Twin Equalization
Basin Improvements

Bid Opening: September 17, 2019

10:00 a.m.

PUBLIC WORKS DEPARTMENT

602 S. Main Street, Joplin Missouri 64801
Phone: 417-624-0820 Ext. 530 FAX: 417-625-4738

TABLE OF CONTENTS

Section A: Information for Bidders 1
Notice to Contractors 2
Scope of Work 5
Information for Bidders 6
Special Provisions 9

Section B: Documents Needed at Bid Opening 10
Proposal 11
Bid Bond 12
CDBG Bidder Qualifications & Certifications 13
Contractor Past Performance Questionnaire 15
Subcontractor Disclosure Form 17
Non-Collusion Affidavit 18

Section C: Documents Needed at Contract Execution 19
Agreement 20
Performance Bond 30
Payment Bond 32
Anti-Lobbying Certification 35
Restriction on Lobbying 36
Certification Regarding Equal Employment Opportunity 39
Demographic Information Form 40

Section D: Documents Needed Throughout Construction 42
Waiver and Release of Lien 43
Certificate of Contractor 44

Section E: Prevailing Wage 45
State of Missouri Prevailing Wage Law and Rules 46
State of Missouri DOL Annual Wage Order 47
Prevailing Wage Law, Chapter 290 51
Rules of Department of Labor and Industrial Relations 59
Affidavit of Compliance with the Prevailing Wage Law 61

Section F: Technical Specifications 62
01005 – Administrative Provisions 63
01300 – Submittals 73
01400 – Quality Control 79
01500 – Construction Facility and Temporary Controls 83
01600 – Material and Equipment 87
01610 – General Equipment Stipulations 91
01620 – Equipment Schedule 100
01700 – Contract Closeout 101
02060 – Demolition 106
02999 – Cleaning of Lagoon Cells and Land Application of Liquid Sludge 109
03600 – Grout 112
05550 – Anchor Bolts and Expansion Anchors 115
05990 – Structural and Miscellaneous Metals 117
13560 – Instrumentation 128
15101 – Sluice Gates 131
15900 – Electric Motor Operators 135
16000 – General Electrical Requirements 138
16060 – Grounding and Bonding for Electrical Systems 150
16120 – LV Electrical Power Conductors and Cables 156
16130 – Raceways and Boxes for Electrical Systems 162
16470 – Panelboards 171
16900 – Controls 179
16910 – Supervisory Control and Data Acquisition (SCADA) System 179
16962 – Submersible Pressure Transducer 189

Appendix A: SCADA Proposal 191

SECTION A:

INFORMATION FOR BIDDERS

NOTICE TO CONTRACTORS

Notice is hereby given that the Director of Public Works of the City of Joplin, Missouri, will accept sealed bids for the following improvements in the City of Joplin, Missouri:

Project:
Twin Equalization Basin Improvements

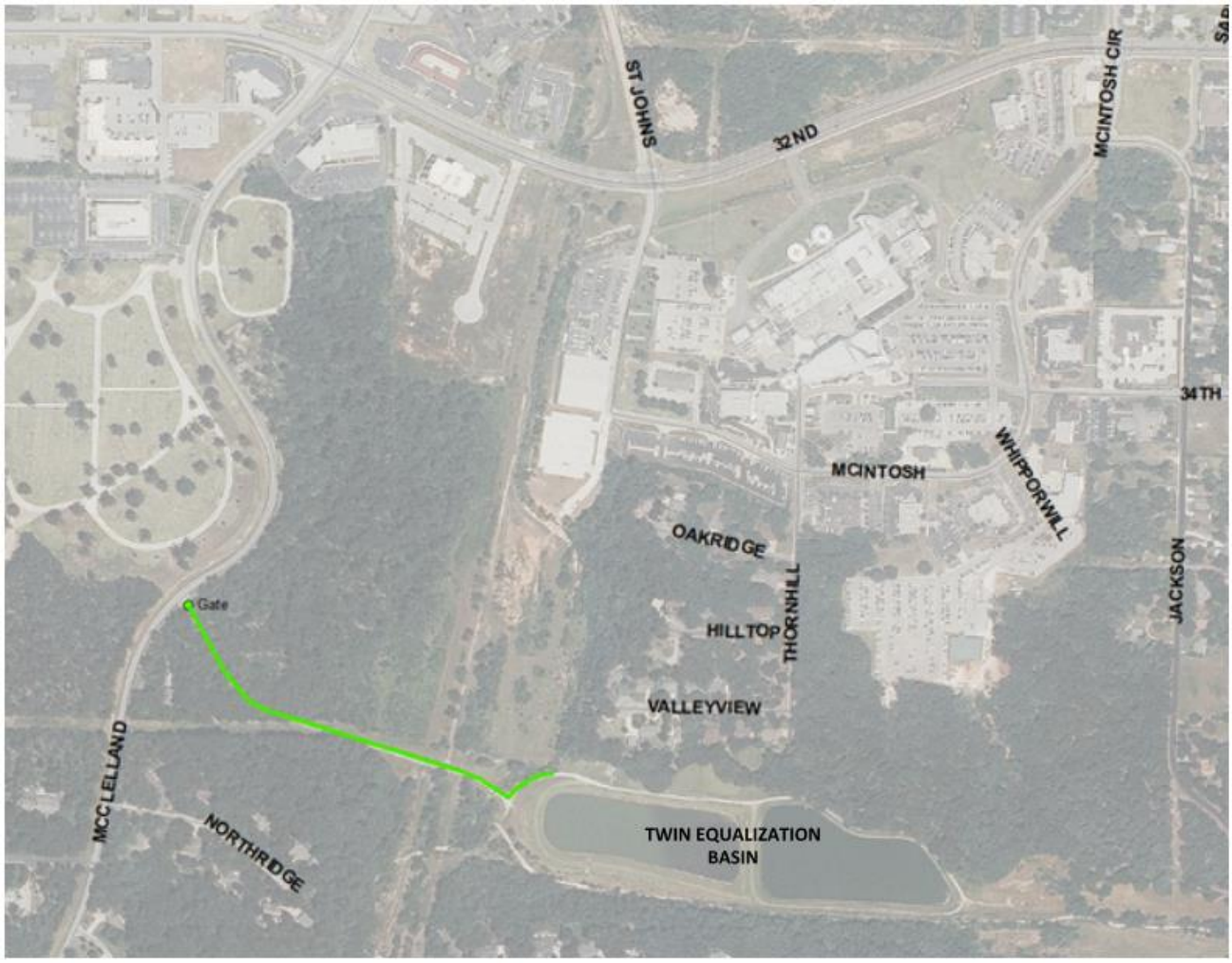
This project includes the construction of improvements to the Twin Equalization Basin owned by the City of Joplin. Improvements include demolition of existing weirs and sluice gates; installation of motor operated sluice gates, ultrasonic flow meter, and area-velocity flow meters; electrical and SCADA improvements to support installation of motor operated gates and flow meters; and removal of sludge from Upper and Lower Basins.

Copies of the plans and specifications are on file and may be examined at the office of Olsson. Bids must be in the hands of the City of Joplin Director of Public Works before 10:00 a.m. prevailing local time on September 17, 2019, at which time all bids will be opened by the Director of Public Works at the Joplin City Hall, 602 S. Main Street, Joplin MO 64801 in the 4th Floor Conference Room.

Plans and Specifications must be secured at the Tri-State Area Contractors Association, located at 1216 Illinois Avenue, Joplin, Mo. 64801 or by contacting Tri-State Area Contractors Association at info@tristatecontractors.net or 417-627-9392.

PLEASE NOTE: Official planholders list will only be the list maintained by Tri-State Area Contractors Association. It is the sole responsibility of all planholders, whether they have received digital downloads or paper copies of the plans and specifications, to return to planroom periodically to check for Addenda which may have been posted. Neither the Owner nor Engineers has any responsibility for the accuracy, completeness or sufficiency of any bid documents obtained from any source other than the source indicated in these documents. Obtaining these documents from any other source(s) may result in obtaining incomplete and inaccurate information. Obtaining these documents from any source other than directly from the source listed herein may also result in failure to receive any addenda, corrections, or other revisions to these documents that may be issued.

A Pre-bid Meeting will be held at 9:00 a.m., Wednesday September 4th, 2019, Twin Equalization Basin. All bidders are encouraged to attend the Pre-Bid Meeting and sign the attendance sheet at the meeting. No other site visits will be permitted outside of the pre-bid meeting. The gate is located at 37.049574, -94.535114 on McClelland Blvd.



The wage rates applicable to this project have been predetermined as required by law and are set forth in the construction specifications and are to be considered as a part of this Notice to Contractors.

A detailed listing of all subcontractors shall be provided by the Bidder. In accordance with the Contract Documents, documentation that the prospective General Contractor and its subcontractors meet minimum qualifications shall be provided and submitted.

The successful bidder will have to sign an agreement that they are enrolled and participating in a Federal Work Authorization Program ("FWAP") that ensures that all of its employees or agents or subcontractors have the legal right to work in the United States, as defined in 8 U.S.C. 1324a(h)(3) and RSMo § 285.525-285.555, and that it will maintain this compliance for the entire duration of its contract with the City of Joplin, and will provide an Affidavit of Compliance to the City stating the same.

Payment for this project will be made to the contractor in cash.

A bid bond or certified check for five percent (5%) of the total bid amount must accompany each bid. The successful bidder will be required to furnish a performance bond in the amount of his bid and shall, before entering on the work of said contract, be licensed as a contractor of the City of Joplin, Missouri. The Director of Public Works reserves the right to reject any or all bids.

The City of Joplin hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, sex, or national origin in consideration for an award. Also, the contractor will be required to have an approved Affirmative Action Program. Attention of bidders is particularly called to the requirement that an Affirmative Action Program must be adopted by the contractor and approved by the Affirmative Action Committee of the City of Joplin before the contract may be executed.

David Hertzberg, P.E.
DIRECTOR OF PUBLIC WORKS

SCOPE OF WORK

Project:
Twin Equalization Basin Improvements

PROJECT SCOPE DESCRIPTION

This project includes the construction of improvements to the Twin Equalization Basin owned by the City of Joplin. Improvements include demolition of existing weirs and sluice gates; installation of motor operated sluice gates, ultrasonic flow meter, and area-velocity flow meters; electrical and SCADA improvements to support installation of motor operated gates and flow meters; and removal of sludge from Upper and Lower Basins.

Equipment listed in Section 16910 shall be provided by Enviro-Line for the allowance listed in the Proposal. Enviro-Line shall become a supplier of the successful bidder for the listed equipment and services in the proposal. Items not included in the proposal, required for a complete and operational system, shall be provided by the Contractor.

Quantities and specific locations are subject to change depending on the bids received and as work progresses. See the project plan sheets for general locations and boundaries.

INFORMATION FOR BIDDERS

1. Receipt and Opening of Bids: The City of Joplin (herein called the "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the City Hall, 4th Floor Conference Room, 602 S. Main Street, Joplin, Missouri, 64804 until 10:00 a.m. prevailing local time September 17th, 2019 and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to the City of Joplin, 602 S. Main Street, Joplin, Missouri and designated as bid for **Twin Equalization Basin Improvements**.

   The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within ninety (90) days after the actual date of the opening thereof.

2. Preparation of Bid: Each bid must be submitted on the required BID form, included as part of these specifications, and accompanied by Certification by Bidder Regarding Equal Employment Opportunity, and completed Tables A-B for Section 3 requirements. All blank spaces for bid prices must be filled in, in ink or typewritten, and the foregoing Certifications must be fully completed and executed when submitted.

3. Subcontracts: The bidder is specifically advised that any person, or other party, to whom it is proposed to award a subcontract under this contract must be acceptable to the procurer

4. Telegraphic Modification: Any bidder may modify his bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the Owner prior to the closing time, and, provided further, the Owner is satisfied that a written confirmation of the telegraphic modification over the signature of the bidder was mailed prior to the closing time. The telegraphic communication should not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known by the Owner until the sealed bid is opened. If written confirmation is not received within two days from the closing time, no consideration will be given to the telegraphic modification.

5. Method of Bidding: The Owner invites the following bid(s): Lump sum submission in compliance with project drawings, specifications and contract documents. Award of the contract shall be based upon the lowest responsive, responsible bid submitted for the Total Contract Base Bid Amount.

6. Qualifications of Bidder: The Owner may make such investigations as he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The OWNER reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the owner that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

7. Bid Security: Each bid must be accompanied by a bid bond payable to the Owner for five percent (5%) of the total amount of the bid. As soon as the bid prices have been compared, the Owner will return all of the bonds except the three lowest responsible bidders. When the agreement is executed the bonds of the two remaining unsuccessful bidders will be returned. The bid bond of the successful bidder will be retained until the payment bond and performance bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a bid bond.

8. Liquidated Damages for Failure to Enter into Contract: The successful bidder, upon his failure or refusal to execute and deliver the contract and bonds required within 10 days after he received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid.

9. Time of Completion and Liquidated Damages: Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within the Time of Completion and Liquidated Damages requirements listed in Special Provisions, Paragraph 7, Project Special Provisions.

10. Conditions of Work: Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract. Insofar as possible the contractor, in carrying out the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

11. Addenda and Interpretations: No interpretation of the meaning to the plans, specifications, or other pre-bid documents will be made to any bidder orally. Every request for such interpretation should be addressed in writing addressed to the Consulting Engineer, Twin Equalization Basin Improvements, Attn: Shaun McConnaughey, P.E. smcconnaughey@olsson.com. To be given consideration, written requests must be received at least five (5) days prior to the date fixed for the opening of bids. Interpretations, supplemental instructions or clarifications considered necessary by the Engineer in response to such questions will be issued in the form of written addenda to the contract documents and specifications which, if issued, will be posted to the planroom found at Tri-State Area Contractors Association located at 1216 Illinois Avenue, Joplin, Mo. 64801 or by contacting Tri-State Area Contractors Association at info@tristatecontractors.net or 417-627-9392, not later than three days prior to the date fixed for the opening of bids. Questions received less than (5) days prior to the date for opening of bids may not be answered. Only answers issued by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

12. Security for Faithful Performance: Simultaneously with the delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the Agreement included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.

13. Power of Attorney: Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

14. Notice of Special Conditions: Attention is particularly called to those parts of the contract documents and specifications which deal with the following:

    a. Inspection and testing of materials.

    b. Insurance requirements.

    c. Wage rates.

    d. Stated allowances.

15. Laws and Regulations: The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

16. Method of Award - Lowest Qualified Bidder: Award of the contract shall be based upon the lowest responsive, responsible bid submitted for the Total Contract Base Bid Amount.

17. Obligation of Bidder: At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to his bid.

    a. Bidders are informed that pursuant to Section 285.530, RSMo, as a condition of the award of any contract in excess of five thousand dollars ($5,000), the successful bidder shall, by sworn affidavit and provision of documentation, affirm its enrollment and participation if a federal work authorization program with respect to the employees working in connection to the contracted services. Successful bidders shall also sign an affidavit affirming that it does not knowingly employ any person who is an unauthorized alien in connection to the contracted services.

18. Safety Standards and Accident Prevention: With respect to all work performed under this contract, the contractor shall:

    a. Comply with the safety standards provisions of applicable laws, building and construction codes, and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "Federal Register", Volume 36, No. 75, Saturday, April 17, 1971.

    b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.

    c. Maintain at his office or other well-known place at the job site, all articles necessary for giving first aid to the injured and shall make arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

19. Bidders are informed that the Project is subject to the requirements of Section 292.675, RSMo, which requires all contractors or subcontractors doing work on the Project to provide, and require its on-site employees to complete, a ten (10) hour course in construction safety and health approved by the Occupational Safety and Health Administration (“OSHA”) or a similar program approved by the Missouri Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The training must be completed within sixty (60) days of the date of work on the Project commences. On-site employees found on the worksite without documentation of the required training shall have twenty (20) days to procure documentation or be subject to removal from the Project.

20. Contractor's Responsibility for Subcontractors:

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

    b. Contractor shall cause appropriate provisions to be inserted in all subcontracts relating to this work, to bind all subcontractors to Contractor by all the terms herein set forth, and insofar as applicable to the work of subcontractors and to give Contractor the same power regarding termination of any subcontract as the City may exercise over Contractor under any provisions of this contract.

    c. Nothing contained in this contract shall create any contractual relation between the subcontractor and the City or between any subcontractors.

SPECIAL PROVISIONS

Project:
Twin Equalization Basin Improvements

1. Wage rates for this project shall be in accordance with wage rate determination made by the Missouri Department of Labor and Industrial Relations on file in the Department of Public Works. The wage rates applicable to this project have been predetermined as required by law and are set forth in the construction specifications and are to be considered as a part of this Notice to Contractors.
2. Contractors are cautioned that unbalanced bids can be rejected. The City reserves the right to reject or delete any part of the bid.
3. The City will issue a notice to proceed after the signing of the contract.
4. All work shall be in accordance with City of Joplin Standard Specifications that are in effect on the City of Joplin website dated 3/5/19, at http://joplinmo.org/DocumentCenter, by selecting Public Works>Standard & Specs>Standard Specs, and the project Drawings and Specifications included herewith. In occurrences where technical specification sections, drawings, drawing details or other notations address the same or similar items, methods or materials, the more stringent requirements shall govern.
5. Contractors shall abide by the requirements set by the United States Access Board for ADA guidelines and standards (ADAAG) by following the ADAAG standards for Public Right of Ways (PROWAG). The contractor is required to familiarize themselves with the PROWAG guidelines, latest edition. Details provided on the plans are designed to the new requirements but due to lack of survey information the contractor needs to verify in the field that all slope requirements can be met. If the requirements cannot be met then it is the responsibility to notify the City Engineer immediately for redesign or an alternative slope requirement within the PROWAG guidelines.
6. Bidder hereby agrees to commence work under this contract on or before a date to be specified in the Notice to Proceed, and to fully complete the project awarded to them within the requirements listed in Paragraph 7 below.
7. Project Special Provisions
    a. The contractor agrees to substantially complete the work within 120 calendar days after the start date specified in the Notice to Proceed, and to fully complete the work within 150 calendar days after the start date specified in the Notice to Proceed. A penalty in the amount of $1,000.00 shall be assessed in accordance with paragraph 13 of the Agreement for each calendar day all work in the agreement is not completed after 150 calendar days from the start date specified in the Notice to Proceed.
    b. Sales Tax Exemption: Senate Bill 477 has expanded the provisions of Section 144.062 of the Revised Statutes of Missouri (RSMo) to allow contractors to make tax-free purchases of materials and equipment for projects owned by tax-exempt entities. This change in Section 144.062 RSMo became effective on August 28, 1994. Purchases of construction materials, by the Contractor, for this project are exempt from sales tax. Prior to being eligible for this exemption, the attached “Missouri Project Exemption Certificate” must be completed by the Owner and presented to the Contractor. For more information about this exemption, the bidder may contact the Missouri Department of Revenue, Technical Support Section, Jefferson City, Missouri (573-751-2836).

DIVISION OF ENGINEERING

DEPARTMENT OF PUBLIC WORKS

SECTION B:

DOCUMENTS NEEDED AT BID OPENING

***The documents provided in this section are required IN ADDITION to all contract requirements. Exceptions will be dealt with on a case-by-case basis.*

PROPOSAL

THE UNDERSIGNED hereby proposes to furnish the labor and material for:

Project:
Twin Equalization Basin Improvements

in the City of Joplin, Missouri, according to the Drawings, Contract Documents and general specifications for such work on file in the office of the City Engineer and Director of Public Works, together with the terms and conditions to be stipulated in the general contract forms, now adopted by the City of Joplin, as advertised to be let on September 17th, 2019 at the following prices to-wit:

Section	**Lump Sum Bid Price**
Mobilization	$
Demolition and Removals	$
Dewater & Sludge Disposal	$
Controls, Flow Metering & SCADA Integration	$
Controls & SCADA Allowance	$
TOTAL	$

The undersigned agrees to enter into a contract within ten (10) days from notice of award should this proposal be accepted, and enter into bonds with good and sufficient securities, to substantially complete the within 120 calendar days after the start date specified in the Notice to Proceed, and to fully complete the work within 150 calendar days after the start date specified in the Notice to Proceed. A penalty of $1,000 per calendar days thereafter shall be instituted; the amount shall be deducted from the contract price. In order to pay all labor employed and material used in connection with this work and to adjust all claims or liens that may arise in consequence of said work, to the satisfaction of the Director of Public Works, above said bonds shall also indemnify and save harmless the said City from all damages or injuries to any person or persons, either in the employ of the contractor, his agents, servants or employees. In the event of the failure of the undersigned to enter into such contract within ten (10) days of the award, then the deposit or certified check of five percent (5%) of the Total Contract Bid Amount as surety is therefore forfeited to the City of Joplin.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the Contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from the any obligation in respect to his BID.

The low BIDDER shall supply the names and addresses of the major material SUPPLIERS AND SUBCONTRACTORS when requested to do so by the OWNER.

Dated _____day of _____, 20___.

Company _____

Address _____

Signature _____

(Print Name) _____

BID BOND PLACEHOLDER

BIDDER QUALIFICATIONS & CERTIFICATIONS

Firm Name: _____

(Company Name)

_____

(Address) (City, State, Zip)

_____

(Phone Number) (Fax Number) (E-mail)

Date: _____

Construction Capabilities:

- □ General Contracting
- □ Electrical
- □ Plumbing
- □ HVAC
- □ Demolition
- □ Earthmoving
- □ Asbestos Abatement
- □ Other: _____

For Corporations Only:

Federal ID Number: _____

Name of State(s) in which incorporated: _____

Date(s) of incorporation: _____

If not incorporated in Missouri:

1. Attach Certificate of Authority to do Business in Missouri
2. Certificate Number: _____ Date: _____

_____ _____

(President's Name) (Vice-President's Name)

_____ _____

(Secretary's Name) (Treasurer's Name)

For Partnerships Only: Date of Organization: _____

Type of Partnership: □ General □ Limited □ Association

Names and Addresses of all partners: (use additional sheet if necessary)

1. _____

(Name) (Address) (City, State, Zip Code)

2. _____

(Name) (Address) (City, State, Zip Code)

General Information:

Federal ID Number: _____ or SSN: _____

Percent of work done by Contractor: _____ Number of Permanent Employees: _____

Number of years in business: _____

Geographical limits of operation: _____

If you have done business under a different name, please give name and location: _____

_____

Has firm ever failed to complete a project or defaulted on a contract? If so, state where and why:

_____

_____

Date: Dated this _____ day of _____, 20____.

Signatures:

□ Individual □ Partnership □ Joint Venture □ Corporation

Business Name: _____

Address: _____

_____

Telephone: _____ Fax Number: _____

Federal ID Number: _____ or Social Security Number: _____

DUNS Number: _____

Incorporated under the laws of the State of: _____

(If a corporation is organized in a state other than Missouri, attach Certificate of Authority to do business in the State of Missouri.)

(Bidder's Signature) (Corporate Secretary's Signature and Seal)

(Typed or Printed Name of Signor)

(Seal)

(Partner/Joint Venture Signature)

(Typed or Printed Name of Signor)

Contractor Past Performance Questionnaire

_____

Legal Name of the Corporation, Firm or Individual Contractor

P.O Box_____City & State_____Zip Code_____

Street Address _____

(If different from P.O. Box:) City & State _____Zip Code_____

Telephone No. _____ Fax No. _____

E-Mail Address_____Contact person: _____

Has this firm or organization (or in the case of a partnership or joint venture, has any contractor which is included within this firm or organization) performed any work as a contractor or subcontractor for the City of Joplin, in the last five (5) years?_Yes _____No

If yes, give complete details, descriptions and dates on additional sheets as needed.

This firm or organization has_____years experience as a general contractor and/or_____years as a subcontractor in the type of work designated in this RFP.

Has your firm or organization ever failed to complete any work awarded to you?____Yes_____No

If so, where and why? (Attach additional sheets as needed.) _____

_____

Has your firm or organization ever failed to complete any work in a timely manner?____Yes___No
If so, where and why? (Attach additional sheets as needed.) _____

Does your firm or organization currently possess a City of Joplin contractor license?_____Yes_____No

This organization has completed the following similar projects for the type(s) of work designated in this RFP within the last five years. (Attach additional sheets as needed.)

Contract Amount	Type of Work	Key Personnel	When Completed	Location City and State	Project Owner's Name and Address

SUBCONTRACTOR DISCLOSURE FORM

CONTRACTOR:_____

PROJECT:_____

DATE: _____

SUBCONTRACTOR	CATEGORY OF WORK	DOLLAR VALUE
Name:		
Contact Name:		
Address:		
Phone Number:		
Fax Number:		
Email:		
Tax ID Number:	DUNS Number:	

Name:		
Contact Name:		
Address:		
Phone Number:		
Fax Number:		
Email:		
Tax ID Number:	DUNS Number:	

Name:		
Contact Name:		
Address:		
Phone Number:		
Fax Number:		
Email:		
Tax ID Number:	DUNS Number:	

Name:		
Contact Name:		
Address:		
Phone Number:		
Fax Number:		
Email:		
Tax ID Number:	DUNS Number:	

Name:		
Contact Name:		
Address:		
Phone Number:		
Fax Number:		
Email:		
Tax ID Number:	DUNS Number:	

Non-Collusion Affidavit

The undersigned affirm that they are duly authorized to execute this contract, that this company, firm, partnership, or individual has not prepared this proposal in collusion with any other proposer, and that the contents of this proposal as to prices, terms or conditions of said proposal have not been communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this proposal.

Vendor_____

Address_____

Phone_____

Proposer (Signature)_____

Proposer (Printed Name)_____

Position with Company_____

Signature of Company Official Authorizing this Proposal_____

Company Official (Printed Name)_____

Official Position_____

SECTION C:

DOCUMENTS NEEDED AT CONTRACT EXECUTION

***The documents provided in this section are required IN ADDITION to all contract requirements. Exceptions will be dealt with on a case-by-case basis.*

AGREEMENT
BETWEEN
CITY OF JOPLIN AND

CITY		CONTRACTOR	
CITY OF JOPLIN **602 S. MAIN STREET** **JOPLIN, MO 64801**		Name: Address:	
Attention:		Attention:	
Department:		Phone:	Fax:
Phone:	Fax:		

THIS AGREEMENT, made and entered into this ____ day of _____, 20____, by the parties identified above.

WITNESSETH: That whereas, the Contractor has become the lowest responsible bidder for furnishing the supervision, labor, tools, equipment, materials and supplies and for constructing the following City improvements:

Twin Equalization
Basin Improvements

The City and Contractor agree to the following:

1. Manner and Time for Completion. The Contractor will furnish all supervision, labor, tools, equipment, materials and supplies necessary to perform, and to perform said work at Contractor's own expense in accordance with the contract documents and any applicable City ordinances and state and federal laws within 90 calendar days from the date Contractor is ordered to proceed, which order shall be issued by the Director of Public Works within 30 days after the date of this contract.

2. Prevailing Wages. All labor utilized in the construction of the aforementioned improvements shall be paid a wage of no less than the "prevailing hourly rate of wages" for work of a similar character in this locality, as established and amended at any time by the Department of Labor and Industrial Relations of the State of Missouri. At any time the contractor is found to not have paid prevailing wages, the contractor shall forfeit as a penalty to the city one hundred dollars for each underpaid worker employed, for each calendar day, or portion thereof such worker is paid less than the said stipulated rates for any work done under this contract.

3. Insurance Requirements. Without limiting any of the other obligations or liabilities of the Contractor, the Contractor shall secure and maintain at its own cost and expense, throughout the duration of this Contract and until the work is completed and accepted by the City of Joplin, insurance of such types and in such amounts as may be necessary to protect it and the interests of the

City of Joplin against all hazards or risks of loss as hereunder specified or which may arise out of the performance of the Contract Documents. The form and limits of such insurance, together with the underwriter thereof in each case, are subject to approval by the City of Joplin. Regardless of such approval, it shall be the responsibility of the contractor to maintain adequate insurance coverage at all times during the term of the Contract. Failure of the Contractor to maintain coverage shall not relieve it of any contractual responsibility or obligation or liability in general or under the Contract Documents.

The certificates of insurance, including evidence of the required endorsements hereunder or the policies, shall be filed with the City within ten (10) days after the date of the receipt of Notice of Award of the Contract to the Contractor and prior to the start of work. All insurance policies shall require that the insurance company in question provide thirty (30) days written notice prior to modification or cancellation of such insurance. Such notices shall be mailed, certified mail, return receipt requested, to:

City of Joplin - Public Works, 602 S. Main Street, Joplin, MO 64801

Such policies shall name the City as an additional insured, with limits of liability not less than the sovereign immunity limits for Missouri public entities calculated by the Missouri Department of Insurance as of January 1 each calendar year and published annually in the Missouri Register pursuant to Section 537.610, RSMo. (See, http://insurance.mo.gov/industry/sovimmunity.php)

As of January 1, 2019, the minimum coverage for the insurance referred to herein shall be as set out below:

a. Workers' Compensation…. Statutory coverage per RSMo 287.010 et seq

Employer's Liability……. $1,000,000.00

b. Commercial General Liability Insurance, including coverage for Premises, Operations, Products and Completed Operations, Contractual Liability, Broad Form Property Damage, Independent Contractors, Explosion, Collapse, and Underground Property Damage and endorsed for blasting if blasting required. Such coverage shall apply to bodily injury and property damage on an "Occurrence Form Basis" with limits of at least Two Million Eight Hundred Sixty-Five Thousand Three Hundred Thirty and no/100 Dollars ($2,865,330.00) for all claims arising out of a single accident or occurrence and at least Four Hundred Twenty Nine Thousand Seven Hundred Ninety-Nine and no/100 Dollars ($429,799.00) with respect to injuries and/or death of any one person in a single occurrence and an amount not less than at least $1,000,000 for all claims to property arising out of a single occurrence and at least $100,000 to any one owner with respect to damages to property. Contractor agrees that the proceeds of such insurance policy shall first be used to pay any award, damages, costs, and/or attorneys' fees incurred by or assessed against City, its employees, officers and agents, before payment of any award, damages, costs or attorneys' fees of Contractor, its employees, officers or agents. Contractor agrees to cause its insurer to name City as an additional insured on such insurance policy, including the City as an additional insured for coverage under its products-completed operations hazard, and said policy shall be primary and noncontributory.

c. Automobile Liability Insurance covering bodily injury and property damage for owned, non-owned and hired vehicles, with limits of at least Two Million Eight Hundred Sixty-Five Thousand Three Hundred Thirty and no/100 Dollars ($2,865,330.00) for all claims arising out of a single accident or occurrence and at least Four Hundred Twenty Nine Thousand Seven Hundred Ninety-Nine and no/100 Dollars ($429,799.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

d. Owner's and Contractor's Protective Liability Insurance to protect the City, its agents, servants and employees from claims which may arise from the performance of this Contract, with limits of at least Two Million Eight Hundred Sixty-Five Thousand Three Hundred Thirty and no/100 Dollars ($2,865,330.00) for all claims arising out of a single accident or occurrence and at least Four Hundred Twenty Nine Thousand Seven Hundred Ninety-Nine and no/100 Dollars ($429,799.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

The Owner's and Contractor's Protective Liability Insurance must:

(1) Be a separate policy with the named insured being: The City of Joplin, and

(2) Contain an endorsement that disclaims coverage for any claim barred by the doctrines of sovereign immunity or official immunity, except attorney's fees and other litigation costs incurred in defending a claim. Nothing contained in this policy (or this endorsement thereto) shall constitute any waiver of whatever kind of these defenses or sovereign immunity or official immunity for any monetary amount whatsoever.

e. Builders Risk Insurance for contracts involving unoccupied structures. The Contractor shall secure All Risk Builder's Risk Insurance. Unless specifically authorized by the City, the amount of such insurance shall not be less than the total contract price.

f. Subcontracts. In case any or all of this work is sublet, the Contractor shall require the subcontractor to procure and maintain all insurance required in subparagraphs (a), (b) and (c) hereof and in like amounts. Contractor shall require any and all subcontractors with whom it enters into a contract to perform work on this project to protect the City of Joplin through insurance against applicable hazards or risks and shall, upon request of the City, provide evidence of such insurance.

g. Notice. The Contractor and/or subcontractor shall furnish the City prior to beginning the work, the policy as specified in subparagraph (d), and satisfactory proof of carriage of all the insurance required by this contract, with the provision that policies shall not be canceled, modified or non-renewed without thirty (30) days written notice to the City of Joplin.

h. Legislative or Judicial Changes. In the event the scope or extent of the City's tort liability as a governmental entity as described in Section 537.600 through 537.650 RSMo is broadened or increased during the term of this agreement by legislative or judicial action, the City may require Contractor, upon 10 days written notice, to execute a contract addendum whereby the Contractor agrees to provide, at a price not exceeding Contractor's actual increased premium cost, additional liability insurance coverage as the City may require to protect the City from increased tort liability exposure as the result of such legislative or judicial action. Any such additional insurance coverage shall be evidenced by an appropriate certificate of insurance and shall take effect within the time set forth in the addendum.

4. Performance, Labor, and Materials Payment Bond: The Contractor shall furnish a Performance Bond and a Labor and Materials Payment Bond with surety approved by the City and on the forms approved by the City, each bond shall be in the amount of $_____ (full amount of contract) conditioned upon the full and faithful performance of all major terms and conditions of this contract and payment of all labor and material suppliers. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bond(s) hereto attached for its faithful performance and payment of labor and material suppliers, the City shall deem the surety or sureties upon such bond(s) to be unsatisfactory, or if, for any reason, such bond(s) ceases to be adequate to cover the performance of the work, the Contractor shall, at its expense, within five (5) days after the receipt of notice from the City to do so, furnish an additional bond or bonds, in such form and amount, and with such surety or sureties as shall be satisfactory to the City. In such event no further payment to the Contractor shall be deemed to be due under this contract until such new or additional security for the faithful performance of the work and the payment of labor and material suppliers shall be furnished in a manner and form satisfactory to the City. The corporate surety on any performance or payment bond must be licensed by the State of Missouri and if the required bond exceeds $25,000.00 must be listed in United States Treasury Circular 570.

5. Certification Regarding Disbarment, Eligibility, Indictments, Convictions or Civil Judgements for all Federal Aid Projects: By signing and submitting the bid, the president or authorized official of the bidder, under penalty of perjury under the laws of the USA, shall certify that, except as noted in the exceptions, the company or any person associated therewith in the capacity of owner, partner, director, officer, principal investor, project director, manager, auditor or any position involving the administration of federal funds:
(Reference can be made to "The System for Award Management" website as a helpful resource).

a. Is not currently under suspension, debarment, voluntary exclusion or determination of ineligibility by any federal agency.

b. Has not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past three years.

c. Does not have a proposed debarment or suspension pending.

d. Has not been indicted, convicted or had a civil judgment rendered against any of the listed parties by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three years.

