southwire Co.
  - 4. Medium-Voltage Cable Splicing and Terminating Products and Accessories:
    - a. Adelet-PLM.
    - b. Amerace Corp.
    - c. Electrical Products Division 3M.
    - d. G&W Electric Co.
    - e. M.P. Husky Corp.
    - f. Raychem Corp.
    - g. RTE Components.
  - 5. Instrument Cable:
    - a. Belden (Trade Nos. 1120A and 1118A).
  - 6. Local Area Network Cable:
    - a. Belden 7882A/7883A, or equal.

## 2.02 LOW-VOLTAGE WIRES AND CABLES

- A. Conductors: Provide stranded conductors conforming to ASTM Standards for concentric stranding, Class B. Construction of wire and cable shall be single conductor (1/c) unless multiconductor cable is shown by notation in form (x/c) where x indicates the number of separate insulated conductors per cable.
- B. Conductor Material: Copper. Minimum size power wire shall be No. 12 AWG.
- C. Insulation: Provide RHW/USE insulation for power conductors used in single- and 3-phase circuits with more than 120 volts to ground. Provide RHW/USE, XHHW, or THWN/THHN insulation for power conductors used in single- and 3-phase circuits with 120 volts or less to ground
  1. Provide RHW, THHN/THWN, or XHHW insulation for grounding conductors installed in raceways.
  2. Provide THHN/THWN insulation for control conductors.

## 2.03 CONNECTORS FOR LOW-VOLTAGE WIRES AND CABLES

- A. Provide UL listed factory fabricated, solderless metal connectors of sizes, ampacity ratings, materials, types, and classes for applications and services indicated. Use connectors with temperature ratings equal to or greater than those of the wires upon which used.

## 2.04 MEDIUM-VOLTAGE CABLE

- A. Cable shall be single-conductor type, size as indicated, and conforming to UL Standard 1072, "Medium Voltage Power Cables."
- B. Cable shall be ethylene propylene rubber (EPR) insulated and shall conform to NEMA Standard WC 74-2000 (ICEA S-93-639) "5-46 kV Shielded Power Cable for use in the Transmission and Distribution of Electrical Energy."
- C. Conductors: Class B stranded, annealed copper.
- D. Conductor Shield: Extruded, semiconducting.
- E. Insulation Shield: Extruded, semiconducting.
- F. Concentric Neutral: Evenly spaced, annealed, coated, solid copper wires applied concentrically over semiconducting insulation shield. Individual wires shall be No. 14 AWG minimum. Concentric neutral ampacity shall be not less than 1/3 the ampacity of central conductor.
- G. Metallic Shielding: Copper shielding tape, helically applied over semiconducting insulation shield or evenly spaced solid copper wires applied concentrically over semiconducting insulation shield.
- H. Cable Jacket: Sunlight-resistant PVC, cross-linked polyolefin, or chlorosulfonated polyethylene (hypalon).
- I. Cable Voltage Rating: 5 kV phase to phase.
- J. Cable Voltage Rating: 8 kV phase to phase.

- K. Cable Voltage Rating: 15 kV phase to phase.
- L. Cable Voltage Rating: 25 kV phase to phase.
- M. Cable Voltage Rating: 28 kV phase to phase.
- N. Cable Voltage Rating: 35 kV phase to phase.
- O. Cable Voltage Rating: 46 kV phase to phase.

## 2.05 MEDIUM-VOLTAGE SPLICING AND TERMINATING PRODUCTS

- A. Types: Compatible with cable materials and shall be suitable for indoor or outdoor environments as required.
- B. Connectors: Compression type as recommended by cable or splicing kit manufacturer for application.
- C. Splicing and Terminating Kits: As recommended by manufacturer in writing for specific sizes, ratings, and configurations of cable conductor, splices, and terminations specified. Kits shall contain components required for a complete splice or termination including detailed instructions and shall be the product of a single manufacturer. Completed splices and terminations shall provide insulation equivalent to the insulation class of cable it connects and maintain current carrying capacity and mechanical strength of cable.

## 2.06 INSTRUMENT CABLE

- A. Instrument Cable: 600 volt minimum insulated shielded cable with two or more twisted No. 16 or No. 18AWG stranded copper conductors; PVC, nylon, or polyethylene outer jacket; and 100 percent foil shielding.

## 2.07 LOCAL AREA NETWORK CABLE

- A. Category 6 (Ethernet) Data and Patch Cable:
  - 1. Paired, 4-pair, 24 AWG, solid bare copper conductors with polyethylene insulation, overall aluminum foil-polyester tape shield with 24 AWG stranded tinned copper drain wire, 100 percent shield coverage, PVC jacket.
  - 2. UL verified to Category 6.
  - 3. Provide plenum rated cable where installed exposed.