5.1 If there are any exceptions, the bidder shall submit the exceptions on company letterhead, signed by the bidder and inserted inside the bid submitted. Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted, the bidder shall indicate to whom it applies, the initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

5.2 By signing the contract, the contractor shall further certify that all related subcontracts of $25,000 shall comply with this requirement. This includes all subcontractors, material suppliers and vendors.

6. Contractor's responsibility for subcontractors. The Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for the acts and omissions of persons it directly employs. Contractor shall cause appropriate provisions to be inserted in all subcontracts relating to this work, to bind all subcontractors to Contractor by all the terms herein set forth, and insofar as applicable to the work of subcontractors and to give Contractor the same power regarding termination of any subcontract as the City may exercise over Contractor under any provisions of this contract. Nothing contained in this contract shall create any contractual relation between the subcontractor and the City or between any subcontractors.

7. General Independent Contractor Clause. This agreement does not create an employee/employer relationship between the parties. It is the parties' intention that the Contractor will be an independent contractor and not the City's employee for all purposes, including, but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, Missouri Revenue and Taxation laws, Missouri Workers' Compensation and Unemployment Insurance laws. The Contractor will retain sole and absolute discretion in the judgment of the manner and means of carrying out the Contractor's activities and responsibilities hereunder. The Contractor agrees that it is a separate and independent enterprise from the public employer, that it has a full opportunity to find other business, that it has made its own investment in its business, and that it will utilize a high level of skill necessary to perform the work. This agreement shall not be construed as creating any joint employment relationship between the Contractor and the City, and the City will not be liable for any obligation incurred by the Contractor, including but not limited to unpaid minimum wages and/or overtime premiums.

8. Liquidated Damages. Time of completion of work by the Contractor is of the essence. Should Contractor, or in the case of default, the surety, fail to complete the work within the time specified in the contract, or within such extra time as may be allowed in accordance with City of Joplin Standard Specifications, Division 0000, General Requirements and Provisions, Section 0400.19, (http://mo-joplin.civicplus.com/DocumentCenter/View/3460) Contractor (or surety) shall be liable to the City in the amount of $1000 per day for each and every calendar day that the contract remains uncompleted after the time allowed for completion, as liquidated damages, and not as a penalty, it being stipulated that actual damages to the City and the public arising from Contractor's failure to timely complete the work would be difficult, if not impossible, to ascertain. The amount assessed as liquidated damages may be withheld from any moneys otherwise due to Contractor from the City.

9. Termination. The City reserves the right to terminate this contract by giving at least five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the City should the Contractor be adjudged a bankrupt, or if Contractor should make a general assignment for the benefit of its creditors, or if a receiver should be appointed for Contractor or for any of its property, or if Contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workmen or proper material, or if Contractor should refuse or fail to make prompt payment to any person supplying labor or materials for the work under the contract, or persistently disregard instructions of the City or fail to observe or perform any provisions of the contract.

10. City's Right to Proceed. In the event this contract is terminated pursuant to Paragraph 8, then the City may take over the work and prosecute the same to completion, by contract or otherwise, and Contractor and its sureties shall be liable to the City for any costs over the amount of this contract thereby occasioned by the City. In any such case, the City may take possession of, and utilize in completing the work, such materials, appliances and structures as may be on the work site and are necessary for completion of the work. The foregoing provisions are in addition to, and not in limitation of, the rights of the City under any other provisions of the contract, city ordinances, and state and federal laws.

11. Termination for Convenience of City. The City shall have the right at any time by written notice to Contractor to terminate and cancel this contract, without cause, for the convenience of the City, and Contractor shall immediately stop work. In such event City shall not be liable to Contractor except for payment for actual work performed prior to such notice in an amount proportionate to the completed contract price and for the actual costs of preparations made by Contractor for the performance of the cancelled portions of the contract, including a reasonable allowance of profit applicable to the actual work performed and such preparations. Anticipatory profits and consequential damages shall not be recoverable by Contractor.

12. Guards and Lights. The Contractor agrees that during the performance of said work, adequate barricades, guards and warning signs, lights or devices consistent with the requirements contained in the Manual on Uniform Traffic Control Devices shall be provided by Contractor during construction.

13. Liability and Indemnity.

a. In no event shall the City be liable to the Contractor for special, indirect, or consequential damages, except those caused by the City's gross negligence or willful or wanton misconduct arising out of or in any way connected with a breach of this contract. The maximum liability of the City shall be limited to the amount of money to be paid or received by the City under this contract.

b. The Contractor shall defend, indemnify and save harmless the City, its elected or appointed officials, agents and employees from and against any and all liability, suits, damages, costs (including attorney fees), losses, outlays and expenses from claims in any manner caused by, or allegedly caused by, or arising out of, or connected with, this contract, or the work or any subcontract thereunder (the Contractor hereby assuming full responsibility for relations with subcontractors), including, but not limited to, claims for personal injuries, death, property damage, or for damages from the award of this contract to Contractor, notwithstanding any possible negligence, whether sole or concurrent, on the part of the City, its officials, agents and employees.

c. The Contractor shall indemnify and hold the City harmless from all wages or overtime compensation due any employees in rendering services pursuant to this agreement or any subcontract, including payment of reasonable attorneys' fees and costs in the defense of any claim made under the Fair Labor Standards Act, the Missouri Prevailing Wage Law or any other federal or state law.

d. The indemnification obligations of Contractor hereunder shall not be limited by any limitations as to the amount or type of damages, compensation or benefits payable by or for the Contractor, under any federal or state law, to any person asserting the claim against City, its elected or appointed officials, agents and employees, for which indemnification is sought.

e. The indemnification obligations herein shall not negate, abridge or reduce in any way any additional indemnification rights of the City, its elected or appointed officials, agents and employees, which are otherwise available under statute, or in law or equity.

f. Contractor affirms that it has had the opportunity to recover the costs of the liability insurance required in this agreement in its contract price. Contractor's obligation under this agreement to defend, indemnify, and hold harmless any person from that person's own negligence or wrongdoing is limited to the coverage and limits of the applicable insurance required of the Contractor under this agreement.

g. The Contractor shall indemnify and hold the City harmless for any penalties, fines, fees or costs, including costs of defense, which are charged or assessed by any Federal, state or local agency including, but not limited to, Environmental Protection Agency or Department of Natural Resources.

14. Payment for Labor and Materials. The Contractor agrees and binds itself to pay for all labor done, and for all the materials used in the construction of the work to be completed pursuant to this contract.

15. Payment. The City will pay the Contractor in accordance with the rate set forth in the contract documents on file in the Public Works Department and by this reference made a part hereof, which shall constitute full and complete compensation for the Contractor's work provided hereunder. Such compensation will be paid in progress payments (less five (5) percent retainage), as established by the City, subject to receipt of a requisition for payment and a statement of work provided by the Contractor and agreement by both the City and the Contractor that the Contractor has fully performed the work to be paid for in such progress payments in conformance with the contract. If the City or the architect or engineer determines that a higher rate of retainage is required to ensure performance of the contract, the City may withhold up to ten (10) percent retainage until the work is fully completed and accepted by the City.

16. Contract Documents. The contract documents shall consist of the following:

a. This Contract
b. All Change Orders
c. Bid Plans and Specifications
d. City of Joplin Standard Specifications (Latest Revised Edition)
e. Special Conditions & Provisions
f. Proposal

g. Statement of Bidder's Qualifications
h. Acknowledgment
i. Performance Bond
h. Payment and Material Bond
k. Instructions to Bidders
l. Non-collusion Affidavit
m. Notice to Proceed

Notice to Contractors: This contract, together with the other documents enumerated in this paragraph, forms the contract between the parties. These documents are as fully a part of the contract as if attached hereto or repeated herein. The Contractor agrees to perform all of the work described in the contract documents and to comply with the terms and conditions defined therein for a total sum of ORIGINAL CONTRACT AMOUNT WRITTEN OUT ($) dollars, said amount being subject to any approved addenda or change order.

17. Subsurface Conditions. Contractor agrees that information contained in the published reports and public actions of the Missouri Division of Geology and Land Survey shall be conclusive and binding upon the Contractor as to what subsurface conditions at the job site are reasonably anticipated or reasonably foreseeable. Contractor acknowledges and agrees that it shall not be entitled to any adjustment in the Contract Sum or Contract Times for any concealed condition of any nature, including but not limited to unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, in addition to the information contained in the published reports and public actions of the Missouri Division of Geology and Land Survey. Contractor recognizes that it has assumed the risks of concealed conditions and is being compensated for assuming these risks.

18. Conflict of Interest. In accepting this contract, Contractor certifies that no member or officer of its firm or corporation is an officer or employee of the City of Joplin, Missouri, or any of its boards or agencies, and further that no officer or employee of the City has any financial interest, direct or indirect, in this contract. All applicable federal regulations and provisions of R.S.Mo. Section 105.450 et seq. shall not be violated.

19. Assignment. The Contractor shall not assign any interest in this contract, and shall not transfer any interest in the same (whether by assignment or novation), without prior written consent of the City thereto, provided, however, that claims for money due or to become due to the Contractor from the City under this Contract may be assigned to a bank, trust company, or other financial institution without such approval. Notice of such assignment or transfer shall be furnished in writing promptly to the City and the bond surety. Any such assignment is expressly subject to all rights and remedies of the City under this agreement, including the right to change or delete activities from the Contract or to terminate the same as provided herein, and no such assignment shall require the City to give any notice to any such assignee of any actions which the City may take under this agreement.

20. Nondiscrimination. The Contractor agrees in the performance of this contract not to discriminate on the ground or because of race, creed, color, national origin or ancestry, sex, religion, handicap, age, status as a protected veteran or status as a qualified individual with a disability, or political opinion or affiliation, against any employee of Contractor or applicant for employment and shall include a similar provision in all subcontracts let or awarded hereunder. The parties hereby incorporate the requirements of 41 C.F.R. §§ 60-1.4(a)(7), 29 C.F.R. Part 471, Appendix A to Subpart A, 41 C.F.R. § 60-300.5(a)ii and 41 C.F.R. § 60-741.5(a), if applicable.

a. This contractor and subcontractor shall abide by the requirements of 41 C.F.R. § 60-300.5(a). This regulation prohibits discriminations against qualified protected veterans, and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans.

b. This contractor and subcontractor shall abide by the requirements of 41 C.F.R. § 60-741.5(a). This regulation prohibits discrimination against qualified individuals on the basis of disability, and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified individuals with disabilities.

21. Nonresident/Foreign Contractors. The Contractor shall procure and maintain during the life of this contract:

a. If the Contractor is a foreign corporation, a certificate of authority to transact business in the State of Missouri from the Secretary of State, unless exempt pursuant to the provisions of Section 351.570 R.S.Mo.

b. A certificate from the Missouri Director of Revenue evidencing compliance with the transient employer financial assurance law, unless exempt pursuant to the provisions of Section 285.230 RSMo.

22. Notices. All notices required or permitted hereinunder and required to be in writing may be given by FAX or by first class mail addressed to City and Contractor at the addresses shown above. The date of delivery of any notice given by mail shall be the date falling on the second full day after the day of its mailing. The date of delivery of notice by FAX transmission shall be deemed to be the date transmission occurs, except where the transmission is not completed by 5:00 p.m. on a regular business day at the terminal of the receiving party, in which case the date of delivery shall be deemed to fall on the next regular business day for the receiving party.

23. Records and Audits. The Contractor shall maintain accounts and records, including personnel, property, and financial records, adequate to identify and account for all costs pertaining to the Contract and such other records as may be deemed necessary by the City to assure proper accounting for all project funds. These records will be made available for audit purposes to the City or any authorized representative, and will be retained for three years after the expiration of this Contract.

24. Authorized Employees. Contractor acknowledges that Section285.530, RSMo, prohibits any business entity or employer from knowingly employing, hiring for employment, or continuing to employ an unauthorized alien to perform work within the State of Missouri. Contractor therefore covenants that is not knowingly in violation of subsection 1 or Section 285.530, RSMo, and that it will not knowingly employ, hire for employment, or continue to employ any unauthorized aliens to perform work on the Project, and that its employees are lawfully to work in the United States.

25. Interest of Contractor and Employees. The Contractor covenants that he/she presently has no interest and shall not acquire interest, direct or indirect, in the study area or any parcels therein or any other interest which would conflict in any manner or degree with the performance of his services hereunder. The Contractor further covenants that in the performance of this Contract, no person having any such interest shall be employed.

26. Interest of Members of a City. No member of the governing body of the City and no other officer, employee, or agent of the City who exercises any functions or responsibilities in connection with the planning and carrying out of the program, shall have any personal financial interest, direct or indirect, in this Contract, and the Contractor shall take appropriate steps to assure compliance.

27. Interest of Other Local Public Officials. No member of the governing body of the locality and no other public official of such locality, who exercises any functions or responsibilities in connection with the planning and carrying out of the program, shall have any personal financial interest, direct or indirect, in this Contract, and the Contractor shall take appropriate steps to assure compliance.

28. Affidavit for Contracts Over $5,000.00. That pursuant to Missouri Revised Statute Sections 285.525 through 285.550, if this contract exceeds the amount of $5,000.00 and Contractor is associated with a business entity, Contractor shall provide an acceptable notarized affidavit stating that the associated business entity is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the contracted services, and that said business entity does not knowingly employ any person who is an unauthorized alien in connection with the contracted services. Additionally, Contractor must provide documentation for said business entity evidencing current enrollment in a federal work authorization program.

29. City Benefits. The Contractor shall not be entitled to any of the benefits established for the employees of the City nor be covered by the Worker's Compensation Program of the City.

30. Occupational License: The Contractor shall obtain and maintain an occupational license with the City of Joplin, Missouri, if required by city code and any required state or federal license. The cost for this occupational license shall be borne by the Contractor. No contract will be executed by the City until this occupational license has been obtained and that the Contractor is current on any City taxes is verified.

31. Safety Training. Pursuant to Missouri Revised Statute Section 292.675, Contractors and subcontractors who sign a contract to work on public works projects must provide a 10-hour OSHA construction safety program, or similar program approved by the Department of Labor and Industrial Relations, to be completed by their on-site employees within sixty (60) days of beginning work on the construction project. Contractors and subcontractors in violation of this provision will forfeit to the public body $2,500 plus $100 a day for each employee who is employed without training. Public bodies and contractors may withhold/assess these penalties from the payment due to those contractors and subcontractors if found to be in non-compliance.

32. Compliance with Laws. Contractor agrees to comply with all applicable federal, state and local laws or rules and regulations applicable to the provision of services and products hereunder. Contractor affirmatively states that payment of all local, state, and federal taxes and assessments owed by Contractor is current.

33. Entire Agreement. This agreement contains the entire agreement of the parties. No modification, amendment, or waiver of any of the provisions of this agreement shall be effective unless in writing specifically referring hereto, and signed by both parties.

34. Remedies. Except as may be otherwise found in the contract documents, all claims, disputes, counter-claims, and other matters in question between the Owner and Contractor arising out of or related to this agreement or the breech thereof, will be decided by arbitration if the parties hereto mutually agree, or in a court of competent jurisdiction within the state in which the Owner is located.

35. Jurisdiction. This agreement and every question arising hereunder shall be construed or determined according to the laws of the State of Missouri. Should any part of this agreement be adjudicated, venue shall be proper only in the Circuit Court of Jasper County, Missouri.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals on the day and year herein stated.

CONTRACTOR:

CERTIFICATE OF DIRECTOR OF FINANCE

I certify that the expenditure contemplated by this document is within the purpose of the appropriation to which it is to be charged and that there is an unencumbered balance of appropriated and available funds to pay therefor.

By: _____

Printed Name: _____

Title: _____

_____
Leslie Haase, Director of Finance

CITY OF JOPLIN, MISSOURI

APPROVED AS TO FORM

_____
Peter Edwards, City Attorney

By: _____
David Hertzberg, Public Works Director

CONTRACTOR'S BOND NO.
FOR CITY CONTRACTS

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: That

{Contractor Name}

a Corporation, hereinafter called Principal, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, in the total aggregate penal sum of {total aggregate penal sum in performance bond spelled out} AND {total aggregate penal sum in performance bond $XXX.00} in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

Twin Equalization
Basin Improvements

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, or any extensions thereof, which may be granted by the OWNER, with or with-out notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment of the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and PRINCIPAL shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER are the only beneficiaries hereunder.

IN WITNESS, this instrument is executed in __ ( ) counterparts, each one of which shall be deemed an original, whereof, this the _____ day of _____, 20____.

ATTEST: (SEAL)

_____ _____
Secretary Principal

Approved as to form this _____ day

of _____, 20____. By _____

_____ By _____
City Attorney

ATTEST: (SEAL)

_____ _____
Secretary Surety

Approved this _____ day of

_____, 20_____. By _____

_____ By _____
Director of Finance (Title)

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.
IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

CONTRACTOR'S BOND NO.
FOR CITY CONTRACTS
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That

{CONTRACTOR NAME}

a Corporation, hereinafter called Principal, and

_____
(Name of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum {total aggregate penal sum in payment bond spelled out} ({total aggregate penal sum in payment bond $XXX.00}) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of:

Twin Equalization
Basin Improvements

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal or coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, all insurance premiums on said work, and for all labor cost incurred in such WORK including the stipulation in said contract requiring the payment of not less than the prevailing hourly rate of wages as found by the Department of Labor and Industrial Relations of the State of Missouri or by final judicial determination of the Courts of the State of Missouri, including that by a SUBCONTRACTOR, and to any mechanic or material man lien holder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCON- TRACTORS, any persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no suit or action shall be commended hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL, shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need to be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, it being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction thereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan documents shall include any alteration, addition, extension or modification of any character whatsoever.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of the other beneficiary hereunder, whose claim may be unsatisfied. The OWNER are the only beneficiaries hereunder.

IN WITNESS, this instrument is executed in __ ( ) counterparts, each one of which shall be deemed an original whereof, this the _____ day of _____, 20___.

ATTEST: (SEAL)

_____ _____
Secretary Principal

Approved as to form this _____ day
of _____, 20____. By _____

_____ By _____
City Attorney

ATTEST: (SEAL)

_____ _____
Secretary Surety

Approved this _____ day of

_____, 20____. By

_____

_____ By_____
Director of Finance (Title)

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

ANTI-LOBBYING CERTIFICATION

Section 319 of Public Law 101-121 prohibits recipients of Federal contracts, grants, and loans from using appropriated funds for lobbying the Executive or Legislative branches of the Federal Government in connection with a specific contract, grant, cooperative agreement, or loan.

The Federal Register (page 52070, dated December 20, 1989) specifically forbids the Department of Housing and Urban Development (HUD) from awarding contracts, grants, cooperative agreements, or loans unless the recipient has made an acceptable certification regarding lobbying.

This new requirement has since been narrowed to signed certifications for all awards of Federal funds over $100,000. This begins with the State's grant and applies to all grantees, contractors, subcontractors, suppliers, etc. for all contracts, grants, cooperative agreements, or loans over $100,000.

Failure of the grantee to obtain this certification from all awards of $100,000 or more will result in a program finding and suspended disbursement of Federal funds for the applicable activity or contract.

A copy of this certification can be found on the following page.

RESTRICTION ON LOBBYING

(For contracts, grants, cooperative agreements, and loans over $100,000)

The undersigned certifies, to the best of his knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards (at all tiers, including contracts under grants, loans, and cooperative agreements, subcontracts, and subgrants) over $100,000, and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction impost by Section 1352, Title 31, U.S.C. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____

Name of Entity (city, county, contractor, etc.)

_____

Name of Certifying Official (Mayor, Presiding Commissioner, President, etc.)

_____ _____

Signature of Certifying Official Date

STATE OF _____)

)ss

COUNTY OF_____)

AFFIDAVIT
(as required by Section 285.530, Revised Statues of Missouri)

As used in this Affidavit, the following terms shall have the following meanings:

EMPLOYEE: Any person performing work or service of any kind for hire within the State of Missouri.

FEDERAL WORK AUTHORIZATION PROGRAM: Any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or an equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, under the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603.

KNOWINGLY: A person acts knowingly or with knowledge,

(a) with respect to the person's conduct or to attendant circumstances when the person is aware of the nature of the person's conduct or that those circumstances exist; or
(b) with respect to a result of the person's conduct when the person is aware that the person's conduct is practically certain to cause that result.

UNAUTHORIZED ALIEN: An alien who does not have the legal right or authorization under federal law to work in the United States, as defined in 8 U.S.C. 1324a(h)(3).

BEFORE ME, the undersigned authority, personally appeared_____ _____, who, being duly sworn, states on his oath or affirmation as follows:

1. My name is _____ and I am currently the President of _____(hereinafter "Contractor"), whose business address is _____ "and I am authorized to make this Affidavit.

2. I am of sound mind and capable of making this Affidavit and am personally acquainted with the facts stated herein.

3. Contractor is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the following services contracted between Contractor and the City of Joplin.

4. Contractor does not knowingly employ any person who is an unauthorized alien in connection with the contracted services set forth above.

5. Attached hereto is documentation affirming Contractor's enrollment and participation in a federal work authorization program with respect to the employees working in connection with the contracted services.

Further, Affiant sayeth not.

Affiant

Subscribed and sworn to before me this ____ day of _____, 20___.

Commission #

CERTIFICATION BY PROPOSED BIDDER REGARDING EQUAL EMPLOYMENT OPPORTUNITY

INSTRUCTIONS:

The certification is required pursuant to Executive Order 11246 (30 F.R. 12319-25). The implementing rules and regulations provide that any bidder or prospective contractor, or any of their proposed subcontractors, shall state as an initial part of the bid or negotiations of the contract whether it has participated in any previous contract or subcontract subject to the equal opportunity clause; and, if so, whether it has filed all compliance reports due under applicable instructions.

Where the certification indicates that the subcontractor has not filed a compliance report due under applicable instructions, such subcontractor shall be required to submit a compliance report before the owner approves the subcontract or permits work to begin under the subcontract.

BIDDER'S CERTIFICATION

NAME AND ADDRESS OF SUBCONTRACTOR (Include ZIP Code):

1. Bidder has participated in a previous contract or subcontract subject to the Equal Opportunity Clause.

   ☐YES ☐NO

2. Compliance reports were required to be filed in connection with such contract or subcontract.

   ☐YES ☐NO

3. Bidder has filed all compliance reports due under applicable instructions.

   ☐YES ☐NO

4. Have you ever been or are you being considered for sanction due to violation of Executive Order 11246, as amended?

   ☐YES ☐NO

NAME AND TITLE OF SIGNER (Please type):

SIGNATURE DATE

DEMOGRAPHIC INFORMATION FORM

Please complete the Demographic Information Form required per HUD 24 CFR 570.506(g)(6) for all contracts (both prime contractors and subcontractors) that will be receiving $25,000 or more in CDBG funds. Please use the racial and ethnic codes located in the chart on the next page. Use additional pages as needed.

Project Name/ Number _____

Contractor/ Engineer _____

Address, City, State, and Zip _____

Contact Person _____ Telephone # _____

Duns # _____ Race Code _____ Ethnicity Code _____

1. Subcontractor _____
   Address, City, State, and Zip _____
   Contact Person _____ Telephone # _____
   Duns # _____ Race Code _____ Ethnicity Code _____

2. Subcontractor _____
   Address, City, State, and Zip _____
   Contact Person _____ Telephone # _____
   Duns # _____ Race Code _____ Ethnicity Code _____

3. Subcontractor _____
   Address, City, State, and Zip _____
   Contact Person _____ Telephone # _____
   Duns # _____ Race Code _____ Ethnicity Code _____

4. Subcontractor _____
   Address, City, State, and Zip _____
   Contact Person _____ Telephone # _____
   Duns # _____ Race Code _____ Ethnicity Code _____

5. Subcontractor _____

   Address, City, State, and Zip _____

   Contact Person _____ Telephone # _____

   Duns # _____ Race Code _____ Ethnicity Code _____

6. Subcontractor _____

   Address, City, State, and Zip _____

   Contact Person _____ Telephone # _____

   Duns # _____ Race Code _____ Ethnicity Code _____

7. Subcontractor _____

   Address, City, State, and Zip _____

   Contact Person _____ Telephone # _____

   Duns # _____ Race Code _____ Ethnicity Code _____

8. Subcontractor _____

   Address, City, State, and Zip _____

   Contact Person _____ Telephone # _____

   Duns # _____ Race Code _____ Ethnicity Code _____

Race Code:	Ethnicity Code:
1 = White **2 = Black/African American** **3 = Asian** **4 = American Indian/Alaskan Native** **5 = Native Hawaiian/Other Pacific Islander** **6 = American Indian/Alaskan Native and White** **7 = Asian and White** **8 = Black/African American and White** **9 = American Indian/Alaskan Native and Black/ African American** **10 = Other Multi-Racial**	**1 = Hispanic or Latino** **2 = Not Hispanic or Latino**

SECTION D:

DOCUMENTS NEEDED THROUGHOUT CONSTRUCTION

***The documents provided in this section are required IN ADDITION to all contract requirements. Exceptions will be dealt with on a case-by-case basis.*

CERTIFICATION REGARDING GOVERNMENT-WIDE
WAIVER AND RELEASE OF LIEN

WHEREAS, the undersigned, _____
(Name of Manufacturer, Materialman, or Subcontractor)

has furnished to _____ the following:
(Name of Contractor)

_____
(Kind of Material & Services Furnished)

_____ for use in the construction of a project

belonging to the City of Joplin, Missouri .

NOW, THEREFORE, the undersigned, _____
(Name of Manufacturer, Materialman, or Subcontractor)

_____ for and in consideration of $_____

and other good and valuable consideration, the receipt whereof is hereby acknowledged, do(es) hereby waive and release any and all liens or right to or claim of lien, on the above-described project and premises, under any law, common or statutory, on account of labor or materials, or both, heretofore or hereafter furnished by the undersigned to or for the account of said:

_____for said Project.
(Name of Contractor)

Given under my (our) hand(s) and seal(s) this ____ day of _____, 20_____.

_____
(Name of Manufacturer, Materialman, or Subcontractor)

By: _____
President, Vice President, Partner, or Owner, or, if signed by other than one of the foregoing, accompanied by Power of Attorney, signed by one of the foregoing in favor of the Signer. (Use designation applicable)

CERTIFICATE OF CONTRACTOR

_____ certifies that he/she is the _____
(Title)

of _____, the Contractor,
(Name of Contractor) (Address)

in a Contract dated _____, 20____, entered into between the Contractor and

City of Joplin, Missouri 602 South Main Street, Joplin, Missouri 64801,
(Name of Owner) (Address)

the Owner for the construction of:

Project:
Twin Equalization Basin Improvements

and that he/she is legally authorized to and does make this certificate on behalf of said Contractor.

The undersigned, further certifies; (1) that all persons who have provided labor for the above-named Project, have been paid in full in accordance with rates for wages applicable to the Project, and (2) that the names of subcontractors and others providing labor for the Project, and the kind or kinds of services so provided are listed on the attached Subcontractor Disclosure Form and are attached hereto; and that a Final Waiver of Lien executed by each and all suppliers, materialmen, subcontractors and others providing materials and/or services has been obtained and delivered to the Owner.

By_____

Date_____

For_____

SECTION E:

PREVAILING WAGES

STATE OF MISSOURI PREVAILING WAGE LAW AND RULES

Prevailing hourly rates of wages shown on the following annual wage order are hereby incorporated in the contract specifications and made a part thereof. Contractor's attention is particularly called to the Performance-Payment Bond form that includes provisions that will guarantee his faithful performance of the prevailing hourly wage requirements of the contract.

The Contractor shall be required to submit a certified copy of all weekly payrolls to the Owner and Engineer showing that the classification of workmen and the hourly wage rates being paid fully comply with the Wage Determination for the project.

The Contractor shall cause to be displayed a complete copy of the Wage Determination for the project as set forth in the Prevailing Wage Law.

Prior to Final Acceptance of the Project, the CONTRACTOR shall obtain and deliver in duplicate to the OWNER, through the ENGINEER, notarized Affidavits of Compliance With the Prevailing Wage Law, in the form attached hereto, from the CONTRACTOR and all subcontractors furnishing services for the Project.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 26

Section 049
JASPER COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Taylor Burks, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2019**

Last Date Objections May Be Filed: **April 8, 2019**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Asbestos Worker		$23.15
Boilermaker		$22.74*
Bricklayer		$22.74*
Carpenter		$41.96
Lather		
Linoleum Layer		
Millwright		
Pile Driver		
Cement Mason		$22.74*
Plasterer		
Communications Technician		$22.74*
Electrician (Inside Wireman)		$42.26
Electrician Outside Lineman		$42.28
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Elevator Constructor		$22.74*
Glazier		$22.74*
Ironworker		$59.62
Laborer		$33.90
General Laborer		
First Semi-Skilled		
Second Semi-Skilled		
Mason		$22.74*
Marble Mason		
Marble Finisher		
Terrazzo Worker		
Terrazzo Finisher		
Tile Setter		
Tile Finisher		
Operating Engineer		$22.74*
Group I		
Group II		
Group III		
Group III-A		
Group IV		
Group V		
Painter		$33.52
Plumber		$45.73
Pipe Fitter		
Roofer		$37.21
Sheet Metal Worker		$44.80
Sprinkler Fitter		$22.74*
Truck Driver		$22.74*
Truck Control Service Driver		
Group I		
Group II		
Group III		
Group IV		

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

Heavy Construction Rates for
JASPER County

Section 049

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Carpenter		$22.74*
Millwright		
Pile Driver		
Electrician (Outside Lineman)		$40.08
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Laborer		$38.59
General Laborer		
Skilled Laborer		
Operating Engineer		$44.88
Group I		
Group II		
Group III		
Group IV		
Truck Driver		$22.74*
Truck Control Service Driver		
Group I		
Group II		
Group III		
Group IV		

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

PREVAILING WAGE LAW, CHAPTER 290

Section 290.210 through 290.340 As Amended RSMo 1987, 1986, & Cumm. Supp. 1993

290.210 Definitions - As used in Section 290.210 to 290.340, unless the context indicates otherwise:

(1) "Construction" includes construction, reconstruction, improvement, enlargement, alteration, painting, and decorating, or major repairs

(2) "Department" means the Department of Labor and Industrial Relations.

(3) "Locality" means the county where the physical work upon public works is performed, except that if there is not available in the county a sufficient number of competent skilled workmen to construct the public works efficiently and properly, "locality" may include two or more counties adjacent to the one in which the work or construction is to be performed and from which such workers may be obtained in sufficient numbers to perform the work, and that, with respect to contracts with the state highway commission, "locality" may be construed to include two or more adjacent counties from which workmen may be accessible for work on such construction.

(4) "Maintenance work" means the repair, but not the replacement of existing facilities when the size, type, or extent of the existing facilities is not thereby changed or increased.

(5) "Prevailing hourly rate of wages" means the wages paid generally in the locality in which the public works is being performed, to workmen engaged in work of a similar character including the basic hourly rate of pay and the amount of the rate of contributions irrevocably made by a contractor or subcontractor to a trustee or to a third person pursuant to a fund, plan, or program, and the amount of the rate of costs to the contractor or subcontractor which may be reasonably anticipated in providing benefits to workmen and mechanics pursuant to an enforceable commitment to carry out a financially responsible plan or program which was communicated in writing to the workmen affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance disability and sickness insurance, accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal or state law to provide any of the benefits; provided that the obligation of a contractor or subcontractor to make payment in accordance with the prevailing wage determination of the department, insofar as Sections 290.210 to 290.340 are concerned, may be discharged by the making of payments in cash, by the making of irrevocable contributions to trustees or third persons as provided herein, by the assumption of an enforceable commitment to bear the costs of a plan or program as provided herein, or any combination thereof, where the aggregate of such payments, contributions, and costs is not less than the rate of pay plus the other amounts as provided herein.

(6) "Public Body" means the State of Missouri or any officer, official, authority, board or commission of the state or other political subdivision thereof, or any institution supported in whole or in part by public funds.

(7) "Public Works" means all fixed works constructed for public use or benefit or paid for wholly or in part out of public funds. It also includes any work done directly by any public utility company when performed by it pursuant to the order of the public service commission or other public authority whether or not it be done under public supervision or direction or paid for wholly or in part out of public funds, when let to contract by said utility. It does not include any work done for or by any drainage or levee district.

(8) "Workmen" means laborers, workmen, and mechanics.

290.220 Policy declared - It is hereby declared to be the policy of the State of Missouri that a wage of no less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, shall be paid to all workmen employed by or on behalf of any public body engaged in public works exclusive of maintenance work.

290.230 Prevailing wage rates required on construction of public works.

(1) Not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, and not less than the prevailing hourly rate of wages for legal holiday and overtime work, shall be paid to all workmen employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work. Only such workmen as are directly employed by contractors or subcontractors in actual construction work on the site of the building or construction job shall be deemed to be employed upon public works.

(2) When the hauling of materials or equipment includes some phase of construction other than the mere transportation to the site of the construction, workmen engaged in this dual capacity shall be deemed employed directly on public works.

290.240 Department of Labor and Industrial Relations to enforce - make regulations

(1) The department shall inquire diligently as to any violation of Sections 290.210 to 290.340, shall institute actions for penalties herein prescribed, and shall enforce generally the provisions of Sections 290.210 to 290.340.

(2) The department may establish rules and regulations for the purpose of carrying out the provisions of Sections 290.210 to 290.340.

290.250 Prevailing wage, incorporation into contracts -- failure to pay, Penalty -- complaint of violation, public body or prime contractor to withhold payment. Every public body authorized to contract for or construct public works, before advertising for bids or undertaking such construction shall request the department to determine the prevailing rates of wages for workmen for the class or type of work called for by the public works, in the locality where the work is to be performed. The department shall determine the prevailing hourly rate of wages in the locality in which the work is to be performed for each type of workman required to execute the contemplated contract and such determination or schedule of the prevailing hourly rate of wages shall be attached to and made a part of the specifications for the work. The public body shall then specify in the resolution or ordinance and in the call for bids for the contract, what is the prevailing hourly rate of wages in the locality for each type of workman needed to execute the contract and also the general prevailing rate for legal holiday and overtime work. It shall be mandatory upon the contractor to whom the contract is awarded and upon any subcontractor under him, to pay not less than the specified rates to all workmen employed by them in the execution of the contract. The public body awarding the contract shall cause to be inserted in the contract a stipulation to the effect that not less than the prevailing hourly rate of wages shall be paid to all workmen performing work under the contract. It shall also require in all contractor's bonds that the contractor include such provisions as will guarantee the faithful performance of the prevailing hourly wage clause as provided by the contract. The contractor shall forfeit as a penalty to the state, county, city, and county, city, town, district, or other political subdivision on whose behalf the contract is made or awarded ten dollars for each workman employed, for each calendar day, or portion thereof, such workman is paid less than the said stipulated rates for any work done under said contract, by him or by any subcontractor under him, and the said public body awarding the contract shall cause to be inserted in the contract a stipulation to this effect. It shall be the duty of such public body awarding the contract, and its agents and officers, to take

cognizance of all complaints of all violations of the provisions of Sections 290.210 to 290.340 committed in the course of the execution of the contract, and when making payments to the contractor becoming due under said contract, to withhold and retain therefrom all sums and amounts due and owing as a result of any violation of Sections 290.210 to 290.340. It shall be lawful for any contractor to withhold from any subcontractor under him sufficient sums to cover any penalties withheld from him by the awarding body on account of said subcontractor's failure to comply with the provisions of Sections 290.210 to 290.340 and if payment has already been made to him, the contractor may recover from the amount of the penalty in a suit at law.