## PART 3 - EXECUTION

### 3.01 FIELD QUALITY CONTROL

- A. Prior to energizing, check installed 480 volt, 3-phase power circuits and higher wires and cables with a 1,000-volt megohm meter to determine insulation resistance levels to assure requirements are fulfilled. Minimum acceptable megohm meter reading is 100 megohms held at a constant value for 15 seconds. A certified copy of megohm meter tests shall be submitted to ENGINEER. Test reports

shall include ambient temperature and humidity at time of testing. Notify ENGINEER 48 hours prior to test with schedule.

- B. Medium-Voltage Cable Tests shall include high-potential test of cable and accessories and such tests and examinations required to achieve specified objectives. Where new cables are spliced to existing cables, high-potential test shall be performed on the new cable prior to splicing. After test results for new cables are approved and splice is made, an insulation resistance test and continuity test on the length of cable including the splice with existing cables being tested to the nearest disconnect point.
- C. Local Area Network (LAN) Cable Tests: Testing of all cable segments shall be completed in compliance with EIA/TIA-568-B.1 Standards. Testing shall be done by CONTRACTOR with at least 5 years of experience in testing Network cabling systems.
  - 1. TESTING: CONTRACTOR shall test each network cable segment. **OWNER reserves the right to have representation present during all or a portion of the testing process. CONTRACTOR must notify OWNER 5 days prior to commencement of testing.** If OWNER elects to be present during testing, test results will only be acceptable when conducted in the presence of OWNER.
  - 2. DOCUMENTATION (Network Cable): CONTRACTOR shall provide documentation to include test results and as-built Drawings. Network Cable Results: Handwritten results are acceptable provided the test is neat and legible. Copies of test results are not acceptable. Only original signed copies will be acceptable.
    - a. Each cable installed shall undergo complete testing in accordance with TIA/EIA-568-B.1 to guarantee performance to this Standard.
    - b. All required documentation shall be submitted within 30 days at conclusion of the project to OWNER.
    - c. Test Criteria: Pass rate to conform to latest TIA/EIA-568-B.1 Standards that incorporate link performance testing through entire path, including cable, couplers, and jumpers.
  - 3. ACCEPTANCE: Acceptance of the Data Communications System, by OWNER, shall be based on the results of testing, functionality, and receipt of documentation.
- D. Reports (non-LAN cable): Testing organization shall maintain a written record of observations and tests, report defective materials and workmanship, and retest corrected defective items. Testing organization shall submit written reports to ENGINEER.

END OF SECTION

## SECTION 16130

### RACEWAYS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Raceways for electrical wiring. Types of raceways in this Section include the following:
1. Flexible metal conduit.
  2. Intermediate metal conduit.
  3. Liquidtight flexible conduit.
  4. Underground plastic utilities duct.
  5. Rigid metal conduit.
  6. Rigid nonmetallic conduit.
  7. Surface raceways.
  8. PVC externally coated rigid metal conduit.
  9. Fiberglass reinforced conduit.
  10. Electrical nonmetallic tubing.
  11. Wireway.
  12. Conduit bodies.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
1. Product data for the following products:
    - a. Surface raceway and fittings.
    - b. Wireway and fittings.
    - c. Conduit.
    - d. Conduit bodies.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards:
1. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
  2. UL Compliance and Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, ETL, or CSA.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in Work include:

1. Conduit:
  - a. Allied Tube.
  - b. Carlon.
  - c. Johns Manville.
  - d. Occidental Coatings.
  - e. Orangeburg.
  - f. Perma-Cote Industries.
  - g. Republic Steel.
  - h. Steelduct Co.
  - i. Triangle Conduit.
  - j. Wheatland Tube.
  - k. Youngstown Sheet and Tube.
2. Liquidtight Conduit:
  - a. Anamet, Inc.
  - b. Carlon.
  - c. Electric-Flex.
  - d. Thomas and Betts.
3. Conduit Bodies:
  - a. Adalet-PLM.
  - b. American Electric.
  - c. Appleton Electric Co.
  - d. Carlon.
  - e. Crouse-Hinds Division, Cooper Industries, Inc.
  - f. Delta Industrial Products.
  - g. Killark Electric Mfg. Co.
  - h. Kraloy Products Co.
  - i. O-Z/Gedney Co.
  - j. Perma-Cote Industries.
  - k. Spring City Electrical Mfg. Co.
4. Conduit Thread Paint:
  - a. CRC Chemicals, USA.
  - b. Sherwin Williams.
  - c. ZRC Chemical Products Co.
5. Wireway:
  - a. Alrey-Thompson Co.
  - b. Anchor Electric Co.
  - c. Hoffman Engineering Co.
  - d. Keystone/Rees, Inc.
  - e. Robroy Industries, Inc.
  - f. Square D Company.
6. Surface Metal Raceway:
  - a. Allied Tube & Conduit.
  - b. B-Line Systems, Inc.
  - c. Butler Mfg. Co.
  - d. Hoffman Engineering Co.
  - e. Isoduct Energy Systems.
  - f. Isotrol Systems.
  - g. Keystone/Rees, Inc.

- h. Square D Company.
- i. The Wiremold Co.
- 7. Surface Nonmetallic Raceway:
  - a. Anixter Brothers, Inc.
  - b. Hoffman Engineering Co.
  - c. Hubbell, Inc.
  - d. Panduit Corp.
  - e. Premier Telecom Products, Inc.
  - f. Thermotools Co.
  - g. The Wiremold Co.

## 2.02 METAL CONDUIT AND TUBING

- A. Rigid Metal Conduit: ANSI C 80.1, hot-dip galvanized.
- B. PVC Externally Coated Rigid Metal Conduit and Fittings: ANSI C 80.1 and NEMA RN 1., Type 40, 40 mil nominal coating and thickness. The bond of the PVC to the substrate shall be stronger than the tensile strength of the PVC.
- C. Flexible Metal Conduit: UL 1, zinc-coated metal.
- D. Liquidtight Flexible Metal Conduit and Fittings: UL 360. Fittings shall be specifically approved for use with this raceway.

## 2.03 NONMETALLIC CONDUIT AND DUCTS

- A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 or 80 PVC.
- B. PVC Conduit and Tubing Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.
- C. Underground PVC and ABS Plastic Utilities Duct: NEMA TC 6, Type I for encased burial in concrete, Type II for direct burial.
- D. PVC and ABS Plastic Utilities Duct Fittings: NEMA TC 9; match to duct type and material.
- E. Liquidtight Flexible Nonmetallic Conduit and Fittings: UL 1660. Fittings shall be specifically approved for use with this raceway.
- F. Fiberglass-Reinforced Conduit and Fittings: CSA B196.1 and B1089 A.

## 2.04 CONDUIT BODIES

- A. Provide matching gasketed covers secured with corrosion-resistant screws. Use cast covers in NEMA 4 areas and stamped steel covers in NEMA 1 and 12 areas. Use nonmetallic covers in NEMA 4X areas and threaded, ground joint covers in NEMA 7 and NEMA 9 areas.
- B. Metallic Conduit and Tubing: Use metallic conduit bodies as follows:
  - 1. Rigid Metal Conduit: Use cast or malleable iron conduit bodies with zinc electroplating, aluminum enamel or lacquer finish, and threaded hubs.

2. Intermediate Metal Conduit: Use cast or malleable iron conduit bodies with zinc electroplating, aluminum enamel or lacquer finish, and threaded hubs.
3. Electrical Metallic Tubing: Use cast or malleable iron conduit bodies with zinc electroplating, aluminum enamel or lacquer finish, and compression type or setscrew connectors.
4. PVC Externally Coated Rigid Metal Conduit: Use hot-dipped galvanized or cadmium-plated cast or malleable iron conduit bodies with threaded hubs factory PVC-coated. Field application of PVC coating to conduit bodies is not acceptable. Secure covers using PVC encapsulated or stainless steel screws.
5. Nonmetallic Conduit and Tubing: Use nonmetallic conduit bodies conforming to UL 514 B.
6. NEMA 7 and NEMA 9 Areas: Use materials conforming to UL standards for the area.

## 2.05 WIREWAYS

- A. Fittings and accessories including but not limited to couplings, offsets, elbows, expansion joints, adapters, hold-down straps, and end caps shall match and mate with wireway as required for complete system. Where features are not indicated, select to fulfill wiring requirements and comply with applicable provisions of NEC.
- B. Wireway covers shall be hinged type.

## 2.06 SURFACE RACEWAYS

- A. Sizes and channels as indicated. Provide fittings that match and mate with raceway.
- B. Surface Metal Raceway: Construct of galvanized steel with snap-on covers, with 1/8-inch mounting screw knockouts in base approximately 8 inches o.c. Finish with manufacturer's standard prime coating suitable for painting. Provide raceways of types suitable for each application required.
- C. Surface Nonmetallic Raceway: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color. Raceway and system components shall meet UL 94 requirements for nonflammable, self-extinguishing characteristics.

## PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16135

### CABINETS, BOXES, AND FITTINGS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other Sections. Types of products specified in this Section include:
1. Outlet and device boxes.
  2. Pull and junction boxes.
  3. Terminal boxes.
  4. Bushings.
  5. Locknuts.
  6. Conduit hubs.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
1. Shop Drawings for floor boxes and boxes, enclosures, and cabinets that are to be shop-fabricated, (nonstock items). For shop-fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.
  2. Product data for boxes, fittings, cabinets, and enclosures.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards:
1. UL Listing and Labeling: Items provided under this section shall be listed and labeled by UL.
  2. NEMA Compliance: Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)."