290.260 Determination of hourly rate for highways and transportation commission, when made, where filed, objections, hearing, determination

(1) The department, as it deems necessary, shall from time to time investigate and determine the prevailing hourly rate of wages in the localities. A determination applicable to every locality to be contained in a general wage order shall be made annually on or before July 1st of each year for the Missouri State Highways and Transportation Commission and shall remain in effect until supersede by a new general wage order. In determining prevailing rates, the department shall ascertain and consider the applicable wage rates established by collective bargaining agreements, if any, and the rates that are paid generally within the locality.

(2) A certified copy of the determination so made shall be filed immediately with the Secretary of State and with the department in Jefferson City. Copies shall be supplied by the department to all persons requesting them within ten days after the filing.

(3) At any time within thirty days after the certified copies of the determinations have been filed with the Secretary of State and the Department, any person who is affected thereby may object in writing to the determination or the part thereof that he deems objectionable by filing a written notice with the department, stating the specific grounds of the objection.

(4) Within thirty days of the receipt of the objection, the department shall set a date for a hearing on the objection. The date for the hearing shall be within sixty days of the receipt of the objection. Written notice of the time and place of the hearing shall be given to the objectors at least ten days prior to the date set for the hearing.

(5) The department, at its discretion, may hear each written objection separately or consolidate for hearing any two or more written objections. At the hearing, the department shall first introduce in evidence the investigation it instituted and the other facts that were considered at the time of the original determination that formed the basis for its determination. The department or the objector or any interested party thereafter may introduce any evidence that is material to the issues.

(6) Within twenty days of the conclusion of the hearing, the department must rule on the written objection and make the final determination that it believes the evidence warrants. Immediately, the department shall file a certified copy of its final determination with the Secretary of State and with the Department and shall serve a copy of the final determination on all parties to the proceedings by personal service or by registered mail.

(7) This final decision of the department of the prevailing wages in the locality is subject to review in accordance with the provisions of Chapter 536, RSMo. Any person affected, whether or not the person participated in the proceedings resulting in the final determination, may have the decision of the department reviewed. The filing of the final determination with the Secretary of State shall be considered a service of the final determination on persons not participating in the administrative proceedings resulting in the final determination.

(8) At any time before trial any person affected by the final determination of the department may intervene in the proceedings to review under chapter 536, RSMo, and be made a party to the proceedings.

(9) All proceedings in any court affecting a determination of the department under the provisions of Sections 290.210 to 290.340 shall have priority in hearing and determination over all other civil proceedings pending in the court, except election contests.

290.262 Determination of hourly rate by location and occupation title, when made, where filed-objections, hearings-final determination-notice to department by public body, when - (1) Except as otherwise provided in section 290.260, the department shall annually investigate and determine the prevailing hourly rate of wages in each locality for each separate occupational title. A final determination applicable to every locality to be contained in an annual wage order shall be made annually on or before July first of each year and shall remain in effect until superseded by a new annual wage order or as otherwise provided in this section. In determining prevailing rates, the department shall ascertain and consider the applicable wage rates established by collective bargaining agreements, if any, and the rates that are paid generally within the locality, and shall, by March tenth of each year, make an initial determination for each occupational title within the locality.

(2) A certified copy of the initial determinations so made shall be filed immediately with the secretary of state and with the department in Jefferson City. Copies shall be supplied by the department to all persons requesting them within ten days after filing.

(3) At any time within thirty days after the certified copies of the determinations have been filed with the secretary of state and the department, any person who is affected thereby may object in writing to a determination or a part thereof that he deems objectionable by filing a written notice with the department, stating the specific grounds of the objection. If no objection is filed, the determination is final after thirty days.

(4) After the receipt of the objection, the department shall set a date for a hearing of the objection. The date for the hearing shall be within sixty days of the receipt of the objection. Written notice of the time and place of the hearing shall be given to the objectors at least ten days prior to the date set for the hearing.

(5) The department, at its discretion, may hear each written objection separately, or consolidate for hearing any two or more written objections. At the hearing, the department shall first introduce in evidence the investigation it instituted and the other facts that were considered at the time of the original determination that formed the basis for its determination. The department, or the objector, or any interested party thereafter may introduce any evidence that is material to the issues.

(6) Within twenty days of the conclusion of the hearing, the department shall rule on the written objection and make the final determination that it believes the evidence warrants. Immediately, the department shall file a certified copy of its final determination with the secretary of state and with the department and shall serve a copy of the final determination on all parties to the proceedings by personal service or by registered mail.

(7) This final decision of the department of the prevailing wages in the locality for each occupational title is subject to review in accordance with the provisions of Chapter 536, RSMo. Any person affected, whether or not the person participated in the proceedings resulting in the final determination, may have the decision of the department reviewed. The filing of the final determination with the secretary of state shall be considered a service of the final determination on persons not participating in the administrative proceedings resulting in the final determination.

(8) At any time before trial, any person affected by the final determination of the department may intervene in the proceedings to review under Chapter 536, RSMo, and be made a party to the proceedings.

(9) Any annual wage order made for a particular occupational title in a locality may be altered once each year, as provided in this subsection. The prevailing wage for each such occupational title may be adjusted on the anniversary date of any collective bargaining agreement that covers all persons in that particular occupational title in the locality in accordance with any annual incremental wage increases set in the collective bargaining agreement. If the prevailing wage for an occupational title is adjusted pursuant to this subjection, the employee's representative or employer in regard to such collective bargaining agreement shall notify the department of this adjustment, including the effective date of the adjustment. The adjusted prevailing wage shall be in effect until the next final annual wage order is issued pursuant to this section. The wage rates for any particular job, contracted and commenced within sixty days of the contract date, which were set as a result of the annual or revised wage order, shall remain in effect for the duration of that particular job.

(10) In addition to all other reporting requirements of sections 290.210 to 290.340, each public body that is awarding a contract for a public works project shall, prior to beginning of any work on such public works project, notify the department, on a form prescribed by the department, of the scope of the work to be done, the various types of craftsmen who will be needed on the project, and the date work will commence on the project.

290.263 Hourly wage must equal or exceed federal minimum wage - The hourly wages to be paid as prescribed in Section 290.250 to workmen upon public works shall not be less than the minimum wage specified under Section 6(a)(1) of the Fair Labor Standards Act of 1938, as amended.

290.265 Wage rates posted, where - A clearly legible statement of all prevailing hourly wage rates to be paid to all workmen employed in order to execute the contract and employed on the construction of the public works shall be kept posted in a prominent and easily accessible place at the site thereof by each contractor and subcontractor engaged in the public works projects under the provisions of this law and such notice shall remain posted during the full time that any such workman shall be employed on the public works.

290.270 Declaration as to prevailing wages final - maximum wages and hours not limited - The finding of the department ascertaining and declaring the prevailing hourly rate of wages shall be final for the locality, unless reviewed under the provisions of Sections 290.210 to 290.340. Nothing in Sections 290.210 to 290.340, however, shall be construed to prohibit the payment to any workman employed on any public work of more than the prevailing rate of wages. Nothing in Sections 290.210 to 290.340 shall be construed to limit the hours of work that may be performed by any workman in any particular period of time.

290.280 Administration of oaths - subpoenas - enforcement of subpoenas - The authorized representative of the department may administer oaths, take or cause to be taken the depositions of witnesses, and require by subpoena the attendance and testimony of witnesses and the production of all books, records, and other evidence relative to any matter under investigation or hearing. The subpoena shall be signed and issued by the department's authorized representative. In case of failure of any person to comply with any subpoena lawfully issued under this section, or any refusal of any witness to produce evidence or to testify to any matter regarding which he may be lawfully interrogated, the authorized representative of the department may proceed to enforce obedience to the subpoenas in the manner provided by Section 536.077, RSMo, for administrative agencies. The authorized representative of the department shall have the power to certify to official acts.

290.290 Contractor's payroll records, contents - affidavit of compliance required - signs on motor vehicles and equipment, requirements - temporary stationary sign, when - exception -

(1) The contractor and each subcontractor engaged in any construction of public works shall keep full and accurate records clearly indicating the names, occupations, and crafts of every workman employed by them in connection with the public work together with an accurate record of the number of hours worked by each workman and the actual wages paid therefor. The payroll records required to be so kept shall be open to inspection by any authorized representative of the contracting public body or of the department at any reasonable time and as often as may be necessary and such records shall not be destroyed or removed from the state for the period of one year following the completion of the public work in connection with which the records are made.

(2) Each contractor and subcontractor shall file with the contracting public body upon completion of the public work and prior to final payment therefor an affidavit stating that he had fully complied with the provisions and requirements of this chapter, and no public body shall be authorized to make final payment until such affidavit is filed therewith in proper form and order.

(3) Each contractor and subcontractor engaged in any construction of public works shall have its name, acceptable abbreviation or recognizable logo, and the name of the city and state of the mailing address of the principal office of the company, on each motor vehicle and motorized self-propelled piece of equipment that is used in connection with such public works project during the time the contractor or subcontractor is engaged on such project. The sign shall be legible from a distance of twenty feet, but the size of the lettering need not be larger than two inches. In cases where equipment is leased or where affixing a legible sign to the equipment is impractical, the contractor may place a temporary stationary sign, with the information required pursuant to this subsection, at the main entrance of the construction project in place of affixing the required information on the equipment, so long as such sign is not in violation of any state or federal statute, rule, or regulation. Motor vehicles that are required to have similar information affixed thereto pursuant to requirements of a regulatory agency of the state or federal government are exempt from the provisions of this subsection.

(4) The provisions of subsection 3 of this section shall not apply to construction of public works for which the contract awarded is in the amount of two hundred fifty thousand dollars or less.

290.300 Actions for prevailing wages by workmen authorized - Any workman employed by the contractor or by any subcontractor under the contractor who shall be paid for his services in a sum less than the stipulated rates for work done under the contract, shall have a right of action for double whatever difference there may be between the amount so paid and the rates provided by the contract together with a reasonable attorney's fee to be determined by the court, and an action brought to recover same shall be deemed to be a suit for wages, and any and all judgments entered therein shall have the same force and effect as other judgments for wages.

290.305 Rebates by workmen prohibited, exceptions. No person, firm, or corporation shall violate the wage provisions of any contract contemplated in Sections 290.210 to 290.340 or suffer or require any employee to work for less than the rate of wages so fixed, or violate any of the provisions contained in Sections 290.210 to 290.340. Where workmen are employed and their rate of wages has been determined as provided in Sections 290.210 to 290.340, no person, either for himself or any other person, shall request, demand, or receive, either before or after such workman is engaged, that such workman pay back, return, donate, contribute, or give any part or all of said workman's wages, salary, or thing of value, to any person, upon the statement, representation, or understanding that failure to comply with such request or demand will prevent such workman from procuring or retaining employment, and no person shall, directly or indirectly, pay, request, or authorize any other person to violate this section. This section does not apply to any agent or representative of a duly constituted labor organization acting in the collection of dues or assessments of such organization.

290.315 Deductions from wages agreement to be written, approval of public body required - All contractors required in Sections 290.210 to 290.340 to pay not less than the prevailing rate of wages shall make full payment of such wages in legal tender, without any deduction for food, sleeping accommodations, transportation, use of small tools, or any other thing of any kind or description. This section does not apply where the employer and employee enter into an agreement in writing at the beginning of said term of employment covering deductions for food, sleeping accommodations, or other similar items, provided such agreement is submitted by the employer to the public body awarding the contract and the same is approved by such public body as fair and reasonable.

290.320 Advertising for bids before prevailing wage is determined prohibited - No public body, officer, official, member, agent, or representative authorized to contract for public works shall fail, before advertising for bids or contracting for such construction, to have the department determine the prevailing rates of wages of workmen for each class of work called for by the public works in the locality where the work is to be performed as provided in Sections 290.210 to 290.340.

290.325 Awarding contract on payment without prevailing wage determinations prohibited - No public body, officer, official, member, agent, or representative thereof authorized to contract for public works shall award a contract for the construction of such improvement or disburse any funds on account of the construction of such public improvement, unless prevailing rates of wages of workmen for the class of work called for by such public works in the locality where the work is to be performed and such determination has been made a part of the specifications and contract for such public works.

290.330 Convicted violators of Sections 290.210 to 290.340 listed, effect of - The department after investigation, upon complaint or upon its own initiative, shall file with the Secretary of State a list of the contractors and subcontractors whom it finds have been prosecuted and convicted for violations of Sections 290.210 to 290.340 and such contractor or subcontractor, or simulations thereof, shall be prohibited from contracting directly or indirectly with any public body for the construction of any public works or from performing any work on the same as a contractor or subcontractor for a period of one year from the date of the first conviction for such violation and for a period of three years from the date of such subsequent violation and conviction thereof. No public body shall award a contract for a public works to any contractor or subcontractor, or simulation thereof, during the time that its name appears on said list. The filing of the notice of conviction with the Secretary of State shall be notice to all public bodies and their officers, officials, members, agents, and representatives.

290.335 Notice of violation, failure to comply, attorney general shall sue, injunctive relief authorized - If it is found that a public body, contractor, or subcontractor has not complied with any of the terms of Sections 290.210 to 290.340, the department shall give notice of the precise violations in writing to such public body, contractor, or subcontractor. Sufficient time may be allowed for compliance therewith as the department deems necessary. After the expiration of the time prescribed in said notice, the department may, in writing, inform the Attorney General of the fact that such notice has been given, and that the public body, contractor, or subcontractor or the authorized representative or agent thereof to whom it was directed has not complied with such notice. Upon receipt thereof, the Attorney General shall, at the earliest possible time, bring suit in the name of the state in the circuit court of the county in which such public body is located or where any such contractor or subcontractor is engaged in any further work or payments thereunder if the contract has been awarded, until the requirements of such notice are fully complied with. The court may issue a temporary restraining order with due notice to the defendant in such action. The plaintiff shall, in any such injunctive action, post an adequate bond to be set by the circuit judge. Upon final hearing thereof, if the court is satisfied that the requirements of the notice by the department to the defendant were not unreasonable or arbitrary, it shall issue an order enjoining the awarding of such contract for a public works, or any further work or payments thereunder if the contract has been awarded, until the notice is fully complied with. Such injunction shall continue operative until the court is satisfied

that the requirements of such notice have been complied with and the court shall have an exercise with respect to the enforcement of such injunctions all the power in it in other similar cases. Both the plaintiff and the defendant in such action have the same rights of appeal as are provided by law in other injunction proceedings.

290.340 Penalty for violation - Any officer, official, member, agent, or representative of any public body, contractor, or subcontractor who willfully violates and omits to comply with any of the provisions and requirements of Sections 290.210 to 290.340 shall be punished for each violation thereof by a fine not exceeding five hundred dollars, or by imprisonment not exceeding six months, or both such fine and imprisonment. Each day such violation or omission continues shall constitute a separate offense as contemplated by this section.

8 CSR-30-3.010 Prevailing Wage Rates for Public Works Projects (Purpose: This rule sets forth prevailing wage requirements relative to work performed by workmen on public funded projects.)

(1) All public bodies of Missouri contemplating construction work must obtain from the department a determination of the prevailing hourly rate of wages in the locality (wage determination) that is applicable to that construction. The rates so determined shall be incorporated in the contract specifications and made a part of those specifications, except that construction contracts of the State Highway and Transportation Commission need not list specific wage rates to apply, but may refer to the wage rates contained in the appropriate General Wage Orders issued by the department, as applicable.

(2) Request for wage determinations shall be initiated at least thirty (30) calendar days before advertisement of the specifications for the contract for which the determination is sought. An exception from this provision will be made by the department only upon a proper showing of extenuating circumstances. The department has prepared and printed Form No. PW-1 for use in making a request. The form may be secured by writing Division of Labor Standards, P.O. Box 449, Jefferson City, Missouri 65102.

(3) A separate request must be filed for each separate project by the public body, except the State Highway and Transportation Commission, which will be furnished prevailing wage determinations under General Wage Orders. One public body cannot use the wage determinations made by this department for another public body even though both public bodies are located in the same county. Special wage determinations issued by the department only apply to the public body and its project described in the special wage determination.

(4) Each wage determination issued by the department shall contain the current wage rates prevailing in the locality at the time the determination is issued. To ensure that the current prevailing hourly rate of wages as established in the wage determination is paid on the public works project, the public works project must be started in good faith or a contract awarded for the project within one hundred eighty (180) days from the date the wage determination is issued. If the proposed public works project is not started in good faith or a contract is not awarded for completion of the project within one hundred eighty (180) days from the date the wage determination is issued, before proceeding with the project the public body shall request from the department an amended wage determination, containing the then current prevailing hourly rate of wages. The amended wage determination shall be subject to objection pursuant to the provisions of section 290.260, RSMo. An amended wage determination becomes final either by order of the Labor and Industrial Relations Commission or automatically if not objected to pursuant to section 290.260, RSMo. This final determination shall contain the prevailing wage rates to be paid on the project. This provision shall not apply to the General Wage Order issued by the department for the State Highway and Transportation Commission.

(5) It should be understood by all interested parties that the certified prevailing wage rates determined by the department are minimum wage rates. The contractor may not pay less than the prevailing wage rates determined by the department for the project or contract awarded to him/her as set forth in the proposal on which s/he submitted his/her bid. Employees are free to bargain for a higher rate of pay and employers are free to pay a higher rate of pay.

(6) Where classification of workers not included in the original contract is desired, the public body shall request the department to issue a determination of the prevailing hourly rate of wages in the appropriate localities. In these cases, it shall be the responsibility of the public body to make an arrangement with the contract that would result in compliance with the wage determinations, as though they were a part of the original contract.

(7) The public body shall make examinations of the payrolls and other records of each contractor or subcontractor as may be necessary to assure compliance with the provisions of the law. In connection with those examinations, particular attention should be given to the correctness of classifications and any disproportionate employment of any workers. The examinations shall be of a frequency that may be necessary to assure conformity with the provisions of the law. An examination shall be made after the project has been substantially completed, but prior to the acceptance of the affidavit as required by section 290.290, RSMo. If any violation of sections 290.210 to 290.340, RSMo is discovered by the inspecting public body, it's their duty under section 290.250, RSMo to withhold and retain from payments to the contractor all sums and amounts due and owing as a result of any violation. Any violation shall be immediately reported to the Division of Labor Standards at P. O. Box 449, Jefferson City, Missouri 65102 or by telephone.

(8) Each month, the successful bid contractors shall submit certified copies of their current payrolls to the contracting public body. The public body, upon receipt of the payrolls on a project, shall keep the payrolls on file for a period of one (1) year from the date of submission of the final payrolls by the contractor. The payroll records shall set out accurately and completely the following: name and address of each worker, the class or type of worker, rate of pay, daily and weekly number of hours worked for each class or type of work performed, deduction made, and actual wages paid for each class or type of work performed by each worker. The payroll records shall be made available at all times for inspection by authorized representatives of the Department of Labor and Industrial Relations.

Woodman Engineering Company v. Butler, 442 SW2d 83 (Mo. App. 1969). The function of reviewing court in prevailing wage cases is to decide if the determination of the commission was authorized by law and was supported by competent and substantial evidence upon the whole record. A decision clearly contrary to the evidence should be set aside. However, all pertinent evidence and factors must be considered in determining the applicable prevailing wage.

City of Joplin v. Industrial Commission of Missouri, 329 SW2d 687 (Mo en banc 1959). Administrative agencies do not have authority to determine constitutionality of legislation. Determination of prevailing wage earnings by commission must be based upon all current relevant factors.

AFFIDAVIT OF
COMPLIANCE WITH THE PREVAILING WAGE LAW

Before me, the undersigned Notary Public, in and for the County of _____ State of Missouri, personally came and appeared

_____
(Name) (Position)

of the _____
(Name of the Company)

(A corporation) (a partnership) (a proprietorship) and after being duly sworn, did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works projects have been fully satisfied and there has been no exception to the full and complete compliance with said provisions and requirements with Wage Determination No(s). issued by the Division of Labor Standards on the day of _____, 20____. in carrying out the contract and work in connection with the construction of

Project:

Twin Equalization
Basin Improvements

in the City of Joplin, Missouri, in Jasper County, Missouri, and completed on the _____ day of _____, 20____.

_____
(Signature)

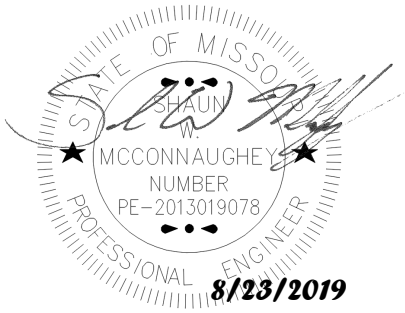
Subscribed and sworn to me this _____ day of _____, 20____.

My Commission expires: _____.

_____
Notary Public

SECTION F:

TECHNICAL SPECIFICATIONS



SHAUN W. MCCONNAUGHEY
PROFESSIONAL ENGINEER
MO# PE-2013019078

SECTION 01005

ADMINISTRATIVE PROVISIONS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Work Covered by Contract Documents.

B. Work By Owner.

C. Alternate Bid Items.

D. Preselected Equipment.

E. Contract Method.

F. Operation of Existing Facilities.

G. Work Sequence.

H. Connection to Existing Facilities.

I. Critical Path Progress Schedule.

J. Unfavorable Construction Conditions.

K. Cutting and Patching.

L. Offsite Storage.

M. Substitutes and “Or-Equal” Items.

N. Preparation for Shipment.

O. Critical Path Progress Schedule.

P. Schedule of Values.

Q. Applications for Payment.

R. Coordination.

S. Lines and Grades.

T. Notice to Owners and Authorities.

U. Preconstruction Conference.

V. Progress Meetings.

W. Reference Standards.

X. Correction Period.

Y. Hazardous Waste Products.

Z. Preconstruction Survey.

AA. Site Administration.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The work covered by the Contract Documents is as follows:
   1. This project includes the construction of improvements to the Tin Cup Equalization Basin owned by the City of Joplin. Improvements include demolition of existing weirs and sluice gates; installation of motor operated sluice gates, ultrasonic flow meter, and area-velocity flow meters; electrical and SCADA improvements to support installation of motor operates gates and flow meters; and removal of sludge from Upper and Lower Basins.

1.3 WORK BY OWNER

A. The Owner shall perform the certain activities during the course of the construction project with its own personnel as follows:
   1. The Owner will operate existing portions of the facility as they are placed into service, after all associated manufacturer's services and training have been completed.
   2. The Owner will operate all existing valves to isolate portions of the existing facilities and pipelines as required to make interconnections with the new work.

1.4 ALTERNATE BID ITEMS

A. The Work required under the Base Bid is indicated in the Specifications and on the Drawings. The following alternative is provided for in the Bid Form.
   1. No alternative Bid Items are required.

1.5 PRESELECTED EQUIPMENT

A. The price for preselected equipment listed in the manufacturer's proposal shall be included in the preparation of the Contractor's bid. The Contractor shall add to its bid all other expenses, overheads, profits, and costs necessary to correct any differences between the supplier's proposal and the contract requirements for the installation and startup of the following equipment.

B. The proposal in Appendix A – SCADA Equipment at the end of the specifications for the preselected equipment item are for reference only and are not part of the Contract. The proposals shall establish a base price for the preselected equipment, but the actual terms of the purchase agreement between the Contractor and the Suppliers of the preselected equipment shall be negotiated between the Contractor and the Suppliers to arrive at a mutual agreement of responsibilities to be shared which shall

comply with the requirements of the Contract Documents.

1. In agreement between the Owner and Primex, the SCADA equipment supplied in the SCADA Equipment Procurement Package shall be supplied at a fixed cost by Primex, without exception.

1.6 CONTRACT METHOD

A. Construct the work on a lump sum basis.

B. Minor items necessary to provide complete, serviceable facilities shall be included in the bid and furnished even if not specifically called for in the plans and specifications.

1.7 OPERATION OF EXISTING FACILITIES

A. All such work impacting the Owner's ability to convey, or store wastewater shall be coordinated with the Owner. The procedure for implementing the work shall be reviewed with the Owner and the timing of such work shall be subject to the approval of the Owner.

B. Contractor shall provide temporary facilities and make temporary modifications as necessary to keep facilities in operation during the construction period.

D. Roadway access to the existing facilities shall be maintained for Owner personnel access. Temporary access restrictions associated with construction activities shall be coordinated with the OWNER.

1.8 WORK SEQUENCE

A. Coordinate construction schedule and operations with Engineer and Owner.

B. Contractor shall have all materials and equipment delivered and on-site ready for installation before work can commence.

1.9 CONNECTIONS TO EXISTING FACILITIES

A. Unless otherwise specified or indicated, Contractor shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electric. In each case, Contractor shall receive permission from Owner or the owning utility prior to undertaking connections. Contractor shall protect facilities against deleterious substances and damage.

B. Connections to existing facilities that are in-service shall be thoroughly planned in advance, and all required equipment, materials, and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock) if necessary, to complete connections in the minimum time. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.

C. Contractor shall provide and install all necessary adapters, fittings, closure pieces, anchorage devices, and appurtenances as required to make connections to existing facilities.

1.10 UNFAVORABLE CONSTRUCTION CONDITIONS

A. During unfavorable weather, wet ground, or other unsuitable construction conditions, Contractor shall confine its operations to work that will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions that would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Contractor to perform the Work in a proper and satisfactory manner.

1.11 CUTTING AND PATCHING

A. As provided in General Conditions, Contractor shall perform all cutting and patching required for the work and as may be necessary in connection with uncovering work for inspection or for the correction of defective work.

B. Contractor shall perform all cutting and patching required for and in connection with the work, including, but not limited to, the following:
1 Removal of improperly timed work.
2 Removal of samples of installed materials for testing.
3 Alteration of existing facilities.
4 Installation of new work in existing facilities.

1.12 OFFSITE STORAGE

A. Offsite storage arrangements shall be approved by Owner for all materials and equipment not incorporated into the Work but included in Applications for Payment. Such offsite storage arrangements shall be presented in writing and shall afford adequate and satisfactory security and protection. Offsite storage facilities shall be accessible to Owner and Engineer.

1.13 SUBSTITUTES AND "OR-EQUAL" ITEMS

A. Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specified item shall be understood as establishing the type, function, and quality desired. Requests for review of equivalency will not be accepted from anyone except Contractor. Other manufacturers' products will be accepted, provided sufficient information is submitted to allow Engineer to determine that the products proposed are equivalent to those named. Such items shall be submitted for review by the procedure set forth in the submittals section.

1.14 PREPARATION FOR SHIPMENT

A. All materials shall be suitably packaged to facilitate handling and protect against damage during transit and storage. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

B. Each item, package, or bundle of material shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.15 CRITICAL PATH PROGRESS SCHEDULE

A. Critical Path Progress Schedule - Within 30 days after the pre-construction conference, Contractor shall prepare a critical path progress schedule covering all Work to be done on the Project. The firm or individual employed by Contractor to prepare the critical path schedule shall be competent and experienced in critical path scheduling. The schedule shall consist of an arrow diagram and associated listings.

1. Arrow Diagram: The arrow diagram shall be sufficiently detailed to indicate such activities as shop drawing submittal and review, equipment manufactures and delivery, installation of equipment, concrete pours, and Subcontractors' items of work. Construction activities of less than 1 day's duration or more than 5 days' duration shall be kept to a minimum. The arrow diagram shall be prepared so that the final diagram will be approximately 30 by 42 inches. Each activity on the arrow diagram shall be labeled with the following information: description, duration, scheduled start date, latest completion date, and total float. The critical path of activities shall be indicated on the arrow diagram by a heavy line.
2. Listings: Two chronological listings of the information in the arrow diagram shall be prepared: one for scheduled start dates and one for latest completion dates. Each listing shall show activity node numbers, description, scheduled start date, duration in workdays, latest completion date, and total float for each item in the arrow diagram.
3. Submittal: The initial critical path schedule and subsequent revisions shall reflect the actual progress of the Project to within 5 days prior to submittal. Contractor and its representative who prepared the schedule shall meet with Engineer and Owner to review the initial schedule and each subsequent revision. The meeting will be held in the office of Owner or Engineer.
    a. At least five copies of the arrow diagram and listings shall be submitted. A revised arrow diagram and listing shall be prepared and submitted at least every 90 days.
    b. If the initial schedule or any subsequent revision is not acceptable to Owner, the schedule shall be revised and resubmitted as many times as necessary until the schedule is acceptable. Acceptance of the schedule will not be unreasonably withheld.
4. Shop Drawings Schedule: At the time the initial critical path schedule is submitted, a schedule shall be submitted of the items of materials and equipment for which Shop Drawings are required by the Specifications. For each required Shop Drawing, the date shall be given for intended submission of the drawing to Engineer for review and the date required for its return to avoid delay in any activity beyond the scheduled start date. Sufficient time shall be allowed for initial review, correction and resubmission, and final review of all Shop Drawings. In no case will a schedule be acceptable which allows less than 14 days for each review by Engineer.
5. Progress Reports: At the end of each month, the node numbers of the activities that have been completed, with their actual start and completion dates, and a list of the activities on which Work is currently in progress and the number of working days required to complete each, shall be submitted to Engineer.
    a. If, at any time during the Project, any activity is not completed by its latest scheduled completion date, Engineer shall be notified within 5 days of Contractor's plans to reorganize the workforce to return to the schedule and prevent delays on any other activity. Owner may require Contractor, at Contractor's expense, to add to its plant, equipment, or construction forces,

as well as increase the working hours, if operations fall behind schedule.

b. Any Work reported complete, but which is not readily apparent to Engineer, must be substantiated with satisfactory evidence.

1.16 SCHEDULE OF VALUES

A. Submit typed schedule on Contractor's standard form or electronic media printout.

B. Submit schedule of values in duplicate within 15 days after date of Owner-Contractor Agreement.

C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification section. Identify site mobilization, bonds and insurance. The format, level of detail, and breakdowns of the schedule of values shall be acceptable to the Engineer.

D. Include within each line item, a directly proportional amount of Contractor's overhead and profit.

E. An unbalanced schedule of values providing for overpayment of Contractor on items of work performed first will not be accepted.

F. A schedule of values submitted that in the opinion of the Engineer is in an unacceptable format, contains an insufficient level of detail, or inappropriate breakdown of items for payment shall not be accepted.

G. Contractor shall revise and resubmit unacceptable schedule of values as required until the schedule of values is acceptable to the Engineer.

H. No progress payments shall be made to the Contractor until an acceptable schedule of values has been received and accepted by the Engineer.

I. Revise schedule to list approved change orders with each application for payment.

1.17 APPLICATIONS FOR PAYMENT

A. Submit five (5) copies of each application on the enclosed payment application, no exceptions.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: Monthly.

D. Include five (5) copies of an updated construction progress schedule.

1.18 COORDINATION

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in-service, such equipment.

C. Execute cutting and patching to integrate elements of work, uncover ill-timed, defective, and non-conforming work, and provide samples for testing.

1.19 LINES AND GRADES

A. All work shall be done to the lines, grades, and elevations shown on the drawings.

B. Basic horizontal and vertical control points have been established or designated by Engineer, as indicated on the drawings. These points shall be used as datum for the work. All additional survey, layout, and measurement work shall be performed by Contractor as a part of the work.

C. Contractor shall provide an experienced instrument man, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement work. In addition, Contractor shall furnish, without charge, competent men from his force and such tools, stakes, and other materials as Engineer may require in establishing or designating control points, or in checking survey, layout, and measurement work performed by Contractor.

D. Contractor shall keep Engineer informed, a reasonable time in advance, of the times and places at which he wishes to do work, so that horizontal and vertical control points may be established and any checking deemed necessary by Engineer may be done with minimum inconvenience to Engineer and minimum delay to Contractor.

E. Contractor shall remove and reconstruct work that is improperly located.

1.20 NOTICE TO OWNERS AND AUTHORITIES

A. Contractor shall, as provided in the General Conditions, notify Owners of adjacent property and utilities when prosecution of the Work may affect them.

B. When it is necessary to temporarily deny access to property, or when any utility service connection must be interrupted, Contractor shall give notices sufficiently in advance to enable the affected persons to provide for their needs. Notices shall conform to any applicable local ordinance and, whether delivered orally or in writing, shall include appropriate information concerning the interruption and instructions on how to limit inconvenience caused thereby.

C. Utilities and other concerned agencies shall be notified at least 24 hours prior to cutting or closing streets or other traffic areas or excavating near underground utilities or pole lines.

1.21 PRECONSTRUCTION CONFERENCE

A. Prior to the commencement of work at the site, a pre-construction conference will be held at a mutually agreed time and place. The conference shall be attended by:
   1. Contractor and his superintendent
   2. Principal subcontractors.

3. Representatives of principal suppliers and manufacturers as appropriate.
4. Engineer and Resident Project Representative.
5. Representatives of Owner.
6. Governmental representatives as appropriate.
7. Others as requested by Contractor, Owner, or Engineer.

B. Unless previously submitted to Engineer, Contractor shall bring to the conference a tentative schedule for each of the following:
1. Progress.
2. Procurement.
3. Values for progress payment purposes.
4. Shop drawings and other submittals.

C. The purposes of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:
1 Contractor's tentative schedules.
2 Transmittal, review, and distribution of Contractor's submittals.
3 Processing applications for payment.
4 Maintaining record documents.
5 Critical work sequencing.
6 Field decisions and Change Orders.
7 Use of premises, office and storage areas, security, housekeeping, and Owner's needs.
8 Major equipment deliveries and priorities.
9 Contractor's assignments for safety and first aid.

D. Engineer will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

1.22 PROGRESS MEETINGS

A. Engineer shall schedule and administer meetings throughout progress of the work at monthly intervals.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review of work progress.
2. Field observations, problems, and decisions.
3. Identification of problems that impede planned progress.
4. Review of submittals schedule and status of submittals.
5. Review of off-site fabrication and delivery schedules.
6. Planned progress during succeeding work period.
7. Coordination of projected progress.
8. Maintenance of quality and work standards.

9. Effect of proposed changes on progress schedule and coordination.
10. Other business relating to work.

E. Engineer will record minutes and distribute copies to participants.

1.23 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect as of the Bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is specified.

C. Obtain copies of standards when required by Contract Documents. Maintain copy at jobsite during progress of the specific work.

1.24 CORRECTION PERIOD

A. Correct all defective work for one year after acceptance of the project.

B. Promptly repair or replace at no cost to the Owner all defects in material or workmanship that may appear during the correction period.

1.25 HAZARDOUS WASTE PRODUCTS

A. If, during the progress of the Work, suspected hazardous waste products are identified, Contractor shall stop Work in the affected area and engage a hazardous waste removal Subcontractor to verify the materials and, if necessary, encapsulate, enclose, or remove and dispose of all hazardous waste in accordance with current regulations of the Environmental Protection Agency and the U. S. Department of Labor - Occupational Safety and Health Administration, the state hazardous waste regulating agency, and any local government agency. Payment for such Work will be made by Change Order.
   1 Subcontractor's Qualifications: The Subcontractor for hazardous waste removal shall be regularly engaged in this type of activity and shall be familiar with the regulations that govern this Work. The Subcontractor shall demonstrate to the satisfaction of Owner that it has successfully completed at least three asbestos hazardous waste projects, that it has the necessary staff and equipment to perform the Work, and that it has an approved site for disposal of the hazardous waste. The Subcontractor shall carry insurance as specified in the Supplementary Conditions.
   2 Removal Methods. The hazardous waste removal Subcontractor shall submit a work plan of its proposed removal procedure to Owner before beginning Work and shall certify that the methods are in full compliance with the governing regulations. The Work plan shall cover all aspects of the removal, including health and safety of employees and building occupants, hygiene facilities, employee certification, clearance criteria, transportation and disposal, enclosure techniques, and other techniques appropriate for the proposed Work.

B. Cleaning Up

1 Contractor shall keep the premises free at all times from accumulations of waste materials and rubbish. Contractor shall provide adequate trash receptacles about the site and shall promptly empty the containers when filled.
2 Construction materials, such as concrete forms and scaffolding, shall be neatly stacked by Contractor when not in use. Contractor shall promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
3 Volatile wastes shall be properly stored in covered metal containers and removed daily.
4 Wastes shall not be buried or burned on the site or disposed of into storm drains, sanitary sewers, streams, or waterways. All wastes shall be removed from the site and disposed of in a manner complying with local ordinances and antipollution laws.
5 Adequate cleanup will be a condition for recommendation of progress payment applications.

1.26 PRECONSTRUCTION SURVEY

A. Not required.

1.27 SITE ADMINISTRATION

A. Contractor shall be responsible for all areas of the sites used by it and by all Subcontractors in the performance of the Work. Contractor will exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to Owner or others. Contractor has the right to exclude from the site all persons who have no purpose related to the Work or its inspection and may require all persons on the sites (except Owner's employees) to observe the same regulations as the Contractor requires of its employees.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. References

B. Submittal procedures

C. Construction progress schedules

D. Product data

E. Shop drawings

F. Samples

G. Design data

H. Test reports

I. Certificates

J. Manufacturer's instructions

K. Operation and Maintenance Data and Manuals

L. Manufacturer's field reports

M. Layout Data

N. Construction Photographs

1.2 RELATED SECTIONS

A. Section 01005 - Administrative Provisions: Work sequence.

B. Section 01005 - Administrative Provisions: Applications for Payment.

C. Section 01400 - Quality Control: Testing laboratory reports.

D. Section 01600 - Material and Equipment: Product Options and Substitutions: Contractor's list of Products.

E. Section 01700 - Contract Closeout: Closeout submittals.

1.3 REFERENCES

A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.4 SUBMITTAL PROCEDURES

A. Transmit each submittal under Engineer accepted form.

B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

E. Schedule submittals to expedite the Project and deliver to Engineer at business address. Coordinate submission of related items. For each section of the specifications, the initial submittal shall be complete for all items and components contained within that section of the specifications.

F. For each submittal for review, allow 14 consecutive calendar days excluding delivery time to and from the contractor. Engineer will review and return submittals on an expedited basis to facilitate progress of the work.

G. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

H. Provide space for Contractor and Engineer review stamps.

I. When revised for resubmission, identify all changes made since previous submission.

J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

K. Submittals not requested will not be recognized or processed.

L. Contractor shall reimburse Owner for charges of Engineer for review of substitutes, review of more than one “or-equal” per specification section, and additional review effort due to incompleteness of submittals or failure of Contractor to coordinate and complete submittals.

M. If more than one resubmission is required because of lack of previously requested data or additional information, Contractor shall reimburse Owner for the charges of Engineer for review of resubmissions. This would not include submittal data for slump tests, fields tests, and other submittal requirements for placing equipment into service.

N. Equipment delivered shall not be considered complete until acceptance of all submittal data and the final operation and maintenance manual by Engineer. Engineer may withhold all payment on equipment and materials delivered, stored or installed at the project site prior to Contractor's completion of acceptable submittal data.

1.5 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial critical path construction schedule in duplicate as per specification Section 01005.

B. Revise and resubmit as required.

C. Submit revised schedules with each Application for Payment, identifying changes since previous version.

D. Indicate estimated percentage of completion for each item of Work at each submission.

E. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.

1.6 PRODUCT DATA

A. Product Data For Review:
   1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Product Data For Information:
   1. Submitted for the Engineer's knowledge as contract administrator or for the Owner.

C. Product Data For Project Close-out:
   1. Submitted for the Owner's benefit during and after project completion.

D. Submit the number of copies that the Contractor requires, plus three copies which will be retained by the Engineer.

E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

F. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

G. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 - CONTRACT CLOSEOUT.

1.7 SHOP DRAWINGS

A. Shop Drawings For Review:
   1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Shop Drawings For Information:
   1. Submitted for the Engineer's knowledge as contract administrator or for the Owner.

C. Shop Drawings For Project Closeout:
   1. Submitted for the Owner's benefit during and after project completion.

D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. Submit the number of opaque reproductions that Contractor requires, plus three copies which will be retained by Engineer.

1.8 SAMPLES

A. Samples For Review:
   1. Submitted to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
   2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

B. Samples For Information:
   1. Submitted for the Engineer's knowledge (as contract administrator) or for the Owner.

C. Samples For Selection:
   1. Submitted to Engineer for aesthetic, color, or finish selection.
   2. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Owner selection.
   3. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

D. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

E. Include identification on each sample, with full Project information.

F. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.

G. Reviewed samples that may be used in the Work are indicated in individual specification sections.

H. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.9 DESIGN DATA

A. Submit for the Engineer's knowledge as contract administrator or for the Owner.

B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.10 TEST REPORTS

A. Submit for the Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product but shall be acceptable to Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to owner in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

C. Refer to Section 01400 - Quality Control, Manufacturers' Field Services article.

1.13 MANUFACTURER'S FIELD REPORTS

A. Submit reports for the Engineer's benefit as contract administrator or for the Owner.

B. Submit report in duplicate within 14 days of observation to Engineer for information.

C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.14 LAYOUT DATA

A. Contractor shall keep neat and legible notes of measurements and calculations made in connection with the layout of the Work. Copies of such data shall be furnished to the Resident Project Representative for use in checking Contractor's layout as provided in the project requirements section. The Engineer will transmit all such data considered of value to the Owner with other records upon completion of the Work.

1.15 CONSTRUCTION PHOTOGRAPHS

A. Contractor shall be responsible for the production of construction photographs as provided herein. Engineer shall designate the subject of each photograph.

B. A total of 36 photographs, as determined by the Engineer, shall be taken before the commencement of Work at the site and promptly submitted to Engineer. The same views shall be re-photographed upon completion of all construction activities and submitted with Contractor's application for final payment. A total of 24 additional photographs shall be made each month throughout the progress of the Work at such times as requested by Engineer and submitted with Contractor's application for progress payment.

C. All photographs shall be produced by a competent photographer and shall be color photographs of commercial quality. The contractor shall submit the photographs electronically and two copies of 4 by 5-inch prints. Prints shall be mounted on linen with flap for binding or enclosed in clear plastic binders and marked with the name and number of the Contract, name of Contractor, description and location of view, and date photographed.

D. Engineer shall transmit one copy of each photograph to Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. General Quality Control

B. Workmanship

C. References and Standards

D. Manufacturer's Instructions

E. Manufacturer's Certificates

F. Manufacturer's Field Services

G. Testing Laboratory Services

1.2 RELATED REQUIREMENTS

A. General Conditions: Inspection and testing required by governing authorities.

B. Section 01005 - Administrative Provisions: Applicability of specified reference standards.

C. Section 01300 - Submittals: Shop Drawings, Product Data, and Samples: Submittal of Manufacturer's Instructions.

1.3 GENERAL QUALITY CONTROL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.4 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and cracking.

1.5 REFERENCES AND STANDARDS

A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current on date of Contract Documents, except where a specific date is established by code.

C. Obtain copies of standards where required by product specification sections.

D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 MANUFACTURERS' INSTRUCTIONS

A. Comply with instructions in full detail, including each step-in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.7 MANUFACTURERS' CERTIFICATES

A. When required by individual Specifications Section, submit manufacturer's certificate, in duplicate, that products meet or exceed specified requirements.

1.8 MANUFACTURERS' FIELD SERVICES

A. When specified in respective Specification Sections, require manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjustments and balancing of equipment as applicable, and to make appropriate recommendations.

B. Representative shall submit written report to Engineer listing observations and recommendations.

C. When required by individual Specification Sections, submit manufacturer’s certification, in duplicate, certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; has been operated under full load conditions and that it operated satisfactorily; and generally meets or exceeds specified requirements.

D. All cost for these services shall be included in the contract price.

1.9 TESTING SERVICES

A. All tests to determine compliance with the Contract Documents shall be performed by an independent commercial testing firm acceptable to Engineer. The testing firm's laboratory shall be staffed with experienced technicians, properly equipped and fully qualified to perform the tests in accordance with the specified standards.

B. Testing services provided by Owner are for the sole benefit of Owner; however, test results shall be available to Contractor. Testing necessary to satisfy Contractor's internal quality control procedures shall be the sole responsibility of Contractor.

C. Testing Services Furnished by Contractor - Unless otherwise specified, Contractor shall provide all testing services in connection with the following:
   1. Concrete materials and mix design.
   2. Embedment, fill, and backfill materials for preliminary review.
   3. All other tests and engineering data required for Engineer's review of materials and equipment proposed to be used in the Work.
   4. Contractor shall obtain Engineer's acceptance of the testing firm before having services performed and shall pay all costs for these testing services.
   5. Concrete.
   6. Moisture-density and relative density tests on embedment, fill, and backfill materials.
   7. In-place field density tests on embedments, fills, and backfill.

D. Engineer shall determine the exact time, location, and number of tests, including samples.

E. Contractor shall furnish all sample materials and cooperate in the testing activities, including sampling. Contractor shall interrupt the Work when necessary to allow testing, including sampling, to be performed by the Owner, if required. Contractor shall have no claim for an increase in Contract Price or Contract Times due to such interruption. When testing activities, including sampling, are performed in the field by Engineer or the testing firm's laboratory personnel, Contractor shall furnish personnel and facilities to assist in the activities.

F. Transmittal of Test Reports - Written reports of tests and engineering data furnished by Contractor for Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

G. The testing firm retained by Owner will furnish four copies of a written report of each test. Two copies of each test report will be transmitted to the Resident Project Representative, one copy to Engineer, and one copy to Contractor, within 3 days after each test is completed.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Beginning new work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Electricity, Lighting

B. Water

C. Sanitary Facilities

D. Barriers

E. Enclosures

F. Protection of Installed Work

G. Land for Construction Purposes

H. Site Security

I. Dust Control

J. Erosion Control

K. Access Roads

L. Parking

M. Treatment During Construction Period

N. Cleaning During Construction

O. Removal

1.2 RELATED REQUIREMENTS

A. Section 01005 - Administrative Provisions: Contractor use of premises.

B. Section 01700 - Contract Closeout: Final cleaning.

1.3 ELECTRICITY, LIGHTING

A. Provide service and electricity required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.

B. Provide separate metering for billing purposes.

C. Provide lighting for construction operations.

D. Existing and permanent lighting may be used during construction. Maintain lighting and make routine repairs.

1.4 WATER

A. All water required for and in connection with the work to be done under this contract will be furnished by the Contractor.

B. Contractor shall comply with any backflow prevention requirements of the City.

1.5 SANITARY FACILITIES

A. Furnish temporary sanitary facilities at the site for the needs of all construction workers and others performing work or furnishing services on the project. Maintain facilities in a sanitary condition.

1.6 BARRIERS

A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

1.7 ENCLOSURES

A. Provide temporary weather-tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons.

1.8 PROTECTION OF INSTALLED WORK

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

1.9 LAND FOR CONSTRUCTION PURPOSES

A. The Contractor will be permitted to use available land belonging to the Owner, on or near the site of the work, for construction purposes and for the storage of materials and equipment. The location and extent of the areas so used shall be designated by the Owner and has been generally shown on the plans.

B. The Contractor shall be solely responsible for obtaining and shall pay all costs in connection with any additional work area, storage site, access to the site, or temporary right-of-way that may be required for proper completion of the work.

C. It shall be understood that the responsibility for protection and safekeeping of equipment and materials on or near the site will be entirely that of the Contractor and that no claims shall be made against the Owner by reason of any act of an employee

or trespasser. It shall be further understood that should any occasion arise necessitating access to the sites occupied by these stored materials and equipment, the Contractor owning or responsible for the stored materials or equipment shall immediately move same. No materials or equipment may be placed upon the property of the Owner until the Owner has agreed to the location contemplated by the Contractor to be used for storage.

1.10 SITE SECURITY

A. Contractor shall comply with Owner's procedures to maintain site security.

1.11 DUST CONTROL

A. Contractor shall take reasonable measure to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. Dusty materials in piles or in transit shall be covered when practicable to prevent blowing.

B. Buildings or operating facilities that may be affected adversely by dust shall be adequately protected from dust. Existing or new machinery, motors, instrument panels or similar equipment, shall be protected by suitable dust screen. Proper ventilation shall be included with dust screen.

1.12 EROSION CONTROL

A. Contractor shall prevent erosion of soil on the site and adjacent property resulting from his construction activities. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operation that will disturb the natural protection.

B. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

1.13 ACCESS ROADS

A. Contractor shall maintain existing roads to the construction site.

B. Provide for gravel surfacing as required to ensure roadways remain suitable for car and truck access and leave roadway condition equivalent to original condition.

1.14 PARKING

A. Provide temporary gravel surface parking areas to accommodate construction personnel in construction staging area.

B. Restore to original condition prior to final completion of project.

1.15 TREATMENT DURING CONSTRUCTION PERIOD

A. The equalization basin shall remain operable during construction activities, except when authorized by Owner. When it becomes necessary to change electrical items, abandon lines or structures for construction of new facilities, suitable temporary facilities shall be constructed, unless suitable permits are secured for bypassing or temporary shutdown.

B. Refer to Section 01005, 1.8 WORK SEQUENCE for details regarding critical work sequencing.

1.16 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish; immediately dispose of off-site.

B. Clean interior areas prior to start of finish work; maintain areas free of dust and other contaminants during construction operations.

C. Adequate cleanup will be a condition for recommendation of progress payment applications.

1.17 REMOVAL

A. Remove temporary materials, equipment, utilities, and facilities prior to Final Completion inspection.

B. Clean and repair damage caused by installation or use of temporary facilities. Grade site and restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

A. Products

B. Transportation and Handling

C. Storage and Protection

D. Product Options

E. Products List

F. Substitutions

1.2 RELATED REQUIREMENTS

A. Section 01005 - Administrative Provisions: Reference Standards.

B. Section 01300 - Submittals: Product Data and Samples.

C. Section 01400 - Quality Control: Submittal of manufacturers' certificates.

D. Section 01700 - Contract Closeout: Operation and Maintenance Data.

E. Section 01700 - Contract Closeout: Warranties and Bonds.

1.3 PRODUCTS

A. Products include materials, equipment, and systems.

B. Comply with Specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a Specification section shall be the same and shall be interchangeable.

D. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by Contract Documents.

1.4 TRANSPORTATION AND HANDLING

A. Transport products using methods to avoid product damage; deliver in undamaged condition in manufacturer's unopened containers or packaging, dry.

B. Provide equipment and personnel to handle products by methods that prevent soiling or damage.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

D. Products shall be transported, handled and installed in accordance with manufacturer's instructions. Contractor shall familiarize himself with manufacturer's recommendations prior to arrival of materials at job site to prevent mishandling.

1.5 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named.

C. Products Specified by Naming Several Manufacturers: Products of named manufacturers meeting specifications, no options, no substitutions allowed.

D. Products Specified by Naming Only One Manufacturer: No options, no substitutions allowed.

1.7 PRODUCTS LIST

A. Within 15 days after date of Owner-Contractor Agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.8 SUBSTITUTIONS

A. Within 30 days after date of Owner-Contractor agreement established in Notice to Proceed, Engineer will consider requests from Contractor for substitutions. Subsequently, substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Including:
   1. Statement indicating why specified material or product cannot be provided.
   2. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
   3. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   4. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
   5. Samples, where applicable or requested.
   6. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners.
   7. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
   8. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
   9. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time.
   10. Cost information, including a proposal of change, if any, in the Contract Sum.
   11. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
   12. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

C. Request constitutes a representation that Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
   2. Will provide the same warranty for substitution as for specified product.
   3. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.
   5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.

E. Engineer will determine acceptability of proposed substitution and will notify Contractor of acceptance or rejection in writing within a reasonable time. If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 30 days of receipt of request, or 30 days of receipt of additional information or documentation, whichever is later.
   1. Form of Acceptance: Change Order.
   2. Use product specified if Engineer cannot make a decision on use of a proposed substitution within time allocated.

F. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01610

GENERAL EQUIPMENT STIPULATIONS

PART 1 - GENERAL

1.1 SCOPE

A. These General Equipment Stipulations apply, in general, to all equipment. They shall supplement the detailed equipment specifications but in case of conflict the equipment specifications shall govern.

1.2 ADAPTATION OF EQUIPMENT

A. Equipment shall be readily adaptable for installation and operation in the structures as shown on the drawings. No responsibility for alteration of a planned structure to accommodate other types of equipment will be assumed by the Owner. Equipment that requires alteration of the structures will be considered only if the Contractor assumes all responsibility for making and coordinating all necessary alteration. All such alterations shall be approved by the Engineer and made at the Contractor's expense.

1.3 PATENT ROYALTIES

A. All royalties and fees for patents covering materials, articles, apparatus, devices or equipment (as distinguished from processes) shall be included in prices quoted by equipment suppliers. Attention is directed to the requirements of the General Conditions concerning patents.

1.4 EQUIPMENT GUARANTEE

A. The Contractor shall guarantee all equipment against (a) faulty or inadequate design, (b) improper assembly or erection, (c) defective workmanship or materials, and (d) leakage, breakage, or other failure. The guarantee period shall be as defined in the General Conditions, unless asked otherwise in the given technical specification.

1.5 WORKMANSHIP AND MATERIALS

A. All equipment shall be designed, fabricated and assembled in accordance with the best modern engineering and shop practice. Individual parts shall be manufactured to standard sizes and gauges so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

B. Materials shall be suitable for service conditions. Iron castings shall be tough, close-grained gray iron free from blowholes, flaws, or excessive shrinkage and shall conform to ASTM A48.

C. Except where otherwise specified, structural and miscellaneous fabricated steel used in items of equipment shall conform to the Standards of the American Institute of Steel Construction. All structural members shall be considered as subject to shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall have a minimum nominal thickness of 1/4 inch.

1.6 ELECTRIC MOTORS

A. Unless otherwise specified, motors furnished with equipment shall meet the following requirements:

B. Designed and applied in accordance with NEMA, ANSI, IEEE, AFBMA, and NEC for the duty service imposed by the driven equipment, such as frequent starting, intermittent overload, high inertia, mounting configuration, or service environment.

C. Motors for use with variable frequency drives shall be inverter duty rated meeting NEMA MG-1, Part 31.

D. Each motor for use with an VFD shall be furnished with at least one automatic reset winding temperature switch per phase. Temperature switch contacts shall be normally closed and rate 5 amperes at 120 volts ac. The contracts shall be wired in series with the end leads brought out to a separate motor terminal box. Switches shall be as recommended by the motor manufacturer.

E. Rated for continuous duty at 40°C ambient, unless the application is well recognized for intermittent duty service as a standard industry practice.

F. Insulated with a Class F insulation system and designed for a maximum Class B temperature rise at service factor load (80°C at 1.0 or 90°C at 1.15), or insulated with a Class H insulation system and designed for a maximum Class F temperature rise at service factor load (145°C at 1.0).

G. Motors used in applications which exceed the usual service conditions as defined by NEMA, such as higher than 40°C ambient, explosive or corrosive environments, departure from rated voltage and frequency, poor ventilation, frequent starting, or adjustable frequency drive applications, shall be properly selected with respect to their service conditions and shall not exceed specified temperature rise limits.

H. To ensure long life, motors shall have nameplate horsepower equal or greater than the maximum load imposed by the driven equipment and shall carry a service factor rating as follows:

Motor Size	Enclosure	Service Factor
Fractional hp	Open	1.15
	Other Than Open	1.0
Integral hp	Open	1.15
	Other Than Open	1.0

I. Designed for full voltage starting.

J. Designed to operate from an electrical system that may have a maximum of 5 percent voltage distortion according to IEEE 519.

K. Clamp-type grounding terminal shall be inside motor conduit box.

L. External conduit boxes shall be oversized at least one size larger than NEMA standard.

M. Totally enclosed motors shall have a continuous moisture drain that also excludes insects.

N. Bearings shall be either oil or grease lubricated.

O. Manufacturer's standard motor may be supplied on appliances, tools, and unit heaters, in which case a redesign of the unit would be required to furnish motors of other than the manufacturer's standard design. However, in all cases, totally enclosed motors are preferred and shall be furnished if offered by the manufacturer as a standard option.

P. Totally enclosed motors shall be furnished on:
   1. Outdoor equipment.
   2. Equipment for installation below grade.
   3. Chemical feeding and chemical handling equipment.
   4. Equipment operating in wet or dust-laden locations.

Q. Drip proof motors, or totally enclosed motors at the Supplier's option, shall be furnished on equipment in indoor, above-grade, clean, and dry locations.

R. Explosionproof or submersible motors shall be furnished as required by applicable codes or as specified in other sections.

S. Motors shall be rated as indicated on the drawings.

T. All motors shall meet the minimum efficiency standards required by the Energy Policy Act (EPACT) of 1992.

U. Horizontal motors shall be energy-efficient and shall have a NEMA nominal efficiency nameplate value equal to or greater than values listed in the following table. Efficiency shall be determined in accordance with IEEE 112, Test Method B.

Motor		Nominal Efficiency Values				Nominal Efficiency Values			
kW	hp	Open Drip Enclosure				TEFC Enclosure			
		3600 rpm	1800 rpm	1200 rpm	900 rpm	3600 rpm	1800 rpm	1200 rpm	900 rpm
0.7	1	84.0	83.0	80.5	75.0	75.5	82.5	81.5	75.5
1.1	1.5	82.5	84.0	84.5	78.0	84.0	84.0	86.5	80.0
1.5	2	84.0	84.0	86.5	86.5	84.0	84.0	87.5	85.5
2.2	3	85.0	87.5	88.0	89.5	87.0	88.0	89.0	86.5
3.7	5	87.5	88.5	89.0	89.5	88.0	88.0	89.5	85.0
5.6	7.5	88.5	89.5	90.0	88.5	90.0	90.0	90.0	86.5
7.5	10	89.0	90.0	91.0	91.0	91.0	90.0	91.0	91.0
11.2	15	90.2	91.7	91.0	91.0	91.0	92.0	92.0	91.0
14.9	20	91.7	92.4	91.7	92.0	92.0	93.0	92.0	91.0
18.7	25	92.4	93.0	92.4	92.0	92.0	93.0	93.0	91.0
22.4	30	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0
29.8	40	93.0	94.0	93.5	93.0	93.0	94.0	94.0	93.0
37.3	50	93.0	94.1	93.5	93.0	92.4	94.0	94.0	93.0
44.8	60	93.0	95.0	94.5	94.0	93.5	95.0	95.0	93.0
56	75	94.0	95.0	95.0	94.0	93.6	95.0	95.0	94.0
74.6	100	94.5	95.0	95.0	95.0	95.0	95.0	95.0	94.0

Motor		Nominal Efficiency Values				Nominal Efficiency Values			
kW	hp	Open Drip Enclosure				TEFC Enclosure			
		3600 rpm	1800 rpm	1200 rpm	900 rpm	3600 rpm	1800 rpm	1200 rpm	900 rpm
93.2	125	95.0	95.0	95.0	95.0	95.0	95.0	95.0	94.0
112	150	95.0	95.0	95.0	95.0	95.0	95.0	95.0	94.0
149	200	95.0	95.0	95.0	95.0	96.0	96.0	95.0	94.0

V. Vertical motors shall be energy-efficient and shall have efficiency values equal to or greater than those shown in the preceding table minus 0.50.

1.7 SUBMERSIBLE ELECTRIC MOTORS

A. Submersible motors shall be air-filled, totally submersible electric motors. Each motor shall have a service factor of 1.05. Motor nameplate rating shall exceed the maximum horsepower required over the operating range of the equipment. The stator housing shall be an air-filled, watertight casing. Motor insulation shall be moisture resistant, Class F, 155°C. Each motor shall be NEMA Design B for continuous duty at 40°C ambient temperature and designed for the number of starts per hour required.

B. The motor bearings shall be antifriction, permanently lubricated type. The bearings shall have a calculated AFBMA L_{10} Life Rating of 40,000 hours when operating at maximum operating head.

C. Each motor shall be capable of continuous operation in air (unsubmerged) for at least 24 hours without exceeding the temperature rise limits for the motor insulation system.

D. Submersible motors shall be equipped with one or more multiconductor cable assemblies for power and control. Each multiconductor assembly containing power cables shall be provided with a separate grounding conductor. Each cable assembly shall bear a permanently embossed code or legend indicating the cable is suitable for submerged use. Cable sizing shall conform to NEC requirements. All cables shall be of sufficient length to terminate in a junction box at least 4 feet above the water level, with 10 feet of slack. Each cable shall be supported by AISI Series 300 corrosion-resistant stainless steel Kellems or woven grips to prevent damage to the cable insulation. The mounting of cable supports shall be coordinated by the supplier to prevent damage to the cable.

E. The cable entry water seal shall include a strain relief and a grommet type seal designed so that a specific fastener torque is not required to ensure a watertight, submersible seal. The cable entry junction box and motor shall be separated by a stator lead sealing gland or a terminal board. The junction box shall isolate the motor interior from moisture gaining access through the top of the stator housing.

1.8 DRIVE UNITS

A. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor. Drive units shall be designed for 24-hour continuous service.

B. Gear motors. Unless otherwise specified, the use of gear motors will not be acceptable.

C. Gear Reducers. Each gear reducer shall be a totally enclosed unit with oil or grease lubricated, rolling element, antifriction bearings throughout.
   1. Helical, spiral bevel, combination bevel-helical, and worm gear reducers shall have a service factor of at least 1.50 based on the nameplate horsepower of the drive motor. Cycloidal gear reducers shall have a service factor of at least 2.0 based on the nameplate horsepower of the drive motor. Shaft-mounted and flange-mounted gear reducers shall be rated AGMA Class II. Helical gear reducers shall have a gear strength rating to catalog rating of 1.5. Each gear reducer shall be designed and manufactured in compliance with applicable AGMA standards.
   2. The thermal horsepower rating of each unit shall equal or exceed the nameplate horsepower of the drive motor. During continuous operation, the maximum sump oil temperature shall not rise more than 100°F above the ambient air temperature in the vicinity of the unit and shall not exceed 200°F.
   3. Each grease lubricated bearing shall be installed in a bearing housing designed to facilitate periodic re-greasing of the bearing by means of a manually operated grease gun. Each bearing housing shall be designed to evenly distribute new grease, to properly dispose of old grease, and to prevent over-greasing of the bearing. The use of permanently sealed, grease-lubricated bearings will not be acceptable. An internal or external oil pump and appurtenances shall be provided if required to properly lubricate oil lubricated bearings. A dipstick or a sight glass arranged to permit visual inspection of lubricant level shall be provided on each unit.
   4. Gear reducers that require the removal of parts or the periodic disassembly of the unit for cleaning and manual re-greasing of bearings will not be acceptable.
   5. Certification shall be furnished by the gear reducer manufacturer indicating that the manufacturer has reviewed the intended application of each unit in detail and that the unit provided is fully compatible with the conditions of installation and service.

D. V-Belt Drives. Each V-belt drive shall include a sliding base or other suitable tension adjustment. V-belt drives shall have a service factor of at least 1.6 at maximum speed based on the nameplate horse-power of the drive motor.

1.9 LUBRICATION

A. Equipment shall be adequately lubricated by systems that require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

B. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

C. Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers, from the normal operating area or platform without removing the unit from its normal installed position.

1.10 SAFETY GUARDS

A. All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gauge or heavier galvanized or aluminum-clad sheet steel or 1/2-inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. All safety guards in outdoors locations shall be designed to prevent the entrance of rain and dripping water.

1.11 ANCHOR BOLTS

A. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. The minimum size anchor bolt shall be 3/4" diameter. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Two nuts shall be furnished for each bolt.

1.12 EQUIPMENT BASES

A. A cast iron or welded steel base plate shall be provided for each pump, compressor, and other item of equipment which is to be installed on a concrete base. Each base plate 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. Base plates shall be anchored to the concrete base with suitable anchor bolts and grouted in place.

1.13 SHOP PAINTING

A. All steel and iron surfaces shall be protected by suitable paint or coatings applied in the shop. Surfaces that will be inaccessible after assembly shall be protected for the life of the equipment. Exposed surfaces shall be finished smooth, thoroughly cleaned, and filled as necessary to provide a smooth uniform base for painting. Surfaces to be painted after installation shall be shop painted with one or more coats of a primer that will adequately protect the equipment and be compatible with the finish coats. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop

finished with a high-grade oil-resistant enamel.

B. Shop primer for steel and iron surfaces which are not to be painted shall be coated with rust preventive compound, Dearborn Chemical "No-Ox-Id 2W", Houghton "Rust Veto 344", or Rust-Oleum "R-9" or equal.

1.14 PROTECTION

A. All equipment shall be boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times. Pumps, motors, electrical equipment, and other equipment having antifriction or sleeve bearings shall be stored in weather tight warehouses that are maintained at a temperature at least 60°F.

B. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Engineer.

C. Electrical equipment controls and insulation shall be protected against moisture or water damage. All space heaters provided in the equipment shall be connected and operating at all times until equipment is placed in operation.

1.15 INSTRUCTIONS AND PARTS LISTS

A. Six copies of a manual containing specifications, drawings, and descriptions of equipment; installation instructions; operating and maintenance instructions; parts lists; and where applicable, test data and curves, shall be provided for each type of equipment indicated in the equipment schedule.

B. These manuals shall be in addition to any instructions packed with the equipment and shall be submitted to the Engineer not later than the date of shipment of the equipment. Each manual shall be bound in a heavy fiberboard or hardback cover having indicated thereon the type of equipment, manufacturer's name, and year of purchase.

1.16 INSTALLATION CHECK

A. An experienced, competent, and authorized representative of the manufacturer or supplier of each item of equipment indicated in the equipment schedule shall visit the site of the work and inspect, check, adjust if necessary, and approve the equipment installation. In each case, the equipment supplier's representative shall be present when the equipment is placed in operation. The equipment supplier's representative shall revisit the job site as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory to the Engineer.

B. Each equipment supplier's representative shall furnish to the Owner, through the 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 conditions and that it operated satisfactorily; and (5) the Engineer and Owner's representatives have

been instructed in all items of operation and maintenance of the equipment.

C. All costs for this work shall be included in the prices quoted by equipment suppliers.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01620

EQUIPMENT SCHEDULE

PART 1 - GENERAL

1.1 SCOPE

A. This section consists of a schedule of the items of equipment for which manufacturer's field services or operation and maintenance manuals are required.

B. Specific requirements for manufacturer's field services are covered in the quality control section.

C. Specific requirements for operation and maintenance manuals are covered in the submittals section.

1.2 SCHEDULE

A. Manufacturer's field services and operation and maintenance manuals shall be provided for the items of equipment indicated in the following schedule:

Spec Section	Type of Equipment	Mfr's. Field Services	O&M Manual
13560	Instrumentation	X	X
15101	Sluice Gates		X
15900	Electric Motor Operators	X	X
16900	Controls		X
16910	Supervisory Control and Data Acquisition (SCADA) System		X

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

E. Spare parts and maintenance Products.

F. Warranties and bonds.

G. Operation and Maintenance Data.

1.2 RELATED SECTIONS

A. General Conditions.

B. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.

1.3 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces.

C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

1. Replace filters of operating equipment.

D. Clean debris from roofs, gutters, downspouts, and drainage systems.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.5 ADJUSTING

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

1.6 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

G. Submit documents to Engineer with claim for final Application for Payment.

H. Contractor shall maintain his records for three (3) years following completion of the project. Records shall be available for review by the Missouri Department of Natural Resources, the EPA, the City, the Engineer, the Comptroller General of the United States or their duly noted assigns for the purposes of making audit, examination, excerpts or transcriptions related to the project.

1.7 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

C. Provide list of spare parts divided by spec section.

1.8 WARRANTIES AND BONDS

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three ring binder with durable plastic cover.

D. Submit prior to final Application for Payment.

E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.9 OPERATION AND MAINTENANCE DATA AND MANUALS

A. Adequate operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The equipment Supplier shall prepare an operation and maintenance manual for each type of equipment indicated in the individual equipment sections or the equipment schedule. Parts lists and operating and maintenance instructions shall be furnished for other equipment not listed in the individual equipment sections or the equipment schedule.

B. Parts lists and operating and maintenance instructions shall be furnished for other equipment not listed in the individual equipment sections or the equipment schedule.

C. Operation and maintenance manuals shall include the following:
   1. Equipment function, normal operating characteristics, and limiting conditions.
   2. Assembly, installation, alignment, adjustment, and checking instructions.
   3. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
   4. Lubrication and maintenance instructions.

5. Guide to troubleshooting.
6. Parts lists and predicted life of parts subject to wear.
7. Outline, cross section, and assembly drawings engineering data, and wiring diagrams'
8. Test data and performance curves, where applicable.

D. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by the Contractor.

E. Preliminary copies of operation and maintenance manuals shall be submitted to the Engineer before shipment of the equipment. Preliminary copies shall be in hardcopy format. Three preliminary copies of the manuals shall be submitted.