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
1. Outlet Boxes, Concealed Conduit System:
    - a. Adalet-PLM Div., Scott Fetzer Co.
    - b. Appleton Electric, Emerson Electric Co.
    - c. Bell Electric, Square D Company
    - d. Eagle Electric Mfg. Co., Inc.
    - e. Midland-Ross Corp.
    - f. OZ/Gedney, General Signal Co.
    - g. Pass and Seymour, Inc.

- h. RACO Div., Harvey Hubbell, Inc.
- i. Thomas & Betts Co.
- 2. Outlet Boxes, Exposed Conduit System:
  - a. Appleton Electric, Type JB, GS, or SHE.
  - b. Crouse-Hinds, Type GS or GRF.
- 3. Device Boxes, Concealed Conduit Systems:
  - a. Adalet-PLM Div., Scott Fetzer Co.
  - b. Appleton Electric; Emerson Electric Co.
  - c. Bell Electric, Square D Company.
  - d. Eagle Electric Mfg. Co., Inc.
  - e. Midland-Ross Corp.
  - f. OZ/Gedney, General Signal Co.
  - g. Pass and Seymour, Inc.
  - h. RACO Div., Harvey Hubbell, Inc.
  - i. Thomas & Betts Co
- 4. Device Boxes, Exposed Conduit System:
  - a. Appleton Electric, Type FS/FD.
  - b. Crouse-Hinds, Type FS/FD.
- 5. Junction and Pull Boxes, Concealed System:
  - a. Adalet-PLM Div., Scott Fetzer Co.
  - b. Appleton Electric, Emerson Electric Co.
  - c. Arrow-Hart Div., Crouse-Hinds Co.
  - d. Bell Electric, Square D Company.
  - e. GTE Corporation.
  - f. Keystone Columbia, Inc.
  - g. OZ/Gedney Co.; General Signal Co.
  - h. Spring City Electrical Mfg. Co.
- 6. Junction and Pull Boxes, Exposed Conduit System:
  - a. Appleton Electric, Type FS/FD.
  - b. Crouse-Hinds, Type FS/FD.
- 7. Terminal Boxes:
  - a. AMFCO.
  - b. Boss.
  - c. Hoffman.
  - d. Keystone.
  - e. Hope.
- 8. Bushings, Knockout Closures, Locknuts, and Connectors:
  - a. Adalet-PLM Div., Scott Fetzer Co.
  - b. AMP, Inc.
  - c. Arrow-Hart Div., Crouse-Hinds Co.
  - d. Appleton Electric Co., Emerson Electric Co.
  - e. Bell Electric; Square D Co.
  - f. Midland-Ross Corp.
  - g. Midwest Electric, Cooper Industries, Inc.
  - h. OZ/Gedney Co., General Signal Co.
  - i. RACO Div., Harvey Hubbell, Inc.

j. Thomas & Betts Co., Inc.

## 2.02 CABINETS, BOXES, AND FITTINGS - GENERAL

- A. Outlet Boxes: Suitable for the conduit system installation as follows:
1. Exposed Conduit: Provide cast outlet boxes finished with aluminum lacquer or enamel. Provide cast metal covers with neoprene gaskets for NEMA 12 and 4 areas and undesignated areas.
    - a. Exception: Provide non-metallic outlet boxes for NEMA 4X areas. Provide the appropriate explosion-proof rating for outlet boxes installed in NEMA 7 and NEMA 9 areas. Provide factory PVC-coated boxes where PVC-coated conduit is specified.
  2. Concealed Conduit: Provide galvanized coated flat-rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes with mounting holes and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding. Provide cast metal outlet boxes for exterior outlets.
- B. Device Boxes: Suitable for the conduit system as follows:
1. Exposed Conduit: Provide cast or malleable iron, zinc electroplated device boxes finished with aluminum lacquer or enamel. Provide exterior mounting lugs on device boxes.
    - a. Exception: Provide non-metallic outlet boxes for NEMA 4X areas. Provide appropriate explosion-proof rating for device boxes installed in NEMA 7 and NEMA 9 areas. Provide factory PVC-coated device boxes where PVC-coated conduit is specified.
  2. Concealed Conduit: Provide galvanized coated flat-rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding. Provide cast metal device boxes for exterior devices.
- C. Junction and Pull Boxes: Suitable for the conduit system installation as follows:
1. Exposed Conduit: For pull and junction boxes provide 316 stainless steel hinged boxes. Provide exterior mounting lugs. Grind exposed edges smooth or roll edges to prevent scuffing of wire during installation. Provide a continuous neoprene or rubber gasket cemented to the box cover where it contacts the box body.
    - a. Exceptions: Provide nonmetallic pull and junction boxes in NEMA 4X areas. Provide appropriate explosion-proof construction for boxes located in NEMA 7 and NEMA 9 areas. Provide factory PVC-coated boxes for areas where PVC conduit is used.
  2. Concealed Conduit: Provide 316 stainless steel junction and pull boxes, with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.
- D. Terminal Boxes: Provide compression lug type terminal strips in each terminal box with a minimum of 20 percent spare terminals. Provide appropriate NEMA enclosure rating for area in which terminal box is installed.
- E. Bushings, Knockout Closures, and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connectors, of types and sizes, to suit

respective installation requirements and applications. Provide watertight hubs on conduits terminated at sheet steel enclosures in NEMA 4 areas.

PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16140

### WIRING DEVICES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section includes the following:
  - 1. Receptacles.
  - 2. Ground fault circuit interrupter receptacles.
  - 3. Plugs.
  - 4. Plug connectors.
  - 5. Telephone and network outlets.
  - 6. Wall plates.

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product data for each type of product specified.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. UL and NEMA Compliance: Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  - 1. Bryant Electric Co., Division of Hubbell Corporation.
  - 2. Cooper Wiring Devices.
  - 3. Hubbell, Inc.
  - 4. Leviton Manufacturing Co., Inc.
  - 5. Pass and Seymour, Inc.

##### 2.02 WIRING DEVICES

- A. Provide devices which are UL listed and which comply with NEMA WD 1 and other applicable UL and NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated.
- B. Receptacles: Provide specification grade or heavy-duty grounding receptacles with the NEMA rating shown on Wiring Device Schedule on Drawings. Comply with UL 498 and NEMA WD1.

- C. Receptacles, Industrial Heavy-Duty: Provide pin and sleeve design receptacles conforming to UL 498. Comply with UL 1010 where installed in hazardous locations. Provide features indicated.
- D. Ground Fault Interrupter (GFI) Receptacles: Provide specification grade or heavy-duty "feed-through" type ground fault circuit interrupter, with integral grounding type NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide units rated Class A, Group 1, per UL Standard 94.3.
- E. Plugs: 15 amperes, 125 volts, 3-wire, grounding, armored cap plugs, parallel blades with cord clamp, and 0.4-inch cord hole; match NEMA configuration with power source's.
- F. Plug Connectors: 15 amperes, 125 volts, bakelite-body armored connectors, 3-wire, grounding, parallel blades, double wipe contact, with cord clamp, and 0.4-inch cord hole, match NEMA configuration to mating plug's. Arrange as indicated.
- G. Telephone and Network Outlets: Telephone outlets shall consist of box, wall plate, and RJ-12 jack. Network outlets shall consist of box, wall plate, and RJ-45 jack. Network outlet shall comply with requirements of CAT-5E cabling systems. Wall plates shall match color and style of receptacle and switch wall plates used throughout the Project.

## 2.03 WIRING DEVICE ACCESSORIES

- A. Wall plates: Single and combination, of types, sizes, and with ganging and cutouts as indicated. Provide plates which mate and match with wiring devices to which attached. Provide metal screws for securing plates to devices with screw heads colored to match finish of plates. Provide wall plates with engraved legend where indicated. Exterior receptacle covers shall provide rainproof protection while in use. Conform to requirements of Section 16075. Provide plates possessing the following additional construction features:
  - 1. NEMA 12 and Unclassified Areas. Material and Finish: 0.04-inch-thick stainless steel, or 0.04-inch-thick brass, chrome plated.
  - 2. NEMA 4 Area Material and Finish: Cast screw cap and cover plate for receptacles. Cast cover plate with lever or plunger operator for switches.
  - 3. NEMA 4X Material and Finish: Non-metallic, watertight wall plates 0.05-inch-thick aluminum, anodized.
  - 4. NEMA 7 and NEMA 9 Material and Finish: cast metal cover plates meeting NEC requirements for area.

## PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16410

### CIRCUIT AND MOTOR DISCONNECTS

#### PART 1 - GENERAL

##### 1.01 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Product data for each type of product specified.
- B. Operation and Maintenance Manuals: Submit in accordance with requirements of Sections 01600 and 13410, operation and maintenance manuals for items included under this Section, including circuits and motor disconnects.

##### 1.02 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. Electrical Component Standards: Provide components which are listed and labeled by UL. Comply with UL Standard 98 and NEMA Standard KS 1.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
  - 1. Allen-Bradley.
  - 2. Square D Company.
  - 3. Siemens

##### 2.02 CIRCUIT AND MOTOR DISCONNECT SWITCHES

- A. Provide NEMA 4, 4X, 7, 9, or 12 enclosure to match the rating of the area in which switch is installed. For motor and motor starter disconnects through 100 horsepower, provide units with horsepower ratings suitable to loads. For motor and motor starter disconnects above 100 horsepower, clearly label switch, "DO NOT OPEN UNDER LOAD."
- B. Fusible Switches: (Heavy-duty) switches, with fuses of classes and current ratings indicated. See Section "Fuses" for specifications. Where current limiting fuses are indicated, provide switches with non-interchangeable feature suitable only for current limiting type fuses.
- C. Circuit Breaker Switches: Where individual circuit breakers are required, provide factory-assembled, molded-case circuit breakers with permanent instantaneous magnetic and thermal trips in each pole, and with fault-current limiting protection, ampere ratings as indicated. Construct with overcenter, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication. Provide push-to-trip feature for testing and exercising circuit breaker trip mechanism.