F. After review by the Engineer, final copies of the operation and maintenance manuals shall be delivered to the Engineer no later than 30 days prior to placing the equipment in operation. Two final hardcopies and three electronic copies shall be included.
   1. Hardcopies for preliminary and final manuals shall be temporarily bound in heavy paper covers bearing suitable identification. All manuals shall be contained in standard 3-hole binding. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction ins not practicable, larger drawings shall be folded separately and placed in envelopes, which are bound into the manuals, each envelope shall be suitable identified on the outside. Each volume containing data for three or more items of equipment shall include a table of contents and index tabs. The final hardcopy of each manual shall be prepared and delivered in substantial, permanent, three-ring or three-post binders with a table of contents and suitable index tabs.
   2. Each electronic copy shall be delivered on a unique CD-ROM in Adobe Acrobat's Portable Document Format (PDF). The PDF file(S) shall be fully indexed using the Table of Contents, searchable with thumbnails generated.
      a. File names shall use the "eight dot three" convention (XXXXX_YY.pdf), where X is the five digit number corresponding to the specification section, and YY is the two digit number set in sequential order when there are more than one PDF document (more than one O&M manual) per specification section. The initial filename for the OEM submittal will be provided with the request for final O&M manuals.
      b. Scanned images must be at a readable resolution. For most documents, they should be scanned at 300 dots per inch (dpi). Optical Character Recognition (OCR) capture must be performed on these images. OCR settings shall be performed with the "original image with hidden text" option in Adobe Acrobat Exchange.
      c. One PDF document (PDF file) shall be created for each equipment service manual. The entire manual shall be converted to a single .PDF file via scanning or other method of conversion. Drawings or other graphics shall also be converted to .PDF format and included into the single PDF document. Pages that must be viewed in landscape format shall be rotated to the appropriate position for easy reading on screen.
      d. The PDF documents shall have a bookmark created in the navigation frame for each major entry ("Section" or "Chapter" in the Table of Contents.

Thumbnails shall be generated for each page or graphic in the PDF file.

3. As a minimum, the following information shall be included on all final O&M manual materials, including CD-ROM disks and hardcopy manuals:
   Manufacturer's Name
   a. Equipment name and/or O&M title spelled out in complete words.
   b. Specification Section Number
   c. Project Name
   d. City Project/Contract Number
   e. File Name and Date

G. Shipment of the equipment will not be considered complete until all required manuals and data have been received.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

SECTION 02060

DEMOLITION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Demolish and remove designated weirs, sluice gates, and related appurtenances as indicated on the drawings and as specified herein.

B. Remove materials from site.

C. Disconnect, cap, and remove identified utilities as required.

D. Where required, demolished items shall be salvaged, cleaned, and delivered to a location designated by the Owner or reused in the work.

1.2 RELATED WORK

A. Section 01005 - Administrative Provisions.

1.3 GENERAL REQUIREMENTS

A. The Contractor shall be responsible for all work under this section.

B. All areas and facilities of the existing equalization basins must remain operable during performance of the work except as approved by the Owner.

C. Demolition work shall create a minimum of interference with the Owner's operations and inconvenience to the Owner.

1.4 QUALITY ASSURANCE

A. Contractor shall visit the site and make himself aware of the existing physical system prior to the bid date.

1.5 SUBMITTALS

A. Submit demolition and removal procedures and schedule under provisions of Section 01300.

B. Submit record documents under provisions of Section 01700.

1.6 EXISTING CONDITIONS

A. Conduct demolition to minimize interference with adjacent structures.

B. Provide, erect, and maintain temporary barriers and security devices.

C. Conduct operations with minimum interference to public or private thoroughfares. Maintain egress and access at all times.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

B. Protect existing appurtenances and structures that are not to be demolished or removed.

C. Disconnect, remove, and cap designated utility lines within demolition areas.

D. Mark location of disconnected utilities. Identify utilities and indicate capping locations on Project Record Documents.

3.2 EXECUTION

A. Contractor shall remove existing materials as specified, referenced and/or noted. The drawings indicate facilities to be demolished but are not intended to itemize every demolition task that may be required. Field verify all conditions and dimensions.

B. Demolish indicated piping, equipment, and/or appurtenances in an orderly and careful manner. Provide demolition for incidental work not specifically identified as required for proper installation of new material and equipment.

C. Contractor shall protect the work and existing work shown to remain. Do not damage materials shown to remain in place. Any work damaged by Contractor shall be repaired by the Contractor at no additional cost to the owner to the condition equal to the condition prior to damage, equal to adjacent surfaces. Cease operations and notify Engineer immediately if adjacent structures appear to be endangered. Do not resume operations until corrective measures have been taken.

D. Contractor shall cooperate with the Owner in the scheduling and execution of the work and use of the site. Contractor shall notify the Owner as far as possible in advance of the commencement of any work or operation that would interfere with the use of the existing facilities.

E. Contractor shall exercise all reasonable and proper precautions for the protection of persons and property. Safety provisions of applicable laws and building and construction codes shall be observed. Machinery and equipment and all hazardous conditions shall be guarded or eliminated in accordance with the safety provisions of the latest applicable laws and codes.

F. Except where noted otherwise, immediately remove demolished material from site.

G. Contractor shall store and protect materials and equipment to be reinstalled or retained in a manner to prevent damage. Any material or equipment to be salvaged that is damaged during demolition shall be replaced in kind by the Contractor at no cost to the Owner.

H. Contractor shall be responsible for proper disposal of all demolished materials not wanted by Owner. Remove demolished materials from site as work progresses. Leave site in clean condition.

I. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.

J. Do not burn or bury materials on site. Remove trash frequently to maintain good housekeeping.

K. Existing emergency egresses shall be maintained in all situations.

L. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.

END OF SECTION

SECTION 02999

CLEANING OF LAGOON CELLS
AND LAND APPLICATION OF LIQUID SLUDGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Responsibilities of the City.

B. Responsibilities of the Contractor.

C. Sludge loading.

D. Transportation.

E. Land application of sludge.

F. Equipment.

1.2 RELATED SECTIONS

A. Section 01005 – Administrative Provisions

B. Section 01500 – Construction Facilities and Temporary Controls

C. Section 01700 – Contract Closeout

1.3 DESCRIPTION OF WORK

A. Work will include the cleaning and land application of residual wastewater sludge from the two (2) existing equalization basin cells. The contractor must be qualified to perform these tasks in strict compliance with all EPA and Missouri Department of Natural Resources (MoDNR) regulations.

1.4 RESPONSIBILITIES OF THE CITY OF JOPLIN

A. Provide the personnel to oversee the sludge utilization operation, including review and approval of application sites and operations and addressing questions on this contract.

B. Review of proposal sludge application rates, prior to removal of sludge from treatment plant site to determine compliance with MoDNR requirements.

C. Provide ingress and egress to work site.

1.5 RESPONSIBILITIES OF THE CONTRACTOR

A. Provide an application site.
B. Transport sludge in accordance with federal, state, county and local requirements.

C. Apply at a rate not to exceed the allowable agronomic rate per acre.

D. Apply sludge in accordance with applicable federal, state, county, and local requirements. Sludge is to be subsurface injected. Alternative methods of sludge distribution may be allowed if approved by the Engineer.

E. Provide the City of Joplin with accurate application records after land application of sludge. Such records are to be submitted to the City of Joplin within thirty (30) days after sludge application.

F. Contractor shall remove all residual sludge and scum from the lagoon cells to be cleaned as necessary.

G. Contractor shall provide all pumping and power equipment to remove residual sludge.

H. Contractor shall remove all sludge to lagoon cell floor.

I. The Contractor shall be responsible for maintaining the records on each field where sludge was applied. This information shall include as a minimum:

1. Date(s) of sludge application.
2. Amount applied each date.
3. Portion of field applied to.
4. Acreage of sludge applied each day.

J. Contractor shall make himself familiar with the scope of services to be provided for under this contract and it shall be the bidder's sole responsibility to determine quantities of sludge to be removed and land applied under this project. No change orders will be issued for the amount of sludge present in the lagoon.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 LOADING SLUDGE AT THE SITE

A. The residual wastewater sludge is contained within the two (2) existing lagoon cells. Each lagoon cell has the following approximate sludge volume:

		Estimated Sludge Volume (cy)
1.	Lower Basin	1,700
2.	Upper Basin	3,900

B. The Contractor shall provide vehicles, equipment, and operators to load and transport the sludge from the lagoon cells to the field sites.

C. The Contractor shall safely drive and park his/her equipment at approved areas at the site.

D. The Contractor shall furnish all personnel, pumps, and safety equipment to remove residual sludge from the lagoon cells.

E. The Contractor shall be responsible for immediate cleanup of any spilled sludge on the plant site and shall include the loading areas and roadways. Said cleanup shall include sweeping, shoveling, or washing all equipment and/or road areas. Wherever possible, sweeping or shoveling shall be used for cleanup with any washing done so as to use as little water as possible. All cleanup equipment shall be provided by the Contractor.

3.2 APPLICATION OF SLUDGE TO LAND

A. The Contractor shall apply the sludge at the specified rate for each field as approved by MoDNR.

B. Loading operations, sludge application and transport will take place during normal working hours of plant personnel. Monday through Friday, unless otherwise approved by the City of Joplin. There is to be no night spreading of sludge to farmland. If the Contractor wishes to load, transport, or apply at other times, the Contractor will notify the City of Joplin.

3.3 EQUIPMENT

A. The Contractor will keep his equipment in good operating condition at all times. All maintenance will be done at the Contractor's expense. City of Joplin facilities will not be used for equipment maintenance except as previously agreed upon by the Contractor and the City of Joplin.

END OF SECTION

SECTION 03600

GROUT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Grouting of motor and equipment base plates or bedplates; column base plates; other miscellaneous baseplates; and other uses of grout as shown on the plans.

B. Epoxy grouting of anchor bolt and reinforcing bars to be installed in hardened concrete.

1.2 RELATED WORK

A. Section 05550 - Anchor Bolts and Expansion Anchors.

1.3 SUBMITTALS

A. Submit product data in accordance with Section 01300 - Submittals.

PART 2 - PRODUCTS

2.1 NON-SHRINKING GROUT

A. Unless otherwise specified, all grouting shall be done with non-shrinking grout.

B. Non-shrinking grout shall be L & M “Crystex,” U.S. Grout “Five Star Grout,” UPCO “Upcon Super Flow” or equal.

C. Nonshrinking grout shall be furnished factory premixed so only water is added at the job site. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout.

2.2 EPOXY GROUT

A. Epoxy grout shall consist of a two-component liquid epoxy adhesive of viscosity appropriate to the location and application, and an inert aggregate filler component. Components shall be packaged separately at the factory and field mixed.

B. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

C. Adhesive for floors and horizontal surfaces shall be as follows:
   1. Low viscosity - Adhesive Engineering "Concresive 1463," Sika "Hi-Mod LV" or equal
   2. High viscosity - Adhesive Engineering "Concresive 1001 LPL," Sika "Hi-Mod" or equal

D. Adhesive for vertical walls and overhead application shall be nonsag consistency; Adhesive Engineering "Concresive 1441," Sika "Hi-Mod Gel" or equal.

E. Aggregate shall be as recommended by the epoxy grout manufacturer.

F. Water shall be clean and free from deleterious substances.

PART 3 - EXECUTION

3.1 NON-SHRINKING GROUT PREPARATION

A. The concrete foundation to receive non-shrinking grout shall be saturated with water for 24 hours prior to grouting.

3.2 NON-SHRINKING GROUT PLACEMENT

A. Unless otherwise specified or indicated on the plans, the thickness of grout under base plates shall be 1-1/2 inches. Grout shall be placed in strict accordance with the manufacturer's recommendation to assure that all spaces and cavities are completely filled without voids. Forms shall be provided where structural components of base plates or bedplates will not confine the grout.

B. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges or grout shall be cut off flush at the base plate, bedplate, member, or piece of equipment.

C. Non-shrinking grout shall be protected against rapid loss of moisture by covering with wet rags or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 7 days.

3.3 EPOXY GROUT PREPARATION

A. Where indicated on the plans, anchor bolts and reinforcing bars shall be epoxy grouted in holes drilled into hardened concrete.

B. Diameter of holes shall be 1/4 inch larger than maximum dimension of head bolt and 1/2 inch larger than bar diameter.

C. The embedment depth for epoxy grouted anchor bolts and reinforcing bars shall not be less than ten bolt or bar diameters unless indicated otherwise on the plans.

D. Holes shall be prepared for grouting as recommended by the manufacturer.

3.4 EPOXY GROUT INSTALLATION

A. Anchor bolts and reinforcing bars shall be clean, dry, and free of grease and other foreign matter at time of installation.

B. The bolts and bars shall be set and positioned, and the epoxy grout shall be placed and finished in accordance with manufacturer's recommendations.

C. Particular care shall be taken to ensure that all spaces and cavities are filled with epoxy grout, without voids.

END OF SECTION

SECTION 05550

ANCHOR BOLTS AND EXPANSION ANCHORS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section covers cast-in-place anchor bolts, anchor bolts for epoxy grouting, and expansion anchors to be installed in hardened concrete or masonry.

B. The General Equipment Stipulations set forth additional requirements for equipment anchor bolts.

C. Epoxy grouting of anchor bolts is covered in the grout section.

1.2 RELATED ITEMS

A. Section 03600 – Grout.

1.3 GENERAL REQUIREMENTS

A. Unless otherwise specified or indicated on the plans, all anchor bolts shall be cast-in-place bolts and shall have a diameter of at least 3/4 inch.

B. Expansion anchors indicated or accepted in lieu of cast-in-place anchor bolts for equipment and structural framing shall have a diameter or at least 3/4".

C. Anchor bolts which are to be epoxy grouted shall be clean and free of coatings that would weaken the bond with epoxy.

D. Two nuts, a jam nut, and a washer shall be furnished for anchor bolts indicated on the drawings to have locknuts; two nuts and a washer shall be furnished for all other anchor bolts.

E. Nuts and washers for expansion anchors shall be as specified for anchor bolts.

F. Expansion anchors shall have a minimum diameter of a least 1/2 inch unless otherwise.

G. Anchor bolts and expansion anchors for buried and immersion service or located in splash zones shall be stainless steel. All other anchor bolts and expansion anchors shall be carbon steel unless otherwise specified.

PART 2 - PRODUCTS

2.1 MATERIAL SPECIFICATIONS

A. Bolts and Nuts:
   1. Carbon Steel - ASTM A307.
   2. Stainless Steel - IFI-104, Grade 303, 304, or 305.

3. Galvanized Steel - Carbon Steel Bolts and Nuts; Hot-Dip Galvanized ASTM A153 and A385.

B. Flat Washers: ANSI B18.22.1; of the same material as bolts and nuts.

C. Expansion Anchors:
1. For Concrete: Fed. Spec. FF-S-325; wedge type, Group II, Type 4, Class 1 or 2; self drilling type, Group III, Type 1; or non-drilling type, group VIII, Type 1 or 2; Hilti, Phillips, Rawlplug, or USM.
2. For Masonry: Hilti HIT HY-20 or Simpson SET epoxy anchors or Engineer approved equal.

PART 3 - EXECUTION

3.1 ANCHOR BOLT INSTALLATION

A. Anchor bolts shall be delivered in time to permit setting when structural concrete is placed.

B. Anchor bolts which are cast-in-place in concrete shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or supporting template.

3.2 EXPANSION ANCHOR INSTALLATION

A. Expansion anchors shall be installed in accordance with the manufacturer's recommendation for maximum holding power, but in no case shall the depth of hole be less than four bolt hole diameters.

B. The minimum distance between the center of any expansion anchor and an edge or exterior corner of concrete shall be at least five times the diameter of the hole in which the anchor is to be installed.

C. Unless otherwise indicated, the minimum distance between the centers of expansion anchors shall be at least 10 times the diameter of the hole in which the anchors are installed.

END OF SECTION

SECTION 05990

STRUCTURAL AND MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Items fabricated from metal plates, sheets, rods, and bars, castings and all other wrought or cast metal except component parts of equipment and items covered by other sections.

B. Fabricated metal items that are indicated on the drawings shall be fabricated in accordance with the applicable requirements of this section.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 05550 - Anchor Bolts and Expansion Anchors.

1.3 REFERENCES

A. ASTM A36 - Structural Steel.

B. ASTM A53 - Hot-Dipped, Zinc-Coated Welded and Seamless Steel Pipe.

C. ASTM A108 - Steel Bars, Carbon, Cold-Finished, Standard Quality.

D. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

E. ASTM A307 - Carbon Steel Extension Threaded Standard Fasteners.

F. ASTM A325 - High Strength Bolts for Structural Steel Joints.

G. ASTM A366 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding.

H. ASTM A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.

I. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes.

J. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

K. ASTM A992 – Standard Specification for Structural Steel Shapes.

L. AWS D1.1 - Structural Welding Code.

M. AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1.4 SUBMITTALS

A. Complete data, detailed drawings, and erection drawings covering all structural and miscellaneous metal items shall be submitted for approval.

B. All welds shall be properly identified on the detailed shop drawings. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld.

C. Submittals for high strength bolts and load indicator washers shall include statements from the bolt and washer manufacturers certifying satisfaction compliance with the governing standards.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

B. Fabricate and erect aluminum in accordance with the provisions of the Aluminum Association "Standard for Aluminum Structures."

1.6 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this section with a minimum five years documented experience.

B. Erector: Company specializing in performing the work of this section with a minimum five years documented experience.

C. Connections not detailed on the drawings shall be designed under the direct supervision of a professional structural engineer licensed in the State of Missouri.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
   1. Store fasteners in a protected place. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
   2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 STRUCTURAL

A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STEEL MATERIAL AND CAST IRON

A. Steel Shapes, Plates and Bars: ASTM A36/A36M.

B. W-Sections: ASTM A992.

C. Steel Sheets: ASTM A366 or A569, uncoated; ASTM A366 or A569, hot-dipped galvanized in accordance with ASTM A525, G90 minimum.

D. Steel Pipe: A53, Grade B; ASTM A500, Grade B, C, or D; or ASTM A501.

E. High Strength Bolts and Nuts: ASTM A325 galvanized to ASTM A153 for galvanized components.

F. Unfinished Bolts: ASTM A307.

G. Anchor Rods: ASTM F1554, Grade 36.

H. Self Locking Nuts: Prevailing torque type, IFI-100, Grade A.

I. Flat Washers: ANSI B18.22.1.

J. Hardened Flat Washers: ASTM F436.

K. Beveled Washers: Table 1 of "Specification for Structural Joints Using ASTM A325 or A490 Bolts," AISC Steel Construction Manual.

L. Load Indicator Washers: ASTM F959.

M. Lock Washers: ANSI B18.21.1, helical spring type.

N. Checkered Plate: ASTM A786, carbon steel, skid resistant pattern.

O. Structural Tubing: ASTM A500, or A501.

P. Steel Grating: Fed. Spec. RR-G-661, Type I, rectangular, welded, galvanized after fabrication.

Q. Welded Steel Chain: Fed. Spec. RR-C-271. Type I, Grade C, Class 5, style 2, galvanized, twist-link style, short length pattern.

R. Cast Iron: ASTM A48, Glass 35B or better.

S. Crane Rails: ASTM A1.

2.2 STAINLESS STEEL MATERIALS

A. Sheet, Strip, Plate, and Flat Bars: ASTM A666, Type 316L.

B. Bars and Shapes: ASTM A276, Type 316L.

C. Bolts: ASTM F593, Alloy Group 1 or 2.

D. Nuts: ASTM F594, Alloy Group 1 or 2.

E. Flat Washers: ANSI B18.22.1.

F. Lock Washers: ANSI B18.21.1, helical spring type.

2.3 ALUMINUM MATERIALS

A. Sheet and Plate: ASTM B209, Alloy 6061-T6.

B. Rolled Sections: ASTM B308, Alloy 6061-T6.

C. Rod and Bar: ASTM B211, Alloy 6061-T6 or 2017-T4.

D. Extrusions: ASTM B221, Alloy 6063-T5 or T6.

E. Pipe: ASTM B429, Alloy 6061-T6 or 6063-T6.

F. Bolts, Stainless Steel: ASTM F593, Alloy Group 1 or 2.

G. Nuts, Stainless Steel: ASTM F594, Alloy Group 1 or 2.

H. Bolts, Aluminum: ASTM B211, Alloy 2024-T4.

I. Nuts, Aluminum: ASTM B211, Alloy 6061-T6.

J. Flat Washers: ANSI B18.22.1.

K. Lock Washers: ANSI B18.21.1, helical spring type.

L. Castings: ASTM B26 or B85.

M. Checkered Plate: Alcoa C102, Alloy 6061-T6.

N. Aluminum Grating: ASTM B221, Alloy 6063-T6, mechanically locked; Klemp “I-Bar,” or equal.

O. Aluminum Railings: All aluminum railings shall be fabricated from 1 ½ inch schedule 40 pipe; or shall be Universal “Uni-Rail,” Moultrie “Wesrail” prefabricated 1 ½ inch railing, or equal.

2.4 SHOP COATINGS

A. Rust-Inhibitive Primer: Universal type; Cook "391-N-167 Barrier Coat, Koppers "No. 10 Inhibitive Primer, Tnemec "77 Chem-Prime," Valspar "13-R-28 Chromox Primer, or equal."

B. Red Oxide Primer: SSPC 15, Type 1, or Fed. Spec. TT-P-636.

C. Coal Tar Paint: Koppers "Bitumastic Super Service Black," Tnemec "46-449 Heavy Duty Black," or Valspar "High-Build Bituminous Coating 35-J-10, or equal."

D. Asphalt Varnish: Fed. Spec. TT-V-51.

2.5 FABRICATION

A. Structural and miscellaneous metal work shall be fabricated in conformity with dimensions, arrangement, sizes, and weight or thicknesses specified on the plans.

B. All members and parts, as delivered, shall be free from warps, local deformations and unauthorized bends.

C. Holes and other provisions for field connections shall be accurately located and shop checked for proper fit and alignment.

2.6 FINISH

A. Prepare structural steel surfaces in accordance with SSPC SP-2.

B. Shop prime structural steel members. Do not prime surfaces that will be in contact with concrete, fire proofing materials, or that will be high strength bolted.

C. Galvanize steel members in accordance with ASTM A123.

D. All fabricated aluminum railings shall be provided with a clear anodic finish, AA-M10C20A41. All prefabricated aluminum railings shall be provided with manufacturer’s standard clear anodic A41 finish.

2.7 HANDLING AND STORAGE

A. Store metal work on blocking so that no metal touches the ground and so no water collects thereon. The material shall be protected against bending under its own weight or superimposed loads.

2.8 RAILINGS

A. Unless otherwise indicated on the drawings, all railings provided under this section shall be of the same type and design. Aluminum railings shall be provided.
   1. All aluminum railings shall be fabricated from 1-1/2 inch Schedule 40 pipe; or shall be Universal “Uni-Rail”, Moultrie “Wesrail”, or approved equal, in-line, side-mounted, prefabricated 1-1/2 inch railing, generally as specified and as indicated on the drawings.
   2. All fabricated aluminum railings shall be provided with a clear anodic finish, AA-M10C20A41. All prefabricated aluminum railings shall be provided with the manufacturer=s standard clear anodic A41 finish.
   3. All angles, offsets, or other changes in alignment in pipe railings shall be made with R & B Wagner or equal railing ells and welding connectors. All fittings and connections in prefabricated aluminum railings shall be as recommended by the railing manufacturer. Field joints in welded railings shall be made with R & B Wagner “Double-Lock Splice-Lock,”, or equal at least 3-3/4 inches long.
   4. Railings shall be smooth, with all projecting joints and sharp corners ground smooth. Welded joints shall be flush type. Members shall be neatly coped and continuously welded or mechanically connected at all junctions. Top rails shall run continuously over posts. All rails and posts shall be in the same plane and shall not be offset. All welding shall be done neatly and substantially by a process (e.g., TIG or MIG) producing a smooth weld. All weld spatter and burrs shall be removed, and all welds shall be thoroughly brushed with a stainless-steel power wire brush.
   5. For base flange mounting, the base flange shall be an R & B Wagner aluminum “Extra Heavy Pipe Flange or equal with set screw and 4 holes Model 1647,” with R & B Wagner aluminum “Anchor Plate with 4 screws Model B1648” or equal Base flange shall connect to the aluminum railing as indicated on the drawings.

B. All welding of aluminum shall be done in accordance with recommendations of the American Welding Society. Welds shall be free of porosity, cracks, holes, and flux.

C. All fasteners used in connection with aluminum railings shall be stainless steel.

2.9 GRATING

A. All grating and grating stair treads shall be aluminum.

B. All grating and grating stair treads shall have a serrated edge on the tread surface.

C. Except as modified herein, the manufacture, fabrication, and installation of grating shall comply with recommendations in the “Metal Bar Grating Manual” of the National Association of Architectural Metal Manufacturers.
   1. Aluminum Grating. Aluminum grating shall be the mechanically locked type, with cross bars deformed or swaged to prevent turning. Grating stair treads shall be pressure locked or one-piece cast or extruded type.

2. Fabrication. Grating panels shall be arranged so that openings are centered on a joint between panels. Toe plates extending the full depth of the grating and 4 inches above the top shall be provided around openings and on the open sides of stairway landings, overhead platforms, overhead walkways, and other locations indicated on the drawings. End of bearing bars in grating floor panels shall be provided with full-depth bands. Bands and toe plates shall be 3/8 inch thick. Toe plates shall be welded to each bearing bar. Bands shall be welded to the first, the last, and every fourth intermediate bar. Crossbars shall be cut off flush with the outside face of sidebars.

D. All angular, circular, re-entrant, and other cuts in aluminum grating shall be sawed or sheared.

E. Grating shall be fabricated in panels that can be easily handled by plant personnel. Unless otherwise indicated on the drawings, the weight of individual panels shall not exceed 150 pounds. Panels shall be within ±3/16 inch of authorized length and ±1/8 inch of authorized width and shall have a maximum difference in length of opposite diagonals of 1/4 inch. The spacing of bearing bars shall be within 1/32 inch of authorized spacing. Cross bars and edge bars of adjacent panels shall align. After installation, there shall be not more than 1/4-inch clearance between panels. All bearing bars shall be parallel. Bands and toe plates shall align within 1/8-inch tolerance, vertical and horizontal.

F. All grating shall lie flat, with not tendency to rock when installed. Poorly fitting of damaged grating will be rejected.

G. Grating stair treads shall be provided with carrier plates and Wooster “A120" abrasive nosings. Stair treads shall be fastened to stair stringers with galvanized bolts. Nosings shall be attached with stainless steel bolts and self-locking nuts.

2.10 ACCESS HATCHES AND EQUIPMENT HATCHES

A. Fabricated access hatches and equipment hatches shall be provided and installed where indicated on the drawings and as specified herein. The hatches shall be of aluminum construction, with mill finish. All surfaces of aluminum that will be in contact with concrete or mortar when installed shall be given a heavy coat of coal tar paint. All paint shall be dry and hard when the coated parts are shipped, assembled, and installed. The aluminum cover plate shall be designed to withstand a live load of 100 pounds per square foot.

B. Prefabricated access hatches and equipment hatches shall be provided and installed where indicated on the drawings. The prefabricated hatches shall be “Bilco,” “Halliday,” or equal.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Attach end welded studs as indicated in the drawings.

B. Galvanize plates after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.2 ERECTION

A. Erection drawings shall be prepared, and each separate piece shall be marked as indicated thereon by the fabricator.

B. Allow for erection loads and provide sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Before assembly, surfaces to be in contact with each other shall be thoroughly cleaned.

D. Light drifting will be permitted to draw parts together but drifting to match unfair holes will not be permitted.

E. Any enlargement of holes necessary to make field connections shall be done by reaming with twist drills. Enlarging holes by burning will not be permitted.

F. Do not field cut or alter members without approval of the Engineer.

G. Unless otherwise acceptable to the Engineer, a platform or other means of access shall be provided at each field connection to facilitate inspection.

H. Base plates shall be set level in exact position and grouted in place.

3.3 STRUCTURAL AND MISCELLANEOUS STEEL

A. Unless otherwise noted, connections shall conform to the details on the drawings.

B. The shop-fabricated portions of structural connections shall be welded or bolted. The shop portion of beam-to-column connections shall be attached to the beam unless otherwise indicated on the plans.

C. Field connections for structural steel, as defined in the AISC Manual, shall be made with ASTM A325 high strength bolts equipped with load indicator washers. Field-welded connections will not be acceptable for structural steel unless noted on the plans.

D. Connections for miscellaneous steel work not included in the AISC definition of structural steel may be made with unfinished bolts. All unfinished bolts shall be equipped with self-locking nuts or unfinished nuts and lock washers.

E. Bolted connections shall be friction type except where other type connections are specifically indicated on the drawings. Contact surfaces of friction connections shall not be painted. When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts, or washers, shall be free of loose mill scale, dirt, burrs, oil, paint, lacquer, galvanizing, and other foreign material that would prevent solid seating of the parts.

F. Bolt holes shall have a diameter nominally 1/16 inch larger than the nominal bolt diameter. Bolt holes for one ply only of vertical diagonal bracing connections may be oversized to a diameter nominally 3/16 inch larger than the nominal bolt diameter. If oversize holes are provided in an outer ply, a hardened flat washer shall be installed over each hole during bolting. Slotted holes shall not be used except for girt connection and other locations specifically indicated on the drawings.

G. Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane perpendicular to the bolt axis. Bolt length shall be increased as required to accommodate the beveled washers.

H. Except as modified or supplemented herein, high strength bolts, method of installation, and bolting tools and equipment shall conform to the requirements of the "Specification for Structural Joints using ASTM A325 or A490 Bolts" set forth in the AISC manual. Bolt length shall be increased 1/8 inch to allow for the thickness of the installed load indicator washer; 1/4 inch if the indicator washer is used in conjunction with one hardened flat washer; and 3/8 inch if two flat washers are required.

I. Load indicator washers shall be installed in accordance with the manufacturer's recommendations, as supplemented herein.

J. To facilitate proper tightening of fastener assemblies, a hardened flat washer shall be installed under the turned element (bolt head or nut) and between the turned element and the indicator washer protrusions, in all cases.

K. Whenever possible, the indicator washer shall be installed on the head end of the bolt. If the bolt head will not be visible for inspection of the indicator washer after installation, or if the bolt head must be turned to tighten the assembly, the indicator washer may be installed on the nut end of the bolt.

L. Tightening of each assembly shall progress systematically from the most rigid part of the joint toward the free edges until the indicator washers on all bolts have been closed to the average gap stipulated by the washer manufacturer.

M. Load indicating washers shall not be substituted for the hardened flat washer required for oversize holes in the outer ply of vertical diagonal bracing connection.

N. Welding and related operations shall conform to applicable provisions of the Structural Welding Code, AWS D1.1 of the American Welding Society. All welding shall be performed in accordance with written procedures using only those joint details that have pre-qualified status when performed in accordance with AWS D1.1. Use of electroslag or electrogas welding processes or the short-circuiting transfer mode of the gas metal arc process will not be acceptable.

O. Welds not dimensioned on the drawings shall be sized to develop the full strength of the least strength component of the connection.

P. Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and where exposed to view shall be ground smooth. Intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

3.4 STRUCTURAL AND MISCELLANEOUS ALUMINUM

A. All materials and work shall conform to the applicable provisions of the Aluminum Association "Standard Aluminum Structures."

B. All members shall be Aluminum Association standard structural shapes. Fabrication work shall be in accordance with current industry standards.

C. Connections not specifically detailed on the drawings shall develop the full strength of the least strength member of the connection.

D. A sufficient number of bolts shall be provided in each connection to develop the shear strength of the members.

E. Unless otherwise noted, welded connections will not be permitted.

3.5 SHOP COATINGS

A. All structural and miscellaneous metal items shall be shop coated as specified herein.

B. Surfaces to be coated shall be dry and free of grease, oil, dirt, dust, grit, rust, loose mill scale, and other objectionable substances.

C. Surfaces to be coated shall be of proper temperatures.

D. Articles to be galvanized shall be pickled before galvanizing. All galvanizing shall be done by the hot-dip process in accordance with ASTM A123, A153 and A385.

E. Ferrous metal surfaces shall be cleaned by high speed wire brushing, blast cleaning, or other methods as recommended by the paint manufacturer.

F. Miscellaneous iron castings shall be hot dipped in asphalt varnish or given a shop coat of coal tar paint.

G. All ungalvanized steel shall be given a rust inhibitive prime coat in the shop after fabrication. Steel surfaces shall be coated as soon as practicable after cleaning. Painting shall be done in a heated structure if outside temperature is below 50 degrees F.

H. All surfaces of aluminum in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

I. Shop coating of zinc-coated steel, stainless steel, or bronze surfaces will not be required.

J. Dry film thickness for shop coating shall be 1.5 mils minimum for rust-inhibitive primer.

END OF SECTION

SECTION 13560

INSTRUMENTATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Equipment and services provided under this section shall be subject to the Instrumentation and Control System Section 13500.

1.2 SUMMARY

A. This Section includes requirements for instrumentation.

B. Supplementing this Section, the drawings indicate the instrument locations and installation details.

C. For all instrument transmitter units installed outdoors, a NEMA 4 enclosure shall be provided.

D. Related Sections include the following:

1. Section 16900 – Controls
2. Section 16910 – Supervisory Control and Data Acquisition (SCADA) System

1.3 SUBMITTALS

A. Submittals shall be provided as specified in Section 01300 – Submittals.

PART 2 – PRODUCTS

2.1 AREA VELOCITY FLOW SENSOR.

A. Area velocity flow sensor shall comply with the following requirements:
1. Install area velocity flow sensor in accordance with manufacturer's recommendations to ensure accurate measurement. Install sensors and transmitters as shown on the detail drawings.
2. Power Supply: 120VAC. Furnish and install power supply in separate enclosure if unit does not accept 120VAC power directly
3. Environment: location: indoor/outdoor, ambient temperature: -18 to 60 degC, relative humidity: suitable for outdoor (NEMA 4X/IP65 enclosure).
4. Accuracy: 0.25% of range.
5. Resolution: 0.1% of program range.
6. Memory: EEPROM (non-volatile).
7. Display: LCD, 2 Line.

8. Enclosure: NEMA 4X/IP65, polystyrene.
9. Sensor: Area velocity flow sensor. NEMA 4X. Provide sensor with length of cable sufficient to reach the controller without splicing. Furnish and install mounting bracket. Refer to metering detail on sheet I9. Sensors shall be provided in the following locations:
    a. Twin Equalization Basin
        1) Southeast Diversion Structure Influent Flow, FM-101, 0-5 MGD, 15" pipe.
        2) Southeast Diversion Structure Influent Flow, FM-102, 0-5 MGD, 15" pipe.
        3) Manhole #3267 Influent Flow, FM-103, 0-10 MGD, 18" pipe.
        4) Inlet Chamber Influent Flow, FM-201, 0-45 MGD, 30" pipe.
10. Relays: 2 alarm/control relays, 1 form "C" SPDT contact per relay.
11. Digital Output: One pulse output for totalizing.
12. Analog Output: One 4 to 20 mA; resolution of 0.1% of range. Set mA signal proportional to flow in MGD.
13. Manufacturers. Hach, Isco, Greyline or approved equal.