Construct breakers for mounting and operating in any physical position and in an ambient temperature of 40 degrees C. Provide with AL/CU-rated mechanical screw type removable connector lugs.

- D. Non-fusible Disconnects: (Heavy-duty) switches of classes and current ratings as indicated.
- E. Double-Throw Switches: (Heavy-duty) switches of classes and current ratings as indicated.
- F. Bolted Pressure Switches: Bolted pressure switches conforming to and listed under UL Standard 977, single- or double-throw arrangement as indicated. For fusible units, provide fuses as indicated.
- G. Service Switches: (Heavy-duty) fusible/circuit breaker switches. UL listed for use as service equipment under UL Standard 98 or 869.
- H. Switches for Classified (Hazardous) Locations: Heavy-duty switches with UL labels and listings for hazardous location classifications in which installed.

### 2.03 ACCESSORIES

- A. Special Enclosure Material: Provide special enclosure material as follows for switches indicated:
  - 1. Stainless Steel for NEMA 12 and NEMA 4 switches.
  - 2. Molded fiberglass-reinforced plastic for NEMA 4X switches.

### PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16420

### MOTOR CONTROLLERS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

A. Section Includes: Types of motor controllers, including:

1. Combination controllers.
2. Solid-state reduced voltage controllers.
3. Fractional HP manual controllers.

##### 1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Shop Drawings: Submit Shop Drawings of motor controllers showing dimensions and sizes.
2. Product Data: Submit manufacturer's data and installation instructions on motor controllers.
3. Wiring Diagrams: Submit power and control wiring diagrams for motor controllers

##### 1.03 QUALITY ASSURANCE

A. Codes and Standards:

1. UL Compliance: Comply with applicable requirements of UL 486A and B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL listed and labeled.
2. NEMA Compliance: Comply with applicable requirements of NEMA Standards ICS 2, "Industrial Control Devices, Controllers and Assemblies," and Pub No. 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)," pertaining to motor controllers and enclosures.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include (no or equal):

1. Allen-Bradley Co.
2. Square D Company.

##### 2.02 MOTOR CONTROLLERS

A. Except as otherwise indicated, provide motor controllers and ancillary components which comply with manufacturer's standard materials, design, and construction in accordance with published product information and as required for a complete installation.

- B. Combination Controllers: Consist of controller and circuit breaker or fusible disconnect switch mounted in common enclosure of types, sizes, ratings, and NEMA sizes indicated. Equip starters with block-type manual reset overload relays. Provide control and pilot devices indicated. Provide 90 degree C SIS or MTW, No. 14 AWG control wiring, tagged at each termination. Provide operating handle for disconnect switch mechanism with indication and control of switch position, with enclosure door either opened or closed, and capable of being locked in OFF position with 3 padlocks. Construct and mount controllers and disconnect switches in single NEMA-type enclosure suitable for the location in which it is installed; coat with manufacturer's standard color finish.
1. The 3-phase starter may be the following types:
    - a. Full Voltage Non-reversing (FVNR): One 3-pole magnetic contactor with a set of 3 overload devices.
    - b. Full Voltage Reversing (FVR): Two 3-pole magnetic contactors with a common set of 3 overload devices.
    - c. Two-speed (for two winding motor): Two, 3-pole magnetic contactors, each with its own set of 3 overload devices.
    - d. Two-speed (for single winding motor): Two magnetic contactors, a 5-pole for high speed, and a 3-pole for low speed, each with its own set of 3 overload devices.
    - e. Reduced Voltage (for wye-connected part winding motors): Two 3-pole magnetic contactors, each with its own set of 3 overload devices and a timer for closing of the running contactor. Running contactor shall be sized for motor full load current, and starting (half-winding) contactor shall be sized for at least 75 percent of the full load current and shall be capable of interrupting at least 10 times full load current.
    - f. Reduced Voltage (closed transition autotransformer type): Three magnetic contactors, two 2-pole and one 3-pole with a common set of 3 overloads, a timing relay and an autotransformer with taps at 50, 65, 80, and 100 percent, and an integral temperature switch or timing relay to protect transformer windings.
- C. Solid-State Reduced Voltage Controllers(Allen-Bradley only-no or equal): Provide 3-phase, solid-state, reduced voltage motor controllers of sizes and ratings indicated.
1. The controller shall be microprocessor-based and shall provide as a minimum the following modes of operation.
    - a. Soft start with selectable kick-start.
    - b. Soft stop.
    - c. Current limit.
    - d. Full voltage.
  2. The controller shall be self-calibrating and shall automatically adjust itself for line voltage, frequency and current fluctuations. It shall have adjustable starting acceleration and stopping deceleration. Provide transient protection for all controllers furnished.
- D. Control and Pilot Devices: Provide an individually fused control power transformer in each starter unit. Provide 2 fuses in the transformer primary circuit and 1 in transformer secondary circuit. Size transformers such that they can supply 100VA in excess of the unit requirements or provide 150VA rated transformer, whichever is greater. Provide 300 volt rated, oiltight type LED pilot lights, push buttons with extended guard and black color insert. Equip stop push buttons with half guard and red color insert. Provide 120/6 volt transformer type push-to-test pilot lights with lens color indicated. Provide machine tool type relays, each with 1 spare N.O. contact. Provide 6-digit elapsed time indicators with one-tenth hour increments. When timers are required, they shall be synchronous type.