2.2 ULTRASONIC FLOW SENSORS.

A. Ultrasonic flow sensor shall comply with the following requirements:

1. Install ultrasonic flow sensor in accordance with manufacturer's recommendations to ensure accurate measurement. Install sensors and transmitters as shown on the detail drawings.
2. Power Supply: 120VAC. Furnish and install power supply in separate enclosure if unit does not accept 120VAC power directly
3. Environment: location: indoor/outdoor, ambient temperature: -18 to 60 degC, relative humidity: suitable for outdoor (NEMA 4X/IP65 enclosure).
4. Accuracy: 0.25% of range.
5. Resolution: 0.1% of program range.
6. Memory: EEPROM (non-volatile).
7. Display: LCD, 2 Line.
8. Enclosure: NEMA 4X/IP65, polystyrene.
9. Sensor: Ultrasonic flow sensor. NEMA 4X. Provide sensor with length of cable sufficient to reach the controller without splicing. Furnish and install mounting bracket. Refer to metering detail on sheet I11. Sensors shall be provided in the following locations:
    a. Twin Equalization Basin
        1) Northwest Diversion Structure Effluent Flow, 0-45 MGD.
10. Relays: 2 alarm/control relays, 1 form "C" SPDT contact per relay.
11. Digital Output: One pulse output for totalizing.
12. Analog Output: One 4 to 20 mA; resolution of 0.1% of range. Set mA signal proportional to flow in MGD.
13. Manufacturers. Siemens Hydroranger or approved equal.

PART 3 – EXECUTION

Not Used.

END OF SECTION

SECTION 15101

SLUICE GATES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Sluice Gates in the Northwest Diversion Structure

B. Sluice Gate in the Southeast Diversion Structure

1.2 RELATED WORK

A. Section 01600 – Material and Equipment.

B. Section 05990 – Structural and Miscellaneous Metals.

C. Section 15900 – Electric Motor Operators.

1.3 DESIGN

A. Gates shall be designed to fit into the structures as shown on the Contract drawings.

B. All gates shall be furnished by the same manufacturer.

C. Gates shall be furnished with the necessary accessories for a complete installation

1.4 SUBMITTALS

A. Complete drawings, details and specifications covering the sluice gates and appurtenances shall be submitted in accordance with Section 01300 - Submittals.

B. Submit operation and maintenance data in accordance with Section 01700 – Contract Closeout.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Fabricated sluice gates shall be as manufactured by Waterman Industries, Golden Harvest, Inc., Whipps, or equal.

B. These specifications set forth are the minimum that will be acceptable. The Manufacturer shall be responsible for furnishing equipment that will operate satisfactorily under the specified conditions and shall modify as necessary any gate that does not operate satisfactorily.

C. All gates shall be designed for the conditions shown on the plans.

2.2 MATERIALS FOR SLUICE GATES

A. ALUMINUM
1. Frames, Rails, Cover Slides, Stiffeners, and Yokes: Aluminum ASTM B-209 and B-211 Alloy 6061-T-6.
2. Fasteners and Anchor Bolts: Stainless Steel, Type 304 or 316.
3. Stems: Stainless Steel ASTM A-276, Type 316.
4. Flush bottom Seals: Rubber ASTM D-2000 BC 615/625 Grade BE 625.
5. Seal: Neoprene ASTM D2000
6. Seats: Ultra High Molecular Weight Polyethylene (UHMW).
7. Finish: Mill finish.
8. Coal Tar Paint: Koppers “Bitumastic Super Service Black”, Tnemec “450 Heavy Tnemecol” or Porters “Tarmastic 103.”

B. STAINLESS STEEL
1. Frames, Rails, Cover Slides, Stiffeners, and Yokes: Stainless Steel ASTM A276, Type 316.
2. Fasteners and Anchor Bolts: Stainless Steel, Type 304 or 316.
3. Stems: Stainless Steel ASTM A-276, Type 316.
4. Flush bottom Seals: Rubber ASTM D-2000 BC 615/625 Grade BE 625.
5. Seal: Neoprene ASTM D2000
6. Seats: Ultra High Molecular Weight Polyethylene (UHMW).
7. Finish: Mill Finish.

2.1 SLUICE GATES

A. Wall Thimbles
1. If required, wall thimbles shall be furnished by the gate manufacturer. The type, depth and length of the wall thimbles shall be as indicated on the drawings.

B. Guides
1. Guides shall be of stainless steel incorporating a dual-slot design. The primary slot shall accept the disc and the secondary slot shall be sufficiently wide to accept the reinforcing ribs of the disc.
2. The guides shall be designed for maximum rigidity and shall have a weight of not less than four and one half (4-1/2) pounds per foot.
3. The guides shall have field replaceable high-density polymer seats in dovetail slots on both sides of the disc. The invert of the frame shall be an angle welded to the bottom of the frame. A neoprene seal shall be attached to the angle and held in place with a bolted retainer bar. Where the guides extend above the operating floor, they shall be sufficiently strong so that no further reinforcing shall be required. The yoke, to support the operating benchstand, shall be formed by two “U”-shaped stainless-steel extrusions welded at top of the guides to provide a one-piece rigid frame.

C. Slide
   1. The disc or sliding member shall be of stainless-steel plate reinforced with “U”-shaped stainless-steel extrusions welded to the plate not more than 16” apart. The disc shall not deflect more than 1/360 of the span of the gate. Under the design head, reinforcing ribs shall extend into the guides so that they overlap the seating surface of the guide.

D. Seals
   1. P-bulb seals shall be provided to prevent excessive leakage. They shall extend along the sides of the frame on slide gates, along sides and across invert on weir gates and across the top on slide and weir gates when required. An extruded stainless-steel spigot shall be welded to the gate frame. P-seals shall be attached to the spigots and held in place by a bolted retainer bar. P-seals shall be field replaceable and adjustable and shall not protrude into the specified gate opening.

E. Wedges
   1. Sluice gates shall have intermediate wedges. Wedges shall be stainless steel with ultra high molecular weight polyethylene faces and be fully adjustable.

F. Operator
   1. Manually operated lifting mechanisms shall be of the hand wheel or crank operated fully enclosed geared type as indicated on the drawings and schedule. The hand wheel type shall be without gear reduction. The crank operated type shall have either a single or double gear reduction depending upon the lifting capacity required.
   2. Operator housing shall be cast steel or cast iron. Each type shall be furnished with a threaded bronze lift nut to engage the threaded portion of the stem. The lift nut shall be flanged and supported on roller bearings to take the thrust developed during opening and closing of the gate. Anti-friction thrust washers or bearing plates will not be permitted.
   3. Gears, where required, shall be provided with machine cut teeth designed for smooth operation. The bearings and lift nut shall be mounted in a housing, which in turn shall be supported by a pedestal or mounted on the yoke of the gate.
   4. Lubrication fittings shall be provided in the gear housing to permit lubrication of all gears and bearings. Mechanical seals shall be provided around lift nut and pinion shaft.
   5. An arrow shall be cast on the gear housing or the hand wheel to indicate the direction of rotation to open the gate. A maximum effort of 40 pounds shall be required to operate the gate after it is unseated.
   6. Operators shall be provided with a vented transparent butyrate stem cover having a transparent mylar scale calibrated in feet and inches to show gate position. Adjustable bronze stop collars shall be provided to limit both upward and downward travel.

G. Dual Operators
   1. Gates having a width equal to, or greater than, two times the height shall have dual stem operators. Assembly shall have enclosed geared operators interconnected so that they will act as a unit and so that a crank lever or interconnecting electric operator may accomplish operation of the gate from a single point.

H. Stem
   1. The operating stem shall be Type 316 stainless steel of suitable length and ample strength for the intended service. The stem diameter shall be capable of withstanding twice the rated output of the operator at 40 pounds pull and shall be supported such that the L/R ratio for the unsupported part of the stem does not exceed 200.
   2. The threaded portion of the stem shall have acme-type cold rolled threads with a maximum surface roughness of 16 micro-inches. Machine-cut threads will not be permitted.
   3. The stem connection shall be either the clevis type, with structural members welded to the slide and a bolt to act as pivot pin, or a threaded and bolted (or keyed) thrust nut supported in a welded pocket. The pocket and yoke of the gate shall be capable of taking at least twice the rated thrust output of the operator at 40 pounds pull.

I. Minimum Thickness
   1. All parts of the gate shall have a minimum thickness of 1/4 inch.

J. Guide Frames
   1. Guide frames assembled from aluminum plate or structural shapes or which require field welding are not acceptable.

K. Fasteners
   1. All necessary fasteners and anchor bolts shall be stainless steel and shall be furnished by the slide gate manufacturer.

   1. SLG-101: Seating and unseating heads are a maximum of 12.0 feet.
   2. SLG-301 and SLG-302: Seating and unseating heads are a maximum of 13.0 feet.
   3. SLG-303: Seating and unseating heads are a maximum of 6.0 feet.

2.6 SHOP PAINTING

A. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Gates shall be installed in accordance with the manufacturer’s instructions.

B. Each embedded gate frame shall be carefully braced in the forms before concrete is placed or a space shall be boxed out and the gate grouted in place later. Install in accordance with the manufacturer’s instructions.

C. Each gate shall be installed so that it does not leak or bind and shall be left in perfect operating condition.

END OF SECTION

SECTION 15900

ELECTRIC MOTOR OPERATORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 REFERENCES

A. MSS SP-102 – Multi-Turn Actuators Dimensional and Mounting Attachment

B. EN ISO 5210 – Multi-Turn Actuator

C. ANSI 16.5 – 2”-24” “Carbon Steel Flanges and Flanged Fittings, ANSI 150. Conforms to related dimensions.

D. IP 67/68 EN 60 529 / NEMA 250 – Enclosure Ratings

1.3 SUBMITTALS

A. Submit detailed product data and descriptive literature to include dimensions and materials of construction.

B. Provide shop drawings to show installation arrangement and cross-sections of major component assemblies.

1.4 QUALITY ASSURANCE

A. Supplier shall have been manufacturing electric motor operators of the current proposed design for a period of at least ten years, and shall at the engineers request, provide a list of installations involving equipment of similar size and application.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. AUMA Actuators Model SARMEL or equal.

2.2 CONSTRUCTION

A. Conform to AWWA C-540 for valve operators, except as noted below.

B. Enclosure

1. NEMA 4X/ 6 enclosure.
2. All connections terminated with plug & socket connection.
3. Sealing by means of o-rings.
4. Terminal connection cap shall be potted to ensure watertight integrity.

C. Motor

1. Motors shall be 240-volt, 3 phase, 60 cycle.
2. Induction type, class F insulation.
3. Thermal switches embedded in motor windings.
4. Aluminum or cast-iron housing with cooling fins, non-ventilated.
5. Plug and socket terminal connection to facilitate removal or replacement.

D. Manual override

1. Permanently attached, declutchable, manual handwheel.
2. Inoperable or fused motor shall not prevent manual operation.

E. Control Circuit

1. Integral travel limit switches to de-energize the motor control circuit in both open and closed directions.
2. A minimum of (4) contacts, (2) normally open (2) normally closed, rated at 10 amps @ 115 volts, for each end of travel.
3. Contacts shall be of silver and capable of switching a low voltage DC control signal.
4. Wiring shall be terminated by plug and socket connection.

F. Limit / Torque Switches

1. Limit switches shall be countergear driven capable of adjustment by no more than (5) turns of an adjustment spindle.
2. Mechanically operated torque switches to de-energize the motor circuit when operating torque exceeds the switch setting.
3. Torque switch adjustment device shall be calibrated directly in engineering units of torque.
4. A space heater shall be installed in the limit switch compartment.

G. Controls

1. Actuators in open/close service shall be furnished with integral motor controls consisting of:
   a. Reversing starters.
   b. Control transformers.
   c. Open/stop/close pushbuttons.
   d. Local/off/remote selector switch.
   e. Red and green position indicating lights with yellow fault indicator.

2. Mechanical dial position indicator shall be furnished.
3. Actuators in throttling/modulating service shall be furnished with:

a. Positioner to accept a current or voltage analog command signal.
b. Positioner shall be capable of comparing a signal with the valve position.
c. Capability of zero, span, time delay, and dead band signal adjustment.

4. Modulating valves shall be capable of (1200) starts per hour.
5. 4-20 MA signal output transmitter for remote indication.
6. 24 VDC regulated power supply for current transmitter.
7. Controls shall be housed in an enclosure that allows for remote mounting away from the main actuator drive unit, or direct mounting to the actuator. The remote mountable enclosure shall include; transformer, local controls including pushbuttons–lights–selector switch, reversing contactors, and positioner board. Connection to the main actuator assembly shall be hard wired or made with a cable connection supplied by the motor manufacturer. Refer to plans for specific requirements of remote mounted heads.

H. Start-up / Service

1. An authorized representative of the manufacturer shall provide (1) day field service to calibrate and train plant personnel on proper operation.
2. A field service report shall be provided to the Engineer upon verification of proper operation and installation of the valves and actuators.
3. The manufacturer shall have an authorized field service agent and facility capable of in-house repairs with 24 hour on-site response time.

I. Accessories

1. Actuator shall be mounted to a cast floorstand with a minimum height of 26” above the floorstand base.
2. Floorstands shall be drilled to accommodate actuator mounting as well as attachment to the platform on which the floorstand will sit.

J. Operating Stem

1. Provide a new operating stem with lower gate to stem coupling. Intermediate couplings shall be supplied to connect multiple stem sections but no more than (3) three couplings can be used.
2. Stem shall be designed with an L/r ratio of no less than 200.
3. Stem material shall be 304 Stainless Steel with minimum yield strength of 30,000 lbs. or as required by the gate manufacturer to withstand the full motor stall torque without buckling.
4. Stem diameter shall be a minimum of 1.5” or as required by the gate manufacturer to withstand the full motor stall torque without buckling.
5. Stainless steel stem guides shall be placed such that minimum stem unsupported length does not exceed 72”.

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 16000

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The work covered by Division 16 consists of furnishing all labor, equipment, supplies, and materials (except as otherwise specified or shown on the drawings) required to perform all operations necessary for the installation of complete electrical systems. All work shall be in strict accordance with the specifications and drawings.

B. The omission of an expressed reference to any parts necessary for, or reasonably incidental to, a complete installation shall not be construed as releasing the Contractor from furnishing such parts.

C. By the act of submitting a bid, the Contractor represents that his bid is based solely upon the materials and equipment described in the bid documents (including addendums if any) and that he contemplates no substitutions.

1.2 COORDINATION OF WORK

A. Coordinate all work with other trades and existing conditions to prevent conflicts causing unnecessary expense or delays in the installation of Work. When conflicts arise, remove and relocate items causing such conflicts at no additional cost to the Owner.

B. Provide a job site representative whenever necessary to coordinate work with others.

C. Refer to other discipline's drawings, relevant equipment drawings, and shop drawings to determine available clearances and possible obstructions. Make any necessary offsets or transitions as required to clear structural members, existing equipment, etc. to facilitate installation of the work in the manner indicated.

D. Contractor shall be responsible for any resultant costs incurred for changes required to accommodate actual equipment furnished when the equipment has characteristics differing from that shown on the drawings.

1.3 QUALITY ASSURANCE

A. All Work shall be performed by craftsman normally engaged in the respective craft required for each installation.

1.4 FEES, PERMITS, AND INSPECTION

A. All permits and licenses that are required by governing authorities for the performance of Division 16 work shall be procured and paid for by the Contractor.

B. Secure all inspections as required by the authorities having jurisdiction.

C. Where applications are required for procuring of services for the building, prepare and file such application. Furnish all information required in connection with the application in the form required by the utility company and/or municipal department.

1.5 APPLICABLE CODES AND STANDARDS

A. All work shall comply with the locally adopted electrical code and all applicable laws, codes, recommendations, regulations, and interim amendments, of the governmental bodies having jurisdiction.

1. Where there is not an adopted electrical code the latest edition of the National Electrical Code (NFPA 70) shall be used.

B. All Electrical work shall be performed in compliance with all applicable governing safety regulations, including OSHA regulations. All safety lights, guards and signs required for the performance of the electrical work shall be provided by and operated by the Contractor.

C. A reference to technical society, organization, or body in the Specification is in accordance with the following abbreviations, and all work shall be performed, as a minimum, in accordance with the latest editions of their publication:

1.	ANSI	American National Standards Institute
2.	ASTM	American Society for Testing and Materials
3.	ASME	American Society of Mechanical Engineers
4.	ETL	Environmental Testing Labs
5.	FIA	Factory Insurance Association
6.	FM	Factory Mutual Laboratories
7.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
8.	NEIS	National Electrical Installation Standards
9.	NEMA	National Electrical Manufacturer's Association
10.	NFPA	National Fire Protection Association
11.	NRTL	Nationally Recognized Testing Laboratory
12.	OSHA	Occupational Safety & Health Administration
13.	NFPA 101	Life Safety Code
14.	NFPA 70	National Electrical Code
15.	NFPA 70E	Standards for Electrical Safety
16.	UL	Underwriter's Laboratories, Inc.

D. All Work shall comply with rules and regulations of utilities and/or municipal departments affected by connection of services.

E. Should these specifications and drawings conflict with any of the building codes, standards, laws, ordinances, utility company rules and regulations, etc. the more stringent requirements shall take precedence. The Architect shall be immediately notified of any conflicts.

F. Include all items of labor and material required to comply with such standards and codes in accordance with the specification. Where quantities, sizes, or other requirements indicated on the drawings or herein specified are in excess of the standard or code requirements, the specifications and/or drawings shall govern.

1.6 GLOSSARY OF TERMS

A. Terms:

1. Contractor - The particular sub-contractor who is directly responsible for the work specified herein.
2. Shall - Action that is required without option or qualification.
3. May - Action that is desirable or is at the Contractors choice or option.
4. Should - Recommendation for the Contractor to follow as an aid in performing the required work.
5. Provide - Contractor shall furnish and install specified item(s).
6. Furnish - Contractor shall be responsible for obtaining specified items.
7. Install - Contractor shall be responsible for all labor and construction equipment necessary to set in place, connect, calibrate and/or test the specified items furnished by him or others.
8. Or Equal - Item should possess the same performance qualities and characteristics as the one specified, and fulfill the function without any decrease in quality, durability or longevity.

B. Definitions:

1. EC – Electrical Contractor
2. FA – Fire Alarm
3. GC – General Contractor
4. MC – Mechanical Contractor
5. NC – Normally Closed
6. NO – Normally Open
7. PC – Plumbing Contractor
8. SPD – Surge Protection Device
9. SPDT – Single Pole, Double Throw
10. Refer to other sections and the Construction Documents for additional definitions.

1.7 SHOP DRAWINGS AND PRODUCT DATA

A. Shop drawings shall be submitted electronically in PDF format. All electronic submittals shall be sent to the Architect and may not be sent directly to the Engineer without prior approval from the Engineer and Architect.

B. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

C. Before submitting a shop drawing or any related material to Engineer for review, Contractor shall:

1. Review each submission for conformance with the means, methods, techniques, sequences and operations of construction, safety precautions and programs incidental thereto, all of which are the sole responsibility of the Contractor.
2. Approve each such submission before submitting it to the Engineer; and so stamp each such submission before submitting it. Engineer shall assume that no shop drawing or related submittal comprises a variation unless Contractor advises Engineer otherwise via a written instrument, which is acknowledged by Engineer in writing.
3. Any shop drawing being resubmitted shall be flagged and clouded where changed.

D. Checking of shop drawings is a gratuitous assistance by the Engineer and shall not relieve any responsibility for deviations, errors, or omissions which may exist in the shop drawings. Shop drawings submitted and rejected more than two times due to incomplete data or unacceptable material shall be reviewed by the Engineer at an additional cost to the Contractor at $250.00 per hour, two-hour minimum. Contractor submitting shop drawing will be responsible for any additional cost.

E. A letter listing the manufacturer's name and model number shall be sufficient for conduit, outlet boxes and rings, wire and cable, switches, receptacles and plates.

F. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing and clearly marking the manufacturer, model number, materials, and miscellaneous data as required describing the equipment.
2. Dimensional drawings showing layout, connection points and sizes, weights, etc.
3. Accessories.
4. Wiring diagrams, including power and control wiring, distinguish between factory and field wiring.
5. Parts list.
6. Installation and maintenance manuals.
7. Warranty statement.

G. Refer to each individual section in Division 16 for additional requirements.

H. The following information shall be submitted in accordance with this Section:

1. Detailed drawings of fabrication and installation for metal fabrications, supports and anchorage for electrical materials and equipment.

I. Contractor shall be responsible for all quantities and dimensions to be confirmed and correlated at the jobsite.

J. Submit copies of his material list and each shop drawing within thirty days after award of the Contract. If any shop drawings cannot be obtained within thirty days, he shall notify the Architect/Engineer immediately upon receiving notice of that fact.

1. Engineer requires up to 2-weeks to review all shop drawing submissions.

1.8 WARRANTIES

A. Warrant all work performed and material & labor provided under the contract against defects in material and workmanship for one year from substantial completion. Provide all services as required to immediately repair or replace, at no additional cost, any defective part of the installation resulting from the supply of faulty workmanship or material. Lack of maintenance, accidents, or carelessness on the part of the Owner shall not be included in this warranty.

B. All equipment, apparatus and appliances which are specified and/or come with warranties longer than one year; shall be registered with the manufacturer in the Owner's name.

C. Refer to other specification sections for additional warranty information for specific products.

1.9 RECORD DRAWINGS

A. Record drawings shall be kept and prepared in accordance as specified herein.

1. A complete "Record" set of prints, shall be kept at the project site and shall be corrected daily to show all changes in layout from the original drawings and specifications. This "Record" set shall be used for this purpose only.
2. On completion of the project, two new sets of prints shall be obtained, and all changes noted on the field record set shall be neatly transferred (in red pencil) to the two new sets of prints.
3. Two dimensions and the depth below grade shall locate all capped conduits. Changes in conduit routing, sizes and number of wires, additional pull or junction boxes shall be clearly noted. The original routing and layout shall be clearly marked out.

4. Drawings shall indicate but not be limited to the following:

    a. The correct location of lighting fixtures, feeder conduits, and other equipment where it differs from the location shown on the drawings
    b. The location of all switches, receptacles, security devices, panelboards, junction boxes, etc.
    c. Changes to circuit identification including panel name and circuit number
    d. Any other information of a pertinent or useful nature
    e. Any change order items not issued on supplementary drawings
    f. Wiring diagrams for electrical grounding and bonding work which indicates layout of ground rings, location of system grounding electrode connections, routing of grounding electrode conductors.

B. Final payment will not be authorized until these Record drawings are received and checked for completeness by the Architect/Engineer

PART 2 - PRODUCTS

2.1 MATERIALS

A. Deliver all materials to the project properly identified with names, model numbers, types, grades, compliance labels and other information needed for identification.

B. Unless otherwise approved in writing, all materials furnished under this Specification shall be new and shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design.

C. Equipment of any one type shall be by one manufacturer unless specifically indicated otherwise.

D. Provide materials and equipment specified under this Division, and incidental materials and equipment not specifically mentioned but essential to make the installation complete, in accordance with the intent and requirements of the drawings and specifications.

E. Where others furnish materials for installation under this Division, notify the supplier of dates that will be ready for delivery as specified in the General Conditions. Receive, unload, handle, store, protect, and insure the material until ready for actual installation. Upon receipt of material furnished by others, spot-check or check the entire shipment and promptly advise the Architect/Engineer in writing of any damage and/or missing components. Any material which is subsequently lost or damaged due to negligence on the part of the Contractor shall be promptly replaced (or repaired to the satisfaction of the Owner) at the Contractor's expense.

2.2 ELECTRICAL EQUIPMENT NAMEPLATE

A. NAMEPLATE: For each piece of Electrical equipment provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Locate nameplates in an accessible location.

2.3 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A-36.

B. Cold-Formed Steel Tubing: ASTM A-500.

C. Hot-Rolled Steel Tubing: ASTM A-501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications.

F. Fasteners: Zinc-coated, type, grade, and class as required.

2.4 CONCRETE

A. Portland Cement shall conform to ASTM C-150, Type I or II as specified in Division 3.

B. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications, and as specified in Division 3.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. All work shall be performed by experienced mechanics in accordance with first class practice and the work shall be neat in appearance and complete to perform the intended function.

3.2 LOCAL CONDITIONS

A. Carefully examine the local conditions, existing installations, shall determine subsurface soil conditions as to what difficulties may be encountered in trenching and backfill, and shall thoroughly familiarize himself with all existing conditions which may affect his work.

B. By the act of submitting a bid, the Contractor will be deemed to have made such examination, to have accepted such conditions, to have made allowance therefor, and included all costs in his proposal. Failure to determine existing conditions will not be considered a basis for the granting of additional compensation.

3.3 SAFETY

A. All work shall be performed in compliance with all applicable and governing safety regulations including the regulations of the Occupational and Safety Health Act. All safety lights, signs and guards required for performance of work shall be provided by the Contractor.

B. Safety of personnel on the project site shall be the responsibility of all divisions. Comply with all local, state, and federal regulations for safety.

3.4 EXCAVATION

A. Refer to other Sections for requirements related to the work specified herein.

B. Perform all excavating and backfilling necessary for the construction and installation of the work included under this Division. Trenches close to walls, foundations, and columns shall not be excavated without prior consultation with the Architect.

C. Care shall be taken in excavating that load bearing soils are not disturbed in any way. Where raceways must cross under a wall footing, the excavation shall be kept at a minimum.

D. Slope sides of excavation as required for soil and local codes and ordinances. Provide shoring and bracing as required. Maintain shoring and bracing in excavation regardless of time period excavation is open. Remove shoring and bracing before backfilling.

E. Perform all pumping and bailing necessary to keep all excavations free of water and provide for the uninterrupted flow of the surface water adjacent to the line of work during the progress of the work.

F. Limit the length of open trench to that in which installation can be made and backfilled within the same day.

    1. Where the trench cannot be backfilled on the same day, provide all temporary bridges, barricades, lanterns and such other signs and signals as necessary to warn the public of open trenches.

G. Conduit shall be supported directly on undisturbed soil, do not excavate beyond indicated depth. If existing soil is unsuitable (soft spot or rock), excavate to solid subgrade, or 6" for rock, below bottom of work and provide sub-base material as required.

H. Protect excavation bottoms against freezing when atmosphere temperature is less than 35°F.

I. Immediately after installation, the trench shall be carefully backfilled with earth free from clods, brick, etc. to a depth one-half the raceway diameter and then firmly tamped in such a manner as not to disturb alignment or joints of the conduit. Thereafter the backfill shall be tamped every vertical foot.

J. For raceways less than 24 inches below surface of roadways, provide 4-inch-thick concrete topping over conduit.

K. Cut and replace all existing walks, roads, street pavement, curbs, steps, retaining walls, and miscellaneous work required for the installation of work under this Division and replace all existing that is damaged by work performed under this Division, whether or not the improvement is shown on the drawings. Such repairs shall be done to the satisfaction of the Architect, and where the work is performed on public property outside of the property lines, obtain permits and permission from the proper authorities, perform all work to comply with requirements of the enforcing authorities and pay all costs relating to this work as a part of the contract bid price.

L. Every effort shall be made to locate existing underground utilities in excavation areas. Maintain and protect existing services in the excavation area. In cases where existing pipes or conduits are encountered, they shall not be displaced or harmed unless necessary, in which case, they shall promptly be replaced in good condition. All existing pipes and conduits damaged or harmed in the construction shall be replaced or repaired at the Contractor's expense.

M. Existing culverts, drains, catch basins, retaining walls, fences or any other permanent structure along and adjacent to the new work shall be properly protected. Any damage occurring to these structures shall be repaired by the Contractor at his own expense.

3.5 PROTECTION OF WORK

A. All conduit openings shall be kept closed by means of plugs or caps to prevent the entrance of foreign matter.

B. Special care shall be taken for the protection of equipment furnished. All equipment and material shall be completely protected from weather elements, moisture, painting, plaster, etc. until the project is completed. Damage from rust, paint, scratches, etc. shall be repaired as required to restore equipment to original condition.

C. Protection of equipment during the plastering and painting of the building shall be the responsibility of others, but this shall not relieve Contractor from the responsibility of checking to assure that adequate protection is provided.

D. Where the installation or connection of equipment requires work in other areas previously finished by the Contractor shall be responsible that such areas are protected and are not marred, soiled, or otherwise damaged. Repairing and refinishing damaged areas shall be the responsibility of the Contractor and shall be approved by the Architect.

E. Any such fixtures, equipment or apparatus damaged prior to final acceptance of the work shall be restored to its original condition or replaced by the Contractor at the Contractor's expense. At completion, fixtures and equipment shall be thoroughly cleaned.

F. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent finished areas, when required.

G. All trenches and pits shall be maintained on a continuous basis, free of water for protection of work.

3.6 ELECTRICAL INSTALLATION

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services.
8. Install systems, materials, and equipment to conform with approved shop drawings, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.7 ADJUSTING AND TESTING

A. All electrical equipment furnished by this Division and electrical equipment furnished by others for this Division to install shall be adjusted, aligned, and tested for proper operation by this Division.

B. This Division shall be responsible for the installation of the proper size heaters in all manual and magnetic starters supplied by this Division. This Division shall be responsible for the operation, service, and maintenance of all new electrical equipment during construction and of all new electrical equipment during construction and prior to acceptance by the Owner of the completed project. The trade supplying equipment shall be responsible for maintaining proper lubrication.

C. Motors and other equipment furnished by others, to which electrical connections are made under this Division, shall be checked for short circuit and open circuits before energizing. Motors shall be checked for proper phasing and rotation. The thermal overload protection devices shall be checked in all motor starters, and equipment and all protection device size, motor nameplate full load amperage, and voltage rating for protection of the motor shall be listed (include equipment designation, rating of heater, motor nameplate horsepower, full load amps and voltage) and a copy submitted to the Architect.

D. Contractor shall be held responsible for the operation, service and maintenance of electrical equipment during construction and prior to acceptance by the Owner. All electrical equipment shall be maintained in the best operating condition. Operational failure caused by defective material and/or labor furnished under this Division shall be immediately corrected. Architect shall be immediately notified of any operational failures caused by defective material and/or labor covered under other Divisions or furnished by others.

3.8 WIRING AND CONNECTION OF EQUIPMENT BY OTHERS

A. Equipment, which is to be provided by others for connection and/or installation by this Division, will be delivered to him at the building in proper condition and complete with all accessories and instructions for the proper installation and connection.

B. Outlets and wiring shown are relevant only, and the correct location, type of outlet, wiring and connection shall be as required for the equipment installed. Equipment connections may be with flexible metal conduit with maximum length of 6'-0" except where indicated otherwise.

3.9 OPERATION DURING CONSTRUCTION

A. This Division is responsible for the installation and operation, service and maintenance of all new electrical equipment during construction and prior to acceptance by the Owner of the completed project. The trade supplying equipment shall be responsible for maintaining proper lubrication. The services of trained factory personnel shall be obtained where required by this specification, and where required for successful startup of equipment. Warranty periods shall not commence until final acceptance by the Owner.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections of the Specifications, apply to Work of this Section.

B. The requirements as set forth in Division 16 GENERAL ELECTRICAL REQUIREMENTS Section shall apply to Work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of electrical grounding and bonding work is indicated by drawings and as specified herein. Grounding and bonding work is defined to encompass systems, circuits, and equipment.

B. Type of electrical grounding and bonding work specified in this Section includes the following:

1. Solidly grounded.

C. Applications of electrical grounding and bonding work in this Section includes the following:

1. Bonding of ALL metal piping
2. Electrical power systems
3. Enclosures
4. Grounding electrodes
5. Ground Rings
6. Metal building frames
7. Raceways
8. Separately derived systems
9. Service equipment.
10. Underground metal water piping

D. Refer to other Division Sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electrical grounding and bonding work; not Work of this Section

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 1 Specification Section and GENERAL ELECTRICAL REQUIREMENTS Section.

B. Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of grounding system required. Include data substantiating that materials comply with requirements.

C. Submit maintenance data and parts lists for each type of grounding system installed, including furnished specialties and accessories. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of this specification.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of grounding and bonding products, of types, and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus, grounding electrodes and plate electrodes, and bonding jumpers whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with electrical grounding work similar to that required for project.

C. Testing Agency’s Qualifications: Firm must be a member company of International Electrical Testing Association (NETA) or a Nationally Recognized Testing Laboratory (NRTL).

1. Testing Agency’s field supervisor shall have current certification from NETA to supervise and perform ground testing.

D. Codes and Standards:

1. Electrical Code Compliance: Comply with the adopted electrical code as applicable to electrical grounding and bonding, pertaining to systems, circuits and equipment.
2. UL Compliance: Comply with applicable requirements of UL Standards No.'s 467, "Electrical Grounding and Bonding Equipment", and 869 "Electrical Service Equipment", pertaining to grounding and bonding of systems, circuits and equipment. In addition, comply with UL Std 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.
3. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141, 142 and 1100 pertaining to grounding and bonding of systems, circuits and equipment.
4. Ground rods to conform to NEMA GRI-2000 Standards for diameter and strength of steel.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide grounding and bonding products of one of the following (for each type of product):

1. Adalet-PLM Div; Scott Fetzer Co.
2. Burndy Corporation
3. Cadweld Div; Erico Products Inc.
4. Crouse-Hinds Div; Cooper Industries
5. Eagle Electric Mfg Co.
6. Ideal Industries, Inc.
7. Joslyn Corporation
8. Okonite Company
9. OZ Gedney Div; General Signal Corp.
10. Thomas and Betts Corp.
11. J.A. Weaver Co.

2.2 GROUNDING AND BONDING

A. Materials and Components:

1. General: 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, and additional accessories needed for a 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 building codes, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding system connections that match power supply wiring materials and are sized according to the adopted electrical code.
3. Bonding Jumper Braid: Copper braided tape, constructed of 30-gage bare copper wires and properly sized for indicated applications.
4. Flexible Jumper Strap: Flexible flat conductor, 480 strands of 30-gage bare copper wire; 3/4" wide, 9½" long; 48,250 CM. Select braid with holes sized for 3/8" diameter bolts and protect braid with copper bolt hole ends.
5. 5/8" x 10' copper or stainless steel-clad, high- strength steel ground rod with threaded ends for coupling.
6. Cast bronze with non-ferrous bolts, nuts and lock washers or AMP C-LOK system utilizing a "C" shaped spring member and a wedge, both made of copper alloys that, when applied to grounding conductors or rods, exert a controlled pressure to maintain a permanent connection.

B. Accessories:

1. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type service indicated.
2. Fusion-Welding: Comply with AWS Code for procedures, appearance, and quality of welds; and for methods used in correcting welding work. Provide fusion welded connections where grounding conductors connect to underground grounding and plate electrodes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

A. General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's instructions and applicable portions of the Building Codes, NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products comply with requirements.

B. Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system work with other work.