- E. Fractional HP Manual Controllers: Provide 3-phase and single-phase fractional horsepower manual motor controllers, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms, and with one-piece melting alloy type thermal units. Controller shall become inoperative when thermal unit is removed. Provide controllers with double-break silver alloy contacts, visible from both sides of controller, and switch capable of being padlocked-OFF. Enclose controller unit in NEMA-type enclosure suitable for the location in which it is installed; coat with manufacturer's standard color finish.

### PART 3 - EXECUTION

NOT USED

END OF SECTION

## SECTION 16422

### VARIABLE FREQUENCY DRIVES

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Section Includes: Types of motor controllers, including:
  - 1. Variable Frequency Drives

##### 1.02 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings (seven copies) covering the items included under this Section. Shop Drawing submittals shall include:
  - 1. Shop Drawings: Submit Shop Drawings of motor controllers showing wiring diagrams, dimensions and sizes.
  - 2. Product Data: Submit manufacturer's data and installation instructions on motor controllers.
  - 3. Wiring Diagrams: Submit power and control wiring diagrams for motor controllers
  - 4. Submit operation and maintenance manuals for the drives. Submit electronic copies on CD, as well as three hard cover copies.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards:
  - 1. UL Compliance: Comply with applicable requirements of UL 486A and B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL listed and labeled.
  - 2. NEMA Compliance: Comply with applicable requirements of NEMA Standards ICS 2, "Industrial Control Devices, Controllers and Assemblies," and Pub No. 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)," pertaining to motor controllers and enclosures.

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturer offering products shall be (no or equal):
  - 1. Rockwell PowerFlex 753 Series.
  - 2. Square D Altivar Process 630 Series.

##### 2.02 MOTOR CONTROLLERS

- A. Variable Frequency Drives: This system shall comprise a motor and a variable frequency drive and
  - 1. Motor: as coordinated with the pump manufacturer.
  - 2. Variable Frequency Drive: The variable frequency drive unit shall convert 480 volt plus 10 percent, minus 5 percent; 3-phase; 60 hertz plus or minus 2 hertz, input power into an adjustable frequency output. Output power shall be of suitable capacity and wave form to provide stepless speed control of the specified AC motor throughout a continuous speed range

of 10:1 under variable torque load not exceeding 1.25 times the motor's full load rating in an ambient of 0-40 degrees C with up to 95 percent humidity. The drive continuous run amperes rating shall be 1.25 times the full load ampere of the load or as shown on the electrical one-line drawings whichever is greater. The drive shall be able to withstand external short circuits without fuse blowing or device failure. The drive shall comply with the latest requirements of IEEE519 2014.

3.
  - a. Drives of the pulse-width-modulation type shall have current limit protection for the drive and load of 110 percent of motor nameplate rating for variable torque loads for a minimum of 1 minute before automatically disconnecting the drive.
  - b. Provide instantaneous static overvoltage and overcurrent protection. Provide undervoltage trip upon input power loss or phase loss without component failure and automatic restart upon return of full power and command. The drive shall not be damaged by application of incorrect phase sequence.
  - c. Provide input circuit breaker interlocked with the door.
  - d. Provide input, output, and bypass contactors(Nema rated) where shown on contract drawings.
  - e. Provide three spare fuses of each type used.
  - f. Provide 3-phase thermal overloads at the output to the motor.
  - g. Provide line voltage transient suppression and immunity to local ambient electrical noise. The drive shall not create radiated or conducted RFI which disturbs the function of adjacent equipment. Units shall be furnished as six pulse drives with input and output filtering to comply with above requirements. Furnish 5% input line reactor or Matrix AP input filter as shown on drawings and DV/DT output filters on drive output for each drive.
  - h. Provide drive fault detection circuit with contacts for remote alarm used by others. The drive shall shut down on any type of failure. Cause of drive shutdown shall be displayed on operator interface.
  - i. Provide isolation of signal circuits from the power circuits. The drive shall have self-protection from regenerative power on rapid decrease of speed signals.
  - j. Provide a forced air ventilation system to remove heat from the drive enclosure. Power for the ventilation system shall be provided from the drive circuits. The fans shall be completely serviceable without having to dis-assemble the drive and shall be interlocked with the drive run status.
  - k. Where shown on the wiring diagrams, the drive shall accept a speed control signal from either an isolated or non-isolated 4-20 mA source while in the automatic speed control mode and from a door-mounted speed potentiometer when the manual mode is selected. In addition, provide a door-mounted operator interface panel that allows remote/local mode selection and manual speed control. Furnish selector switches and pilot lights for the control shown on the wiring diagrams. Devices to be mounted on face of drive door, controls section.
  - l. The drive shall output an isolated 4-20 mA speed signal for remote speed indication.
  - m. The drive shall accept a remote start/stop contact closure while in the Auto mode and from operator interface when the Local mode is selected. Refer to the wiring diagrams for additional control requirements.
  - n. The drive shall have an alphanumeric operator interface display capable of displaying amps, voltage, kW, rpm, frequency, and elapsed running time.
  - o. Provide a delay to restart the motor after the motor is running. The delay to restart shall be adjustable from 3 to 60 seconds. Minimum delays greater than 5 seconds will not be accepted.