C. Fusion-Weld grounding conductors to underground grounding electrodes.

D. Ground electrical service system neutral at service entrance equipment to grounding electrodes.

E. Ground "service entrance" and separately derived system neutral to:

1. Driven ground rod

a. Handholes shall be installed at each driven ground rod that will allow for access to the grounding connection to perform annual ground testing. The handhole shall be installed close to wall and flush to finished floors where installed inside and shall be mounted flush to grade where installed outside. Where the ground rod is driven through a concrete floor, the penetration shall be sealed with waterproof, non-shrink grout and the rod shall be protected with a heat-shrunk insulating sleeve or pressure sensitive insulating tape a minimum of 6” below the concrete slab. Handholes shall be provide with a lid that requires a nonproprietary tool to remove. Lids for exterior handholes shall have a drive over rating.
b. Ground rods shall be installed at least 2” below finished floor or grade level with all connections made without damaging any coating.
c. A minimum of three ground rods shall be installed no closer than 10’-0” apart and located the same distance apart from other ground rods.

2. Concrete Encased Electrode

    a. Where the concrete is installed with insulation, a vapor barrier or similar barrier separating the concrete from earth, the concrete encased electrode shall not be an acceptable grounding means.

F. Connect together system neutral, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

G. Raceway systems shall NOT be used as grounding method. All branch and feeder conduits to have grounding conductor installed with phase and neutral conductors. Size of ground conductor to be in accordance with the adopted electrical code. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

H. Grounding electrode conductors, where not installed as part of a branch circuit or feeder, shall be installed in PVC conduit, to protect the wiring from physical damage.

I. 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.

J. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible to minimize transient voltage rises.

K. Apply corrosion-resistant finish to field-connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed, which are subjected to corrosive action.

L. The utility company meter socket shall be grounded to a 1/2" x 10' copper clad steel ground rod with copper wire installed in P.V.C. conduit as indicated on floor plan. The ground rod shall be driven into the earth as near as possible to the location of the meter socket with the top 1'-0" below finished grade.

M. Provide frames of motors and other equipment with a code sized stranded copper ground wire inside the flexible conduit connection. Connect this wire inside the junction box at one end and inside the motor terminal box at the other, with cast connector lugs.

N. All receptacles installed shall have a separate grounding contact. Device mounting ears shall make face to face contact with metallic box, which shall be clean and tight.

O. Provide a separate green ground wire from each outlet to a ground lug at the termination of the conduit system. In lieu of ground wire specified above, approved self-grounding receptacles may be used.

3.3 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical grounding and bonding systems but before electrical circuits have become energized, engage a qualified testing agency to perform ground testing.

B. Test ground resistance with ground resistance tester. Test shall be based on Three-Point (Fall of Potential) Method according to IEEE 81, using a 600-volt Biddle megger or equal test equipment. 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. Not more than three (3) ground rods will be required.

C. Test shall only occur after two full days without any precipitation.

D. Submit in writing to the Engineer's office, upon completion of the project, the measured ground resistance of each ground system, indicating the location of the ground rods, the soil condition at the time the measurements were taken, and type of equipment used to measure the ground resistance.

E. Grounding system will be deemed defective if the above tests and inspections do not meet or exceed these requirements and the Contractor will be responsible for correcting and having the testing agency retest.

END OF SECTION

SECTION 16120

LV ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections of the Specifications, apply to Work of this Section.

B. The requirements as set forth in Division 16 GENERAL ELECTRICAL REQUIREMENTS Section shall apply to Work of this Section.

1.2 DESCRIPTION OF WORK

A. This Section includes wires, cables, and connectors for power, lighting, signal, control and related systems rated 600 volts and less.

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 1 Specification Section and GENERAL ELECTRICAL REQUIREMENTS Section.

B. Product Data: Submit manufacturer's name and type on all installed electrical wire, cable and connectors.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Wiring shall comply with:

1. Adopted electrical code.

a. Where an electrical code is not adopted the latest edition of NFPA 70 "National Electrical Code" shall be used.

2. UL Standards:

a. Std. 83 & 719- Thermoplastic-Insulated Wires and Cables.
b. Std. 486A- Wire Connectors and Soldering Lugs for Use with Copper Conductors.
c. Std. 854 & 44- Service Entrance Cable.
d. Std. 1063 - Machine Tool Wire

3. ANSI/ICEA Standards:

a. S-95-658 / NEMA WC70 – Non-shielded 0-2kV Cables

4. IEEE Standards:

    a. Std. 82- Test procedures for Impulse Voltage Tests on Insulated Conductors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following:

    1. Wire and Cable:

        a. Alcan Products Corporation; Alcan Cable Division.
        b. American Insulated Wire Corp.; a Leviton Company.
        c. Encore Wire Limited
        d. General Cable Corporation.
        e. Senator Wire & Cable Company.
        f. Southwire Company.

    2. Connectors for Wires and Cable Conductors:

        a. AFC Cable Systems, Inc.
        b. Hubbell Power Systems, Inc.
        c. O-Z/Gedney; EGS Electrical Group LLC.
        d. 3M; Electrical Products Division.
        e. Thomas and Betts Co
        f. Tyco Electronics Corp.

2.2 WIRES AND CABLES

A. General: Provide wires and cables suitable for the temperature, conditions and location where installed.

B. Conductors: Provide solid conductors for power and lighting circuits no. 10 AWG and smaller. Provide stranded conductors for sizes no. 8 AWG and larger.

C. Conductor Material: Copper for all wires and cables.

D. Conductor sizes indicated are based on copper.

    1. Insulation:

        a. TFFN for all copper conductors No. 16 AWG and smaller.
        b. THHN/THWN for all copper conductors No. 14 AWG thru No. 10 AWG.
        c. For ALL other sizes provide THHN/THWN or XHHW insulation as appropriate for the location where installed.

E. Jackets: Factory-applied nylon or PVC external jacketed wires and cables for pulls in raceways over 100-feet in length, for pulls in raceways with more than three equivalent 90° bends, for pulls in conduits underground or under slabs on grade, and where indicated.

F. Cables: Provide the following type(s) of cables in approved locations and applications where indicated. Provide NRTL listed cable for particular application:

Cable/Wire Type:	**Description of Use:**
THHN	• Branch circuit conductors for indoor use in dry locations. Rated for 90° C. • Branch wiring inside fluorescent channels. • Use only sizes 10 and 12 AWG.
THWN/XHHW	• Branch circuit conductors for indoor use in wet locations. Rated for 75° C. • ALL Branch circuits located outside (exposed, concealed or underground) on circuits with wire sizes of 10 and 12 AWG.
TFFN	• Signal wiring, size 16 AWG.
Conductors	• Solid soft annealed copper (AWG 12 and AWG 10 only).
Conductors	• Concentric-lay-stranded annealed copper (standard flexibility, AWG 8 and larger).
Insulation	• All conductor insulation to be rated 600V.
'SO' cable	• Portable power cord, rubber insulated, safety yellow outer insulation, internal ground wire 90°C rated for 600 volts.

2.3 CONNECTORS FOR CONDUCTORS

A. General: Provide UL type factory-fabricated, metal connectors of sizes, ratings, materials, type and classes for each service. Connectors are to be designed and sized so as to have a current rating equal or greater than the cable being connected. Where not indicated, provide proper selection as determined by Installer and approved by Engineer to comply with installation requirements and Electrical Code standards. **Self-stripping and crimp type tap connectors for small branch circuits are not to be used**. Select from the following types, classes, kinds and styles:

1. Power Connectors (10 AWG and Smaller) 600V and Below:

    a. "Scotchlok" pre-insulated spring wire connectors.
    b. Buchanan open-end copper splicing caps, applied with "Lok-Seal" tool, with nylon snap on insulators.

2. Power Connectors (Sizes 8-4 AWG) 600V and Below:

    c. Non-insulated ring-tongue type.
    d. Ring-tongue sized to match terminal stud size.
    e. Brazed barrel seam.
    f. Application tooling designed to crimp the wire barrel (conductor Grip) with a one-step crimp.

3. Power Connectors (Sizes 2 AWG - 600 kcMil) 600V and Below:

    a. Non-insulated one-hole rectangular tongue for sizes 2 AWG through 3/0.
    b. AWG and two-hole rectangular tongue for 4/0 AWG through 600 kcMil.
    c. Application tooling shall be hydraulic operated.

B. Motor Lead Termination/Splice (Low Voltage, 600V and Below):

1. Splices shall be made using compression-type connectors bolted together. The compression-type connectors shall be properly sized for the cables. Reference acceptable connector manufacturer's cross-reference chart. Splice to be covered with heat-shrinkable tubing connector insulators.

C. Cable Ties:

1. Nylon self-locking type.
2. Have a normal service temperature range of -40° C to 85°.
3. Be weather-resistant type for outdoor use.
4. Manufacturers:

    a. AMP Special Industries "AMP-TY"
    b. Dennison Manufacturing Company "BAR-LOK"
    c. Panduit Corporation "PAN-TY"
    d. Thomas & Betts "TY-RAP"
    e. Minnesota Mining and Manufacturing 3M Brand cable ties.

D. Terminal Blocks:

1. Designed and sized for the cable being terminated.
2. Phenolic block rated 600 volts.
3. Binding screw-type terminals for power cables and straight-strap stud being terminated.
4. Rated current carrying capacity equal to, or greater than, the cable being terminated.
5. Marking strip.
6. General Electric Type CR2960SY139 for power cables and States Company Type NT Model M-251 or approved equal for control cables.

E. Splices:

1. Where splices are allowed in these specifications and where approved by Engineer, splices for #6 and larger are to be made using compression type butt splices with cold shrink insulation kits as manufacturer by 3M Electrical Products 8420 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which panel boards and enclosures are to be installed and notify Engineer in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 WIRING METHOD

A. Use the following wiring methods as indicated:

1. Wire: install all wire in metal raceway or cable tray as indicated.
2. Service Entrance Cable Type USE-RHW: For underground service feeders to building.
3. Portable Cord Type SO: For flexible pendant leads to outlets and equipment where indicated.

3.3 INSTALLATION OF WIRES AND CABLES

A. General: Install electrical cables, wires, and connectors in compliance with adopted electrical code.

B. Coordinate cable installation with other Work.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use NRTL listed pulling compound or lubricant, where necessary.

D. Use pulling means including; fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

E. All branch circuit wires, feeder cables, etc., shall be continuous from outlet to outlet. No joints shall be made except in outlet, junction or pull boxes, panelboard and switchboard gutters. For the splicing of existing conductors, compression type butt splices with cold shrink insulation kits are to be used.

F. Thoroughly clean out all conduit and wireways and see that all parts are perfectly dry before pulling any wires.

G. Install all feeder conductors continuous between terminal points indicated without intermediate splices or taps unless specifically approved by Engineer.

H. Install splice and tap connectors who possess equivalent or better mechanical strength and insulation rating than conductors being spliced.

I. Use splices and taps connectors, which are compatible with conductor material.

J. Provide adequate length of conductors within electrical enclosures and train the 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 the terminal.

K. Where raceways containing conductors No. 4 AWG or larger enter a cabinet, box enclosure, or raceway; the conductors shall be protected by a substantial fitting providing a smoothly rounded insulating surface.

L. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torque's specified in UL 486A and UL 486B.

M. Where more than one ground, common neutral, or common phase conductor enters a box, all like conductors shall be in good electrical contact with each other and the arrangement shall be such, that the disconnecting or removal of a device fed from the box, will not interfere with or interrupt service to the remainder of the branch circuit wiring.

3.4 FIELD QUALITY CONTROL

A. Prior to energizing, check installed wires and cables with meg-ohm meter to determine insulation resistance levels to assure requirements are fulfilled.

B. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuits and demonstrate proper functioning. Correct malfunctioning units, and retest to demonstrate compliance.

D. Any cable found to have nicks, cuts or cracks in insulation is to be replaced. Repair of insulation with electrical tape is not acceptable

END OF SECTION

SECTION 16130

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections of the Specifications, apply to Work of this Section.

B. The requirements as set forth in Division 16 GENERAL ELECTRICAL REQUIREMENTS Section shall apply to Work of this Section.

1.2 DESCRIPTION OF WORK

A. This Section includes raceways for electrical wiring. Types of raceways in this Section include the following:

1. Electrical metallic tubing (EMT)
2. Flexible metal conduit (Greenfield)
3. High density polyethylene (HDPE)
4. Intermediate metal conduit (IMC)
5. Liquid-tight flexible conduit (LFMC & LFNC)
6. Rigid metal conduit (RMC)
7. Rigid nonmetallic conduit (PVC)
8. Conduit Bodies
9. Boxes, enclosures and cabinets

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 1 Specification Section and GENERAL ELECTRICAL REQUIREMENTS Section.

B. Product Data for the following products:

1. Metal and non-metallic conduit fittings

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with the adopted electrical code.

1. Where an electrical code has not been adopted NFPA 70 "National Electrical Code" shall be used.

B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.

C. UL Compliance and NRTL Labeling: Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL or NRTL

1.5 SEQUENCING AND SCHEDULING

A. Coordinate with other Work, including metal and concrete deck installation, as necessary to interface installation of electrical raceways and components with other Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by the following:

1. Conduit Bodies:

    a. AFC Cable Systems
    b. Allied Tube and Conduit
    c. CANTEX Inc.
    d. Carlon
    e. Crouse-Hinds Division, Cooper Industries Inc.
    f. Hubbell Wiring Systems (RACO)
    g. Kilark Electric Manufacturing Company
    h. Kraloy Products Company
    i. O-Z/Gedney
    j. Republic Conduit
    k. Southwire
    l. Thomas & Betts
    m. Western Tube and Conduit
    n. Wheatland Conduit

2. Handhole and Boxes

    a. Armorcast Products Company
    b. Carson Industries LLC
    c. CDR Systems Corporation
    d. Hoffman
    e. NewBasis Steel City, Midland-Ross Corp.
    f. Orbit Industries
    g. OZ/Gedney Co; General Signal Co.

h. Pass and Seymour, Inc.
i. RACO Div; Harvey Hubbell Inc.
j. Thomas & Betts Co., Inc

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: (RMC) to conform to Federal Specification WW-C-581E, adopted electrical code, ANSI Standard C80.1 and U.L. Standard No. 6 for rigid metallic conduit, except hot dipped galvanized after threading. Minimum size concealed in concrete or below grade shall be 3/4". Minimum size shall be 1/2".

1. Fittings: Galvanized threaded type meeting above standards. Threadless fittings shall not be used.
2. Termination: In dry locations use two steel locknuts, one inside, one outside of the cabinet, junction box or outlet box and an insulated bushing. Bushings shall be malleable iron or steel with smooth insulating ring molded into edge of bushing to prevent damage to cable. Insulated bushings shall be 150°C self-extinguishing thermoplastic. Provide grounding bushings on 1-1/4" conduit and larger. Construction of bushings shall be like steel bushings described above with lugs for grounding connection.
3. Where conduits are installed underground, the threaded joints shall be sealed with a conductive joint sealing compound.

B. Aluminum Rigid Conduit: conforming to Federal Specifications WW-C-540A, UL standard No. 6 and ANSI C80.5 for rigid metal conduit with threaded joints.

1. Fittings: Aluminum screw-on type, with steel locknuts. Protect steel locknuts with compound to prevent corrosion. Lubricate all joints with conductive compound to prevent seizing.
2. Termination: In dry locations use two steel locknuts, one inside, one outside of the cabinet, junction box or outlet box and an insulated bushing. Bushings shall be malleable iron or steel with smooth insulating ring molded into edge of bushing to prevent damage to cable. Insulated bushings shall be 150°C self-extinguishing thermoplastic. Provide grounding bushings on 1-1/4" conduit and larger. Construction of bushings shall be like steel bushings described above with lugs for grounding connection

C. Intermediate Metal Conduit: (IMC) to conform to Federal Specification WWC-581, UL Standard No. 1242, ANSI C80.6 and adopted electrical code. Hot dipped galvanized or accepted equivalent. Minimum size shall be 1/2".

1. Fittings: Constructed to same standards as rigid steel conduit. Threaded type with all threads engaged.

D. Electrical Metallic Tubing: (EMT) conforming to ANSI Standard C80.3, UL 797 and adopted electrical code. Galvanized inside and out, with additional corrosion resistant finish; threadless, steel type.

E. Flexible Metal Conduit: "Greenfield", continuous spirally wound and inter-locked, threadless, galvanized steel conforming to UL Standard No. 1, adopted electrical code and CSA Standards for flexible steel conduit. Finish shall be zinc-coated steel.

1. Fittings :Galvanized steel, threadless type with insulated throats, UL approved for grounding means.

F. Liquid-tight Flexible Metal Conduit: (LFMC) continuous spirally wound and inter-locked, threadless, galvanized steel conforming to UL Standard 360. Flexible steel conduit in PVC jacket.

1. Fittings: Shall be specifically approved for use with this raceway. Sealing type, with steel gland, nylon ring and ground cone inside locknut. All fittings with insulated throat, UL approved for grounding means.

G. All fittings shall be the same type and size as listed raceway unless otherwise noted specifically in these specifications. Fittings shall be listed for application and environment for which they are installed. (All types shall conform to NEMA FB-1).

1. Hazardous locations: UL 886

2.3 NON-METALLIC CONDUIT AND TUBING

A. Rigid Non-metallic Conduit: (PVC Sch. 40 & 80, HDPE) conforming to Federal Specification W-C-1094A, NEMA TC-7, UL 651A & B and adopted electrical code. Thermoplastic polymer conforming to ASTM D3350, rated for direct burial, ultraviolet resistant.

1. Fittings: Match conduit type and material and install with watertight joint compound recommended by manufacturer. Comply with NEMA TC-3.

B. Liquid-tight Flexible Non-metallic Conduit: (LFNC) conforming to UL 1660.

1. Fittings shall be specifically approved for use with this raceway and meet UL 514B.

C. All fittings and accessories shall match raceway.

2.4 CONCRETE ENCASED BURIAL DUCT

A. Polyvinyl chloride compound conforming to NEMA Standard TC-6, UL Standard No. 651A and designed for encased burial.

1. Fittings: Match conduit type and material. Elbows shall be Schedule 40 and installed with watertight joint compound recommended by manufacturer.

2.5 CONDUIT BODIES

A. Types, shapes, and sizes as required to suit individual applications and electrical code requirements. Provide matching gasket covers secured with corrosion-resistant screws.

B. Metallic Conduit and Tubing: Use metallic conduit bodies with threaded hubs for threaded raceways. Aluminum conduit bodies to be used with aluminum conduit only.

C. Conduit Bodies 1” and Smaller (Indoors only): Use bodies with compression type EMT connectors.

2.6 CONDUIT SEALS

A. Conduits shown requiring conduit-seals are to be provided with Appleton #EYS or approved equivalent. Conduit-seal to be sized according to conduit size and to be installed with "Apelco" Sealing Cement.

2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

A. Comply with SCTE 77.

1. Frame color shall be green.
2. Unit shall be intended flush burial.
3. Cover shall be weatherproof with tamper-resistant locking devices and have a non-drive overload rating unless installed in paved areas.
4. Cover shall have permanent labeling indicating “Electrical” or “Telecommuncation” terminations.
5. Minimum size shall be 12” wide by 24” long. Larger boxes shall be installed where the quantity of conduit and the volume of cabling requires a larger box.

B. Boxes, handholes and covers shall be a Polymer-concrete made from molded sand and aggregate bound using a polymer resin and reinforced with steel and fiberglass as required.

2.8 JUNCTION BOXES

A. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.

B. Boxes for exposed work, shall be 4" square or 4" long by 2-1/8" wide standard utility boxes suitable for wet locations. Boxes shall be specifically designed for surface installation and as required by the device, wiring, and number of conduits. All covers for devices and blank covers shall be stamped steel with turned down edges to fit with sides of box. Where surface mounted die cast boxes are specified or indicated to be used, deep housing die cast aluminum boxes with cast mounting lugs and threaded hubs as required for the installation, shall be provided.

C. 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.

D. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding.

PART 3 - WIRING METHOD EXECUTION

3.1 WIRING METHOD

A. Outdoors: Use the following wiring methods:

1. Exposed: intermediate metal conduit.
2. Concealed: intermediate metal conduit.
3. Underground: rigid nonmetal conduit, HDPE.
4. Connection to Vibrating Equipment: Including transformers and hydraulic, pneumatic or electric solenoid or motor-driven equipment: liquid-tight flexible non-metal conduit.
5. Connection to vibrating equipment and hydraulic, pneumatic, or electric solenoid or motor-driven equipment in moist or humid location or corrosive atmosphere, or where subject to water spray or dripping oil, grease, or water: liquid-tight flexible non-metal conduit.

B. Electrical Service Raceways:

1. Underground conduit(s) shall be schedule 80 unless noted otherwise.
2. Above ground conduit(s) shall be rigid metal conduit (RMC), unless noted otherwise.
3. EMT conduit shall not be used for service feeders from the power company equipment to main switchboards or from standby AC plants to generator distribution equipment.
4. Use type EB PVC conduit for exterior concrete encased service entrance application only where shown.

C. Rigid Metal Conduit shall be used for the following:

1. Conduits installed underground
2. Conduits installed in hazardous locations
3. When exposed to physical damage and heavy moisture both indoors and outdoors
4. All sleeves
5. All motor circuits subject to physical damage or below 10’ AFF
6. Intermediate grade metal conduit (threaded only) may be used in lieu of rigid steel conduit where allowed by adopted electrical code, and local ordinances.

3.2 INSTALLATION

A. General: Install electrical raceways in accordance with manufacturer's written installation instructions, applicable requirements of the Electrical Code, complying with recognized industry practices. No conduit shall be smaller than 3/4" unless specified otherwise in the specifications or on the drawings. No conduit shall be smaller than 3/4" when installed underground.

B. Complete installation of electrical raceways before starting installation of conductors within raceways.

C. Prevent foreign matter from entering raceways by using temporary closure protection. Prior to conductor installation, conduit to be swabbed clean of dirt, dust debris and moisture.

D. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

E. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated. This does not apply to conduits in crawl spaces.

F. Raceways are not to be embedded in concrete slabs. Tie raceways to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Run conduit larger than 1-inch trade size, 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 tubing is used, raceways must be converted to rigid steel conduit or IMC before rising above floor.

G. Raceways located below a floor slab, where the concrete slab is not poured on grade, raceways are not to be poured into the structural slab or the concrete topping. Raceways are to be installed above ceiling of floor below. Hold raceways as high as possible and turn up vertical to connect to electrical systems above concrete floor. Installation of raceways through concrete floor slab to maintain fire rating of floor system as described elsewhere in these specifications.

H. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. The exposed conduit at ceiling shall enter wall and drop down to wall box concealed.

I. Run exposed, parallel or banked raceways together. Make bends in parallel or banked runs from the same center line 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 the same size. In other cases, provide field bends for parallel raceways.

J. 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. Make raceway terminations tight. 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.

K. Rigid Steel or Intermediate Metal Conduit located below grade or anywhere that corrosion protection of the raceway is required, and the raceway is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

L. Install raceway-sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with NRTL- listed sealing compound. For concealed raceways, install each fitting in a flush steel 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 required by the Electrical Code.

M. Provide approved telescoping expansion fittings where conduit or tubing crosses expansion joints or use a maximum 12" section of flexible conduit of same pipe size with minimum #6 ground wire bonded to fittings across flexible conduit.

N. PVC conduit installation shall allow for expansion and contraction above grade and shall be encased in 3" sand fill below grade.

1. For all power wiring, install insulated ground wire, sized per adopted electrical code, unless shown larger.
2. Where PVC conduit is used for individual ground conductor, do not use metallic supports that completely encircle conduit.

O. Electrical Services:

1. Feeder and branch circuit conduits are NOT to be run in Utility Service Trench.
2. Multiple Utility Services (electrical, telephone, plumbing) are NOT to be run in a single underground trench.

P. Flexible Connections:

1. Use short length (maximum of 6 ft.) of flexible conduit for each recessed and semi-recessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors.
2. Use liquid-tight flexible conduit for connection of kitchen equipment and in wet locations. Install separate ground conductor in conduit with phase and neutral conductors.

Q. Do not install aluminum conduit embedded in or in contact with concrete.

R. Raceways for Fiber and Communication Cabling:

1. Shall be installed per the latest BICSI standards.
2. Raceways shall be no longer than 100’-0” between pull points unless stricter requirements are shown on the drawings.
3. A maximum of two (2) 90-degree elbows or equivalent between pull points unless stricter requirements are shown on the drawings.

3.3 ADJUSTING AND CLEANING

A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt, and construction debris.

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections of the Specifications, apply to Work of this Section.

B. The requirements as set forth in Division 16 GENERAL ELECTRICAL REQUIREMENTS Section shall apply to Work of this Section.

1.2 DESCRIPTION OF WORK

A. Extent of panelboard and enclosure work, including cabinets and cutout boxes, is indicated by drawings and schedules, and as specified herein.

B. Types of panelboards and enclosures required for the project include the following:

1. Power Distribution Panelboards
2. Lighting and Appliance Branch-Circuit Panelboards

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 1 Specification Section and GENERAL ELECTRICAL REQUIREMENTS Section.

B. Product Data: Submit manufacturer's data on panelboards, including amperes, voltages and current ratings, interrupting ratings, mounting requirements, physical dimensions and auxiliary components.

C. Include evidence of NRTL listing for series rating of installed devices.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Wiring shall comply with:

1. Adopted Electrical Code

a. Where an electrical code is not adopted the latest edition of NFPA 70 "National Electrical Code" shall be used.

B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of panelboards and enclosures, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

C. Panelboards, overcurrent protective devices, components, and accessories shall be from a single source from single manufacturer.

D. Codes and Standards:

1. Comply with applicable local code requirements of the authority having jurisdiction and the adopted electrical code as applicable to installation, and construction of electrical panelboards and enclosures.
2. Comply with applicable requirements of UL 67, "Electric Panelboards," and UL's 50, 67, 869, 486A, 486B, and 1053 pertaining to panelboards, accessories and enclosures. Provide panelboard units, which are NRTL-listed and labeled. Complying with applicable requirements of UL 489, “Molded-Case Circuit Breakers”.
3. Provide panelboards, constructed for special use, with appropriate NRTL markings, which indicate that they are suitable for special type of use/application.
4. Comply with NEMA Stds Pub/No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)," Pub/No. PB 1, "Panelboards," and Pub/No. PB 1.1, "Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less." Complying with applicable requirements of NEMA Std. Pub. Nos. AB1, AB2, and SG3 pertaining to molded-case circuit breakers.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 degrees F and not exceeding 104 degrees F.
2. Altitude: Not exceeding 6600 feet

B. Do NOT install panelboards, switchgear or switchboards in spaces until they are weather-tight and all wet areas within the space are dry. Interiors to panels shall not be installed until all overhead work is complete and any dust from drywall work is complete in the area of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide panelboard products of one of the following (for each type and rating of panelboard and enclosure):

1. Eaton Corporation
2. General Electric Company
3. Siemen’s, ITE
4. Square D

2.2 GENERAL REQUIREMENTS

A. Except as otherwise indicated, provide panelboards, switchgear, and switchboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials; with the design and construction in accordance with published product information; equip with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with adopted electrical code, UL and established industry standards for those applications indicated.

B. All panelboards, switchgear, and switchboards components shall be built, assembled and shipped by one manufacturer so there is one source of supply and responsibility.

C. As indicated on the drawing’s panelboards shall either have a main circuit breaker to protect and de-energize the phase buses or be main lug only with protection being provided from an upstream distribution. Main fusible switches are not acceptable.

D. Bus bar connections to all circuit breakers shall be bolt-on type. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.

1. Single phase, three-wire panelboard bussing shall be such that any two adjacent single-pole breakers are connected to opposite polarities in such a manner that two-pole breakers can be installed in any location.
2. Three-phase, four-wire panelboard bussing shall be such that any three adjacent single-pole breakers are individually connected to each of the three different phases in such a manner that two or three-pole breakers can be installed at any location.
3. All current carrying parts of the bus assembly shall be plated.

E. Enclosure Ratings:

1. NEMA 3R, NEMA 250 – Exterior Locations.

F. Enclosure Construction:

1. Panelboards shall have a door-in-door trim where a piano hinge is installed down one side and the other side secured with screws that will allow access to the interior parts of the panelboard, and a lockable, interior door allows access to the circuit breakers.

2. Where doors are longer than 36” they shall have two latching mechanisms keyed alike.
3. Equip with interior circuit-directory frame, and card with clear plastic covering.
4. Provide manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat

G. Short-circuit values are shown on the drawings. Panelboards and distribution panels shall have a rating equal or higher than what is shown on the plans with a minimum of 10,000AIC for 208V systems and 14,000AIC for 480V.

H. Phase, Neutral and Ground Buses:

1. Buses shall be constructed of 98% copper or tin-plated aluminum.
2. Bus assembly shall be designed for a maximum temperature rise of 55 degrees C above 40 degrees C ambient temperature when carrying rated current.
3. Minimum thickness of bus bars shall be 3/32".
4. Bussing shall be braced to withstand a fault current equal to the highest device interrupting capacity in the panel.
5. Neutral bus shall be rated for 100% of phase bus rating. Provide suitable lugs for outgoing feeders requiring neutral connections.
6. Provide a bare uninsulated grounding bar suitable for bonding to enclosure.

I. Conductor Connectors:

1. All connectors shall be suitable for both aluminum and copper conductors.
2. All connections shall be mechanical type (No compression type connections).

J. Temperature Ratings: All conductor terminals and equipment enclosures to be U.L. Listed for use with minimum 75°C rated conductors.

K. Panelboards used as Service Entrance equipment to be NRTL labeled for the installation and provided with all necessary bonding straps required to comply with Code.

L. Where “Space”, “Space Only” or another indication in the panel schedule is shown to reflect a future device, provide the proper bus connection, mounting brackets, blank plates so a future device can be installed.

M. Panelboards shall be fully rated unless otherwise indicated on the plans.

N. Load Centers are not approved for this project.

2.3 CIRCUIT BREAKERS

A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, UL 489 and as required for a complete installation.

B. Molded-Case Circuit Breakers:

1. Provide factory-assembled, molded-case circuit breakers of frame size, pole and ampere rating indicated. Construct with over center, trip-free, toggle type operating mechanisms with quick-make, quick-break action and positive handle indication.
2. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40°C.
3. Breakers shall have mechanical screw type removable connector lugs, AL/CU rated and be bolt-in type construction.

C. Thermal-Magnetic: Inverse time-current element for overloads, and an instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Electronic Trip: Field adjustable settings for instantaneous trip, pickup levels, time adjustments and GFCI adjustments including time delay (where breakers are indicated on the plans to have GFCI protection). Breaker shall include an interchangeable rating plug that can be replaced in the field.

E. Circuit breakers used on heating, air conditioning, or refrigeration equipment shall be type “HACR” and U.L. listed for such use.

F. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

G. Interrupting Ratings of breakers shall meet or exceed the AIC rating shown on the drawings with a minimum of 10,000 RMS for 208V systems and 14,000 RMS for 480V.

H. For breakers 100A and larger provide with a handle padlocking device with fixed attachment, for locking circuit-breaker handle in on or off position.

I. For breakers smaller than 100A and shown on the plans as being locked in the on or off position, provide a handle clamp as a loose attachment.

PART 3 - EXECUTION

3.1 INSTALLATION OF PANELBOARDS

A. General: Install panelboards and enclosures where indicated, in accordance with manufacturer's written instructions, applicable requirements of the adopted electrical code and NECA 407 and NEMA PB1.1, and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486A and B.

C. Anchor enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically secure.

D. Provide electrical connections within enclosures.

E. Every circuit and circuit modification shall be legibly identified in a circuit directory. Circuit directory shall be neatly typed and mounted on the inside of door, designating the room numbers, outlets, lights, receptacles and motors served by each branch circuit. Room numbers shown on the plans and panelboard schedules are the design room numbers. Room numbers typed into the circuit directory are to be Actual Room numbers used in building. Verify numbers with Architect.

F. All panelboards shall be field marked to warn qualified persons of potential electric arc flash hazard. Marking shall be located so as to be clearly visible to qualified persons before examination, adjusting, servicing or maintenance of equipment. Marking shall be self- adhesive, commercial label conforming to adopted electrical code and A.N.S.I. Z535.4 as manufactured by Ideal or approved equal.

3.2 INSTALLATION OF CIRCUIT BREAKERS

A. Install overcurrent protective devices as indicated, in accordance with the manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with the adopted electrical code and NEMA standards for installation of overcurrent protective devices.

B. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.

C. Install breakers from top to bottom, located and numbered with spare and spaces per the panel schedules. This must be done to maintain balanced loads on panelboard feeders.

3.3 ADJUST AND CLEAN

A. Contractor to clean inside of all panelboard enclosures prior to pulling conductors and installing interior components of panelboards.

B. Inspect circuit-breaker-operating mechanisms for malfunctioning and, where necessary, adjust units' for free mechanical movement.

C. Upon completion of installation, inspect interiors and exteriors of accessible components. Remove paint splatters and other spots, dirt, and construction debris. Touch up scratches and mars of finish to match original finish.

3.4 GROUNDING

A. Provide equipment grounding connections for panelboards as indicated. Tighten connections to comply with tightening torques specified in UL Stds. 486A and B to assure permanent and effective grounds.

3.5 FIELD QUALITY CONTROL

A. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification.

B. Prior to energizing of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

C. Prior to energizing of panelboards, check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

D. Prior to energizing, check panelboards for electrical continuity of circuits, and for short-circuits.

E. Subsequent to wire and cable hook-ups, energize panelboards and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

F. Perform the following infrared scan tests and inspections and prepare reports:

1. Infrared Scanning: Perform an infrared scan of each panelboard after Substantial Completion, but not more than 60 days after Final Acceptance.

END OF SECTION

CONTROLS 16900
SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM 16910

1.0 GENERAL

1.1 Description: The work to be accomplished under this section shall consist of furnishing and installing the various equipment necessary for a complete control system to function as specified herein and as shown on the drawings. The manufacturer shall furnish and install a completely integrated all solid-state cellular based web hosted Supervisory Control and Data Acquisition (SCADA) system. It shall be the system manufacture's responsibility to supply a system that is compatible with existing equipment. The complete system shall be supplied, installed, and warranted by the telemetry system manufacturer to insure a single source of responsibility.

1.1.1 Scope of Project: This section covers a Network SCADA and Instrumentation System two (2) remote transmitting units.

1.1.1.2 RTU's in each location shall be connected via cellular modems in each RTU.

1.1.2 Contractor shall supply:

1. Shop drawings prior to installation.
2. All equipment required by schedule.
3. All wiring and ancillary equipment, hardware, software, and appurtenances needed for proper installation and operation of equipment.
4. All labor for installation and start-up of the system.
5. Provide spare parts and maintenance tools as described below.
6. Operations and maintenance manuals as detailed below.
7. verification that their system shall communicate and be displayed on the existing platform

1.2 Quality Assurance

1.2.1 Manufacturer's Qualifications: The system specified herein shall be the product of a manufacturer who can demonstrate at least five (5) years of satisfactory experience in furnishing and installing comparable fiber optic/ control systems for water and wastewater installations. System shall be intregral with the existing SCADA system.