- p. The 4-20 mA input signal shall control the motor speed between 10 percent of full speed and full speed. The 20mA signal being full speed and 4mA being minimum speed. The 4-20 mA input signal shall control the motor speed between the adjustable minimum and maximum speed settings. The minimum speed shall be field adjustable from 10-70 percent of rated speed. The maximum speed shall be field adjustable from 70-100 percent of rated speed. The minimum and maximum speed settings shall override the 4-20 mA signal at their respective settings. The speed signal shall follow a linear time ramp, adjustable from 4 to 20 seconds. Provide separate acceleration and deceleration control. The motor speed shall follow the input signal, in the steady state, with a plus or minus 2 percent linearity.
  - q. The drive shall be of modular construction for ease of maintenance.
  - r. The drive shall be capable of communicating monitoring and diagnostic functions.
  - s. Coordinate with the pump supplier for the installation and wiring associated with the seal leak/motor temperature sensor. Refer to the wiring diagrams for additional information.
    - 1) Provide, for remote use by others, two normally open contacts rated 3amps at 120 volt AC which close when the controller is running, or faults.
  - t. In pump applications and where shown on Drawings, the variable frequency drives shall contain the necessary circuitry to energize a 120 volt AC pump seal water solenoid valve when the pump is running. The rating of this circuit shall be sufficient to control a solenoid valve with an inrush of 360 VA and a holding VA of 120.
  - u. The drives including the enclosure and controls shown shall be assembled, and built by the manufacturer. Drives assembled by the Contractor do not comply with this specification.
  - v. The entire drive electronics/circuit boards shall be conformal coated.
  - w. Drives shall be provided with input surge protection and fast acting electronic fuses.
  - x. Three spare fans shall be provided.
  - y. The drive shall be supplied within a free standing NEMA 12 enclosure or as shown on contract drawings. Drives shall be constructed such that they can be located back to back. Service of equipment including fans and ventilation filters shall be from the front, of the enclosure. No maintenance of parts shall be required from the drive rear. Cable entry for incoming power and pump wiring shall be from the bottom or top of the enclosure as coordinated with the Contractor.
  - z. The door mounted keypad shall also serve to maintain/store the drive configuration.
  - aa. Selector switches, contactors, relays, pilot lights, etc., shall be NEMA rated.
  - bb. The drive including the VFD, contactors, relays, switches, drive enclosure shall be supplied as a complete system by the VFD manufacturer Rockwell or ABB.
4. All wires are to be identified, and the identifying mark shown on the schematics and wiring diagram. Documentation of schematics, wiring diagrams, terminal strips, and operating and maintenance manuals shall be supplied at Shop Drawing time and delivered with the equipment.
  5. The drive manufacturer shall provide a field start-up and calibration service on-Site for five eight hour days for the drives. The manufacturer shall configure the drive parameters based on the inputs shown and motor information as supplied by the Contractor/pump manufacturer/Owner. The manufacturer's personnel shall have a stable 4-20 mA source, and a plus or minus 0.5 percent accurate 3-1/2-digit, digital milliamp meter to be used in the calibration procedure.
  6. The system calibration shall be checked at 100 percent, 75 percent, 50 percent, and minimum speed points. The minimum and maximum speeds shall be set. The deceleration and acceleration rates shall be set. The delay to restart shall be set. Settings by the drive manufacturer, to be performed on-site as coordinated with the Owner/Engineer.
  7. Furnish a 36 month warranty on each drive from date drives are placed on-line at the Owner's facility.

8. Furnish one eight hour day of follow-up training following installation and start-up of the drives at the Owners facility. Provide training materials and handouts for up to twenty (20) people of the Owners staff.

PART 3 - EXECUTION

NOT USED

END OF SECTION