The manufacturer of this system shall maintain a 24-hour available inventory of all replaceable modules to assure the Owner of prompt maintenance service and a single source of responsibility. The manufacturer and shall certify this to the Engineer in writing at the time of bidder pre-qualification.

1.2.2 The system components shall be supplied by iControl Solutions Primex, (basis of design and spec) or a pre-approved equal.

1.3 Prebid Submittal:

1.3.1 General: Any system supplier other than the named pre-approved system supplier must submit a pre-bid submittal document fifteen (15) days prior to project bid date. Provide two bound copies, with tabbed dividers and contents organized and presented as hereinafter specified.

1.3.1.1 Pre-Bid approval does not exempt the Contractor from meeting all the requirements of the Contract Documents nor does it give any prior acceptance of any equipment, software or services. The Contract Documents are the final authority for acceptance of the work provided. The Pre-Bid Submittal is not a part of the contract documents and as such does not exempt the Contractor from the requirements of contract submittals described hereinafter.

1.3.1.2 The Engineer's decision as to pre-bid approval shall be final. The Consulting Engineer shall be considered the sole judge of the merits of the alternate system and shall indicate pre-approval of the alternate system via a written addendum to the specifications prior to the actual bid date.

1.3.1.3 The right is reserved to reject any and all proposals, to waive any informality, irregularity, mistake, error or omission in any proposals received and to accept the proposal, as determined by the Engineer or Owner, deemed most favorable to the Owner's interests.

1.3.2 Contents:

1.3.2.1 System Description: Provide a multiple page overview of the proposed SCADA system. Explain the system architecture and configuration in terms of the block diagram required. Describe the principal functions and capabilities of the system's PLC, cellular based web hosted system, system communications and general system capabilities I/O points, communication protocols available, etc.). Describe the display, annunciation, control, and event logging of the web host.

1.3.2.2 Block Diagrams: Provide a block diagram of the proposed system showing all major components and their interconnections and interrelationships. Label each diagram and indicate all external power and communications interfaces. All diagrams shall be in an 11 by 17 format.

1.3.2.3 Equipment List: Provide an equipment list with descriptive literature and specifications for the proposed system which includes all major items, manufacturer quantity provided, and model. A product performance data sheet shall be included for each proposed component in the system (i.e. cellular antennas, arrestors, remote terminal equipment, power supplies, time delays and relays, and the various sensors required). The installation list shall include the names and phone numbers of both the Owner and Consulting Engineer for projects of similar size and complexity. The bidder shall include a "statement of compliance" detailing paragraph by paragraph his compliance or exceptions to these specifications.

1.3.2.4 The system supplier must submit evidence from a qualified surety indicating they can provide performance/payment and maintenance bonds for SCADA and telemetry general contracts with a value equal to 100 percent of the SCADA and telemetry contract price. Additionally, the system supplier shall submit evidence that they carry a minimum of $1,000,000 of umbrella liability insurance. Liability insurance shall include $500,000 of "errors and omissions" insurance coverage. Bonding company must carry a rating of A or better. Insurance company must carry a rating of AAAA

1.3.2.5 The system supplier must be an authorized facility for assembly of control panels in accordance with UL 508 standards. Submit system supplier's UL number which verifies their panel assembly shop is capable of providing UL labeled control panels.

1.3.2.6 Provide a tentative construction schedule for completion of the project within the specified Contract period. Indicate the following activities with milestones: Mobilization, submittal preparation, submittal review, equipment procurement, equipment assembly, system configuration and programming, factory testing, system delivery, system installation, startup, field testing and training, and post acceptance routine service intervals.

1.3.2.7 Describe the system supplier's provisions for service, technical assistance and re-placement parts for the proposed system. Include the system supplier's 1-800-toll free number. Identify with resumes, all personnel who will be providing technical support services for the project after it is accepted.

1.3.3 Codes & Standards: The control system and its components shall comply will all applicable requirements of the following:

Electrical Code Compliance (National & Local) 2011 NEC
NEMA Compliance
IEEE Compliance
EIA Compliance
FCC Compliance

1.4 Submittals: Complete electrical and dimensional drawings shall be provided for approval by the consulting Engineer prior to equipment fabrication. The submittal data shall include the following:

1.4.1 Product Data: Provide product data sheets for each instrument and component supplied in the system. The data sheets shall show the component name as used on reference drawings, manufacturer's model number or other product designator, input and output characteristics, scale or ranges selected, electrical or mechanical requirements, and materials compatibility.

1.4.2 Shop Drawings: Provide drawings for each panel showing the wiring diagrams for control circuits and interconnections of all components. The drawings shall include wiring diagrams for all remote devices connected to the panel.

1.4.3 Panel Layout Drawings: A front panel and sub-panel layout shall be included as part of each control panel drawing. Components shall be clearly labeled on the drawing.

1.4.4 Installation Drawings: Typical installation drawings applicable to each site in the system shall be included.

1.4.5 Operator Interface Software: The submittal shall include a generic but detailed technical description of the Operator's Interface Software as proposed for this system including:

1. Sample text screens and menus
2. Sample graphics screens
3. Sample report logs and printed graphs

1.5 Delivery, Storage, and Handling: All items shall be stored in a dry sheltered place, not exposed to the outside elements, until ready for installation. All items shall be handled with appropriate care to avoid damage during transport and installation.

1.6 Sequencing and Scheduling: Coordinate with other electrical and mechanical work including wires/cables, raceways, electrical boxes and fittings, controls supplied by others, and existing controls, to properly interface installation of the control system with other work. Sequence installation and start-up work with other trades to minimize downtime and to minimize the possibility of damage and soiling during the remainder of the construction period.

1.7 MAINTENANCE

1.7.1 Maintenance Data: Submit maintenance manuals and "as built" drawings on all items supplied with the system. The manuals and drawings are to be bound into one or more books as needed. In addition to "as built" engineering submittal data and drawings, the manual shall include:

1. Trouble Shooting Guides.
2. Maintenance and calibration data for all adjustable items.

1.7.2 Maintenance Stock: The contractor shall provide 10 spare fuses and lamps for each type used in the system.

1.8 Job Conditions: All instruments and equipment shall be designed to operate under the environmental conditions where they are to perform their service. The equipment shall be designed to handle lightning and transient voltages as normal environmental hazards. The environmental conditions are as follows:

1.8.1 Outdoor: The equipment will be exposed to direct sunlight, dust, rain, snow, ambient temperatures from -20 to +120 degrees F, relative humidity of 10 to 100 percent, and other natural outdoor conditions. The installations shall be hardened to withstand normal vandalism.

1.8.2 Indoor: The equipment will be capable of operating in ambient temperatures of +32 to +130 degrees F and relative humidity of 20 to 100 percent.

2.0 MATERIALS

2.1 General: The functions and features specified hereunder are the minimum acceptable requirements for the SCADA system. The provided system shall equal or exceed each requirement. In some cases, the specifications may allow the

accomplishing of certain functions by means of more than one hardware/firmware/software approach. Any approach that is proposed shall equal or exceed all functional, operational, convenience and maintenance aspects of the one described. Major equipment, component and software items are specified; however the Contractor shall, at no additional cost, provide all appurtenant items, whether specifically referenced herein or not, but which may be required for operation as hereinafter specified.

2.2 System Overview: Monitoring and control of the system will be accomplished by the use of a centralized control and monitoring strategy and cellular based web hosted SCADA system. The control system will be comprised of a web hosted SCADA system, which monitors the system and the cellular modems in each RTU commuting via the web. The combined system will consist of the following units:

RTU 21 at the NE Inlet of the Tin Cup EQ basin	RTU 22 at the SE Inlet of the Tin Cup EQ basin

The web hosted SCADA system monitors and controls the data that is received from the equipment. The SCADA shall also allow the operations staff to control the gates as required.

2.3 Component Specifications:

2.3.1 General

2.3.1.1 Enclosures shall be corrosion resistant NEMA 4X corrosion resistant for outdoor locations. Enclosure shall be fabricated from a minimum of Fiberglass to match existing or stainless steel with a baked enamel finish in the manufacturer's standard color. Units shall include a single gasketed front door. Full height hinges, locking hasp and door clamping hardware shall be included. All enclosures shall be UL listed.

2.3.1.2 Controls shall operate from a source of 120 volts, 1 phase, 60 Hz. All controls shall be protected from lightning or other transient voltages by a power arrestor. A properly sized control power circuit breaker shall be provided. The breaker shall supply power to all controls within the enclosure.

2.3.1.3 Condensation protection shall be provided. Enclosure shall have a heater, which operates continuously from thermostat to prevent condensation build-up.

2.3.1.4 All DC power supplies required for operation shall be provided. Units shall provide sufficient voltage regulation and ripple control to assure powered components can operate within their required tolerances.

2.3.1.5 Included shall be a battery backed power source to run the PLC/RTU/Cellular Modem for a period of two (2) hours in the event of a failure of the normal AC source. The battery shall be of the gel cell type and sized to provide DC power for the specified power fail period. The battery shall be kept fully charged using a regulated float voltage charging system.

2.3.1.6 All telemetry units shall have an operational temperature range of -20^{O} C to 60^{O} C (-4^{O} F to 140^{O} F), and a storage temperature range of -40^{O} C to 80^{O} C (-4^{O} F to 176^{O} F), under relative humidity conditions of 10 to 95% non-condensing.

2.3.1.7 All wiring shall be in complete conformance with the National Electric Code, state, local and NEMA electrical standards. All incoming and outgoing wires shall be connected to numbered terminal blocks and all wiring neatly tied and fastened to chassis as required.

2.3.1.8 UL Labeling: Panels provided under this section shall meet the requirements of UL 508. All panels shall bear the UL 508 serialized label or be third party certified when delivered to the job site. All field modifications shall be in conformance with UL 508. When the Owner accepts the panels, the contractor certifies that the panels have retained their UL labeling or third party certification.

2.4 PLC Controllers:

2.4.1 The PLC will be attached to an Uninterruptible Power Supply (UPS) that will keep the system controlling and communicating during a short power outage, and the system will start controlling and communicating automatically after an extended power outage.

2.4.2 The control strategy will be agreed upon between the bidder and owner or their designated agent before the installation is started.

2.4.3 The PLC controllers shall be Primex VPAC 6 unit. The controller will be configured with enough discrete and analog I/O for each location plus 20% for future expansion.

2.4.4 Each site will have an ethernet modem to communicate to the web.

2.4.5 All controls will be enclosed in a NEMA 4Xenclosure. All wiring extended from this box will be enclosed in conduit to the extent possible.

2.4.6 All RTU's shall have a 5.7" HMI touch screen for control and data acquisition mounted in the inner door or back panel of each RTU displaying the integral part of each Lift Station.

2.4.7 Electrical control panels shall be placed in the vicinity of the above locations to interface with equipment and local process instrumentation as indicated elsewhere in these specifications and on the plan drawings.

2.4.8 Each location shall be equipped with SCADA equipment to monitor equipment and local process instrumentation. Where required, the SCADA equipment shall provide automatic control functions in addition to monitoring functions.

2.4.9 At the completion of this project, the Bidder will supply drawings of the controllers in Autocad format.

2.5 Uninterruptible Power Supply (UPS)

2.5.1 An uninterruptible power supply shall be furnished to continuously provide a reliable source of power to the computer and peripherals. Unit shall provide no-break sine wave power, lightning and surge protection, isolation per FIP Standard 94, voltage regulation and be switch-mode power supply rated. Standby Power Supplies which allow a break in power when transferring to battery are not acceptable.

2.5.2 The UPS shall be a 1400 VA to accommodate the load of the DLC, HMI, Cellular Modem. UPS shall utilize sealed, maintenance-free batteries to provide a minimum of 60 minutes of backup power at full load in the event of a failure of the normal AC source.

2.5.3 Unit shall include LED indicators for AC line ready, charging, battery power and alarm. Provide unit as manufactured by Best Power Technology, APC Smart UPS or equal.

3.0 HOSTED SCADA SERVICE

3.1 General: Existing system must be used and interfaced with the system. A separate system is not allowed. The ISS shall consist of servers and telecommunications and related equipment located in the service provider's central-data center facilities.

3.1.1 The service provider is responsible for establishing the cellular communication link between the ISS and the customer's utility site(s). City of Joplin will accept the transfer of cell service once completed

3.1.2 The service provider is responsible to ensure the continuous (24 x 7) ongoing operation and performance of all aspects of the web hosted SCADA service with an overall availability of 98.5% or greater.

3.2 Service Scope/Definitions: Internet SCADA System (ISS): Hardware, software, firmware and communication services collectively configured to provide centralized monitoring and control of the Utility System. This is inclusive of communication devices interconnected with the Utility System, central-site communication devices, server systems, and related peripherals, and the communication services which connect them. It is exclusive of local Utility System control devices such as RTU's, PLC's, and related control devices.

3.2.1 Utility System: The equipment and related facilities used for production, transport, storage and/or processing of water and/or wastewater, including localized control panels and devices such as RTU's, PLC's, and related instrumentation.

3.3. Hosted SCADA Service Components: Central Data Center Site

3.3.1 SCADA System: The service provider shall supply a hosted SCADA system based on industry-standard hardware and software and is existing for existing lift stations.

3.3.2.1 The programming and software provided shall be capable of displaying the items for the specific I/O of each location on the web and local controller.

4.0 UTILITY-SITE

4.1 Communication Device: The service provider shall supply a communications device for each identified utility-site PLC. The communication device shall provide the interface between the communications network, be it the Internet or proprietary network, and the PLC. The device shall be of a standard configuration, non-proprietary in nature, and available from a number of providers. The device shall draw primary and backup owner from the same source as the PLC.

4.2 Interface: The device shall connect to the distributed utility site PLC through a single interface cable between the modem and the PLC. This interface may be via RS232 Serial or RJ-45 Ethernet.

4.3 Capabilities: The communications device shall support the following capabilities:

4.3.1 Two-way communications between the distributed utility site PLC and the ISS communications network, to support the collection of PLC statistics as well as remote command/control of PLC functions; and remote programming, reconfiguration, and reloading of the PLC logic.

4.3.2 The ability to directly read PLC memory to acquire utility system statistics. Communications.

4.4 Cellular Connectivity: When cellular communications are utilized to maintain communication between the ISS and the customer utility site(s), the service provider shall be responsible to acquire and maintain communications services. The services shall be through a communications provider chosen by the service provider based on economic and technical considerations.

4.5 Security/Reliability: Electronic communications traversing the Internet between the ISS and the customer site(s) shall be encrypted with industry standard protection via a VPN connection.

5.0 INTERNET SCADA SYSTEM (ISS) FEATURES

5.1 Utility-Site System Monitoring and Data Collection

5.1.2 The ISS shall provide continuous electronic polling and gathering of distributed utility system PLC data on a pre-defined interval to maintain current knowledge of the utility system status, including distributed system component condition and performance, operating values, and failures or other out-of-specification conditions.

5.1.3 This feature shall provide electronic collection and distribution of analog and digital data within the following pre-defined intervals:

5.1.3.1 Cellular:

- The monthly subscription rate shall be based on interval polling of data once every two (2) minutes. Subscription plans with more frequent polling intervals shall be available.
- A Fastpoll feature shall be provided to allow users to dynamically initiate a change in the polling algorithm obtain system data as frequently as once every thirty (30) seconds for a period of five (5) minutes. After the five minute Fastpoll period the polling interval returns to two (2) minutes. The Fast poll feature shall be included with standard monthly subscription rate.

5.2 Data Storage and Management

5.2.1 The ISS shall provide managed storage of interval data and events/alarms as monitored. The most recent two years of historical data monitored shall be available online. Subscription plans shall be available to accommodate storage and retrieval of older historical data storage.

5.3.2 Client Web Application:

5.3.2.1 The ISS shall support a graphical, Internet-based access service (Web Application) for secure, on-demand user connectivity to their utility system. This service shall provide secure access to current system status and trending, system control, alarm management, historical data access, reporting, and user input screens. The Web Application is available via any personal computer, smartphone, or tablet device that supports Java and a standard browser supporting HTTPS and HTML5.

5.3.3 Accessing the Web Application: The authorized user shall access the Web Application via an SSL connection to the ISS provider's website.

5.3.4 Utility System Status: The service shall provide multiple graphical screens as previously described. A summary (overview) screen shall be provided that rolls up all of the sites/screens to depict overall utility system status shall be provided as the main overview screen.

Standard screens may be used if they fit the application. Additionally, the service shall have the ability to

customize standard screens and create new custom screens that closely depict that process being monitored. Systems that are not capable of providing custom graphic screens shall not be considered.

5.3.5 Utility System Trending: The service shall be capable of trending any process variable being monitored by the ISS. Process variables to be trended were previously identified in this specification. Trend data shall be graphed on the client's Web Application screen. The authorized user shall select to graph one or more analog points simultaneously. There are two options for outputting trend data: trend graphs can be printed or trend data can be exported to Excel.

5.3.6 Utility System Control: The service shall provide the ability for direct, remote execution of system commands to initiate or suspend various system operations (for example, to start or stop a pump). It shall also provide the ability to reconfigure utility system operating parameters such as set points and pump alternation/sequencing.

5.3.7 Alarm Management: The service shall provide access to actively manage alarms and the underlying configuration of alarms and alarm notifications.

- Each of the graphical status screens shall integrate the display of applicable alarms such that components display in flashing red when alarms related to the component are activated.
- Users of the service shall be able to acknowledge alarms interactively through the web interface via a dedicated alarm screen.
- Access to the alarm notification configuration shall permit authorized users to configure and/or change notification and alarm sending parameters, including the addition, deletion, or modification of contacts, contact methods, and contact particulars.

5.3.8 Alarms and Alarm History Screen: All current alarms are displayed at the bottom of the client's Web Application screen. Unacknowledged alarms are displayed in red, acknowledged alarms are displayed in black. For a history of all alarms for the customer's site the Alarm History Screen displays the alarm name, when the alarm became active, when the alarm was cleared (alarm condition no longer present), when the alarm was acknowledged, and who acknowledged the alarm.

5.3.9 Performance Reporting: The service shall provide users with access to generate standard performance reports, including those specified below. These reports shall be user-configurable at time of generation to allow the user to, at a minimum, specify the timeframes to be included in the report, as well as the output format for the report. Reports generated shall be printed or saved in PDF, HTML, or graphical (PNG) formats.

- Basic pump operation performance report, including pump start and runtimes, and total flow over the course of the month.
- Flow meter report, including daily weekly and current totals for any and all customer analog flow meters.

5.3.10 Custom Reporting: The service shall include the custom report building capability. Custom reports shall be built by the ISS provider to the standard described below. If custom reports are not defined below, no custom reports are required for this project.

5.3.11 Access Security: The Web Application shall implement security to ensure that only authorized users are permitted access to view or modify the operations of the utility system. At a minimum, the service must implement:
- Variable-Privilege Accounts – The service supports the following user accounts:
- Manager: Controls multiple client sites (if applicable), controls all user accounts for each site, has full control of each site's equipment and parameters. There may only be one Manager account.
- Supervisor: Controls user accounts for a single customer site, has full control of the site's equipment and parameters. There may be multiple Supervisor accounts.
- Operator: Has full control of all customer site equipment and parameters. There may be multiple Operator accounts.
- User: Has view-only access to the customer site. Cannot change set points or turn site equipment on or off. There may be multiple User accounts.

5.3.12 Password Management: Each user account shall have a strong password associated with it. Passwords shall be eight (8) characters or greater and include both alphabetical and numeric characters. Users may change their password from within the Web Application. Managers and Supervisors may also manage passwords for users assigned

to their sites or created by them.

5.3.13 User Account Control: Managers and Supervisors may manage user accounts for their customer site(s) from within the Web Application. Users with Manager or Supervisor access can:

- Add or remove users.
- Change user passwords.
- Enable and disable users.
- Change user roles (Supervisor, Operator, or User).
- Add or remove users to groups within their site.

5.3.14 Secured Communications: Information sent between the Web Application and the ISS shall be secured using industry standard data encryption such as but not limited to HTTPS and SSL.

6.0 SERVICE PROVIDER REQUIREMENTS

6.1 The service provider shall be required to demonstrate its suitability to provide the services described in this section by meeting the following requirements.

6.2 Services: The service provider shall be normally engaged in the integration, configuration, operation, repair, and maintenance of control systems for water/wastewater systems. The service provider shall modify or supplement its standard services to meet these specifications. Standard services of a particular provider that do not meet the functional and technical requirements of these specifications are not acceptable.

6.3 Experience: The supplier shall have successfully provided systems of similar or larger complexity in the last five (5) years.

6.4 Acceptance: No provider shall be accepted on this project unless they have been found to comply with the above requirements.

7.0 SERVICE SUPPORT AND ADMINISTRATION

7.1 The service provider shall supply the following services to implement and provide ongoing technical and service support.

7.2 Commissioning: The service provider shall conduct assessment, design, integration, startup and testing services, including:

7.2.1 Design of the system to meet these specifications and the requirements identified during the business and technical requirements assessment.
7.2.2 Integration of the ISS, including utility-site and central-site components, and activation of communications systems.
7.2.3 Startup and testing of the ISS service to ensure that it meets specifications and the identified business and technical requirements.

7.3 Technical Support: The service provider shall make telephone support available for the hosted SCADA service on a 24 x 7, year-round basis, for technical assistance with the ISS hardware, software, communications and the services they support. This shall include:

7.3.1 Staffing of a support line during normal business hours; calls shall be responded to within 90 minutes of receipt. Normal business hours are defined as Monday through Friday 8:00 AM until 5:00 PM CST except Holidays.
7.3.2 Emergency calls placed after normal business hours shall page a technical resource that responds within 3 hours of receipt.
7.3.3 The service provider shall provide support and timely follow-up and escalation to other technical and managerial resources if needed to resolve the issue, and mutually agreed resolution, closing, and periodic reporting of trouble tickets.

7.4 Account Administration: The service provider shall provide a consolidated quarterly bill for all services, itemizing fixed

costs on a per-site basis, and specifying variable- and added-cost items as incurred.

8.0 INTERNET SCADA SYSTEM (ISS) ADMINISTRATION

8.1 The service provider shall perform active, ongoing monitoring, management, and administration of the ISS to ensure its continued secure, reliable, efficient and effective performance.

8.2 Configuration and Change Administration: The service provider shall have an established procedure in place to ensure that only communicated, authorized and scheduled changes are made to the ISS. The change procedure shall also include a process for tracking and controlling changes to the ISS.

8.3 Fault Administration: The service provider shall conduct 24 x 7 continuous monitoring of critical ISS components to detect failures, deficiencies, or other out-of-specification conditions. This includes monitoring, detection, and resolution of faults to the communications services provided as part of the service. The service provider shall provide notification, escalation, trending, and reporting on out-of-specification conditions affecting the ISS or with communications between the ISS and the customer site(s) consistent with requirements identified during initial commissioning.

8.4 Performance Administration: The service provider shall track, trend, and report on ISS availability and reliability on a component and system-wide basis. This service shall include ongoing tuning of the ISS to maintain performance per specifications; tracking and reporting of the capacity and utilization of system resources; and, recommending and implementing changes to ensure continued proper performance.

8.5 Security Administration: The service provider shall provide ongoing protection and security of the ISS. This service shall be provided through secured login identification and managed password authentication, pre-defined security levels and controls access, monitoring of unauthorized access attempts, application of critical software security updates, system recovery management, implementation of industry standard network and system security practices and procedures, and secured physical access to Data Center system components.

8.6 System Recovery: The service provider shall have a recovery procedure in place to should there be a failure of the primary ISS. The recovery procedure shall utilize the geographic off site backup as part of the recovery procedure.

9.0 SPARE PARTS

9.1 As part of this contract, the Contractor shall furnish a minimum of one (1) each of the following spare parts:
- PLC Processor
- Analog isolator module
- Cellular Modem
- Fuses – 10% or a minimum of one of each types and size

10.0 EXECUTION

10.1 General: Coordinate all work with the engineer/owner to avoid conflicts, errors, delays and unnecessary interference with operation of the existing system during installation, testing, cutover and startup. Install all new equipment in accordance with the manufacturer's instructions and approved submittals.

10.2 Start-Up: The manufacturer shall supply "Factory" personnel for start-up service as needed to insure satisfactory operation. Subsequent trips to the job site to correct defects shall be made at no charge to the Owner during the warranty period.

10.3 Training: The system manufacturer shall supply "factory" personnel to conduct two separate on-site training sessions. The initial training session shall be conducted during start-up as needed until the Owner and Engineer are satisfied that the operators are comfortable with the operation and maintenance of the system. Training shall be done on site with the owner's personnel.

10.3.1 Six months after the Owner commencing system operation, the system manufacturer shall supply "factory" personnel to conduct follow-up training of the Owner's personnel. The follow-up training shall be conducted on-site and consist of a one-day (8 hour) training session reviewing the operation and maintenance of the system. The Owner shall be contacted a minimum of two weeks in advance, prior to scheduling the training session to allow proper coordination.

SUBMERSIBLE PRESSURE TRANSDUCER..... 16962

1. GENERAL

1.1 Description: The work of this section shall consist of furnishing and installing maintenance free submersible level transducer system that uses reliable hydrostatic head pressure sensing principle to provide an accurate and reliable proportional 4-20 ma signal representing level/pressure. Submersible sensor systems that use protective caps or cages to protect the sensing diaphragm, are susceptible to solids buildup, shall be considered high maintenance and unreliable, and shall not be acceptable.

1.2 General Characteristics: The submersible transducer shall be suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed 6 inches above the floor of the wetwell. The sensor shall be suspension mounted using a cable suspension mounting kit or equivalent, consisting of a 2' long inlet NPT Type 316 stainless steel pipe with coupling, bolt, cable clamps and hardware along with the required length of 1/8 inch diameter cable.

2. MATERIALS

2.1 Sensor/Transducer: The transducer housing shall be fabricated of a Teflon coated 316 stainless steel with a bottom diaphragm 2 5/8" diameter of heavy-duty, limp, foul free, molded Teflon bonded to a synthetic rubber back/seal. Housing construction shall resist and be unaffected by the buildup of solids on its surfaces or sensing diaphragm. The transducer electronics shall be encased within the protective housing and shall be electrically and mechanically isolated from the sensed media via nonconductive fluid filled pressure tran sference cavity and barometric compensated transducer electronics chamber.

2.1.1 The submersible transducer shall be a two-wire type and shall operate from a supply voltage of 9 to 30 v DC and produce a 4 – 20 mA signal in direct proportion to the measured level excursion over a pre-calibrated range of 0 to 1.5, 5, 15, 30 PSI depending on characteristics of the wetwell it is placed. The unit shall have ample instrument loop load capacity and shall be able to drive a minimum load of 750 ohms @ 24 DC loop power. The sensor technology shall be based on the use of a highly reliable and stable piezo-resistive pressure element with a .25% full scale accuracy with compensation for non-linearity, hysteresis and repeatability.

2.1.2 The internal pressure of the transducer assembly shall be relieved to atmospheric pressure through a heavy-duty urethane jacketed hose/cable assembly with a dedicated breather tube. The tube shall be rigid to prevent compression that may result from mounting or folding of the cable through installation. The breather system shall be sealed through the use of a maintenance free air bladder assembly connected to the breather tube and mounted within a junction box. The sealed breather system shall compensate for variations in barometric pressure including expansion and contraction of air due to temperature changes and altitudes as well as prevent fouling from moisture and other corrosive/atmospheric elements.

2.2 Operating Temperature: The unit shall operate over a wide –40° to 185°F Temperature range and shall have not more than a 3% full scale error over –40° to 185°F range.

2.3 Intrinsically Safe Barrier: Provide an intrinsically safe barrier between the control panel and lower assemblies. The barrier shall render the level sensing system suitable for use in Class I, Division I Groups A, B, C, and D Division I, Groups E, F and G, and Class 3, Division I hazardous locations.

2.4 Transducer Junction Box: A weatherproof fiberglass junction box shall be provided to terminate the submersible transducer electronics/breather cable. The junction box shall include a stainless steel incoming strain relief connector, breather system PVC bellows and a terminal block. The installing contractor shall furnish and install a three-wire shielded cable between the junction box and the control panel.

3.0 EXECUTION

3.1 The submersible pressure transducer shall be Siemens Water Technologies, a 1000i loop powered/4-20ma submersible level transmitter or xylem H-3123 or an approved equal.

APPENDIX A:

SCADA PROPOSAL

Enviro Line co., inc.
HQ OFFICE - 409 SIXTH STREET P.O. BOX 308 OSAWATOMIE, KS 66064

August 23rd, 2019

Warren Humphrey, PE
Olsson & Associates
601 P Street, Suite 200
Lincoln, NE 68508

RE: City of Joplin, MO
Tin Cup EQ Basins – PLC Panels

Dear Warren:

Thank you for the opportunity to submit our PLC panel scope for the Tin Cup EQ project. If you should have any questions, please don't hesitate to contact me anytime.

Our proposal references the overview drawing, suggested specifications and includes those items as described in the attached Bill of Materials:

- **Northwest Structure VPAC PLC Panel**
- **Southeast Structure VPAC PLC Panel**

VPAC Panels will provide monitoring only. Automation will be added in the Future.

Spec 16910 page 1, notes that RTU's in each location shall be connected via cellular modems in each RTU. Each RTU will communicate directly to icontrol via cellular modem. Please note that RTU's will not communicate directly to each other between locations.

Bill of Materials:

1. **Control Panels**
    - **A. Northwest Structure PLC Panel, 120Vac, 1 PH, 60 Hz**
        1. NEMA 4X Fiberglass Enclosure with 3Pt latch, Inner Door and back panel
        2. UL 508 Label
        3. AC Surge Arrestor
        4. Circuit Breaker, 120Vac, 1P
        5. Condensation Heater/Thermostat
        6. Power Supply, Battery Backup
        7. Primex VPAC 6 PLC with I/O for the following:
            a. DI – Power Failure
            b. DI – Gate 1 Actuator Local
            c. DI – Gate 1 Actuator Remote
            d. DI – Gate 1 Fully Closed

e. DI – Gate 2 Actuator Local
f. DI – Gate 2 Actuator Remote
g. DI – Gate 2 Fully Closed
h. DI – Gate 3 Actuator Local
i. DI – Gate 3 Actuator Remote
j. DI – Gate 3 Fully Closed
k. AI – Level Transducer
l. AI – Ultrasonic Flow meter
m. AI – 30" Velocity Flow meter
n. AI – Gate 1 Position Reference
o. AI – Gate 2 Position Reference
p. AI – Gate 3 Position Reference
q. AO – Gate 1 Position Signal
r. AO – Gate 2 Position Signal
s. AO – Gate 3 Position Signal

8. Ethernet Switch, 5-Port
9. Cell Modem w/enclosure mounted antenna 4G
10. Analog Input Surge Arrestors
11. IS Barrier, Level Input
12. Misc relays, fuses, terminal blocks, etc.

B. Southeast Structure PLC Panel, 120Vac, 1 PH, 60 Hz

1. NEMA 4X Fiberglass Enclosure with 3Pt Latch, Inner Door and back panel
2. UL 508 Label
3. AC Surge Arrestor
4. Circuit Breaker, 120Vac, 1P
5. Condensation Heater/Thermostat
6. Power Supply, Battery Backup
7. Primex VPAC 6 PLC with I/O for the following:
    a. DI – Power Failure
    b. DI – Gate 1 Actuator Local
    c. DI – Gate 1 Actuator Remote
    d. DI – Gate 1 Fully Closed
    e. DI – Gate 2 Actuator Local
    f. DI – Gate 2 Actuator Remote
    g. DI – Gate 2 Fully Closed
    h. AI – Level Transducer
    i. AI – 15" Velocity flow meter
    j. AI – 15" Velocity flow meter
    k. AI – 18" Velocity flow meter
    l. AI – Gate 1 Position Reference
    m. AO – Gate 1 Position Signal
    n. AO – Spare
    o. AO – Spare
8. Ethernet Switch, 5-Port
9. Cell Modem w/enclosure mounted antenna 4G
10. Analog Input Surge Arrestors
11. IS Barrier, Level Input
12. Misc relays, fuses, terminal blocks, etc.

2. **icontrol SCADA Software Additions**
    A. Northwest and Southeast Diversion Structure additions to existing icontrol system
        1. Overview updates to show new Northwest and Southeast locations with link to site screens
        2. Site graphics for Northwest and Southeast to display points noted above
        3. Gate position will be manual operation only
        4. Trending of Analog signals
        5. Alarm notification
        6. Cellular modem setup and configuration
        7. 3-Years of icontrol service for both panels
3. **Spare Parts - 16910**
    A. Section 1.7.2 – Spare fuses for control panel
    B. Spare VPAC 6 PLC
4. **Submersible Level Transducers**
    A. Two (2) A1000i Submersible Level Transducers, 0-15PSI, 4-20ma loop powered, breather bag, 40 ft transducer cable, SS Suspension Fixture and 30 ft SS Cable.
5. **Services**
    A. Engineering/CAD
    B. VPAC Programming and icontrol programming services
    C. Documentation
    D. Warranty – 1 Year
    E. Freight (FOB Shipping Point)

Total Price for the above materials, including startup, freight, training services and sales tax is $58,648.00 USD

Proposal notes and clarifications:

1. Three [3] Years of icontrol® Service is provided above for these sites in the above net price. The Owner will be responsible for renewing the service when the original Service Agreement expires. This fee is billed separately (see icontrol™ service fees below).
2. The equipment, as listed above, will be supplied for installation by others.
3. Primex is not responsible/liable for cellular down times/outages. It is expected that Cellular coverage is reliable at all sites connected.

icontrol® service fees - Cellular

icontrol® subscription fees are for monitoring the above system utilizing cellular communication is **$40.00 per month per site** as listed above. The monthly subscription fee is based on a 3-year commitment and may not increase more the 3% per year during the 3-year period. icontrol® can be purchased in advance by multiplying the monthly fee by the number of prepayment months. **A separate Master Service Agreement will be supplied to address icontrol service fees. Three [3] Year of service is included in the base price above for each panel.**

Items specifically NOT included in this proposal

1. Field instruments such as level sensors, flow meters, gate equipment, etc.
2. Unistrut
3. Sales or use tax
4. Installation of equipment and job site labor other than as specified
5. Receiving and storage of equipment on the job site
6. Installation materials, brackets, wire, clamps, piping, junction boxes, etc., not specifically described in our material list.
7. Performance, payment or equipment bond of any kind
8. Installation of any instruments
9. Field Terminations
10. Mounting of any control panels or hardware
11. Mounting stands, brackets, channel strut or field assemblies of any kind.
12. Permits or Bonding
13. Fiber optic cable, connectors, patch panels, termination and/or testing
14. Electrical testing services

Sincerely,

Chris Dickason

Cc: Mark Mayer – E-L