Rock River Water Reclamation District
Rockford, Illinois

Bidding Requirements and Contract Forms

for

RAS Pump Replacement Pilot Project (RSP-5 and RSP-6)

Capital Project No. 1859

Bid Doc. No. 18-409

Rock River Water Reclamation District
Rockford, Illinois

Bidding Requirements and Contract Forms
and
General Provisions and Technical Specifications
for
Sanitary Sewer Construction

for

RAS Pump Replacement Pilot Project (RSP-5 and RSP-6)

Capital Project No. 1859

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Section I

Bidding Requirements

Article 1 — Notice to Bidders

The Rock River Water Reclamation District will receive sealed and signed bids for the RAS Pump Replacement Pilot Project (RSP-5 and RSP-6), Capital Project No. 1859, improvements at the Rock River Water Reclamation District offices, 3501 Kishwaukee Street, Rockford, Illinois until 2:00 p.m. on July 18, 2018 at which time and place all bids will be publicly opened and read aloud.

The RAS Pump Replacement Pilot Project (RSP-5 And RSP-6), Capital Project No. 1859 consists of the construction of concrete slab shoring, removal of two vertical turbine pumps, removal of pump piping, removal of a metal sided wood framed pump house, cutting and chipping of existing concrete slab and associated steel, installation of a new hatch with fall protection, concrete replacement, concrete fill in clarifier sludge sump, two new submersible pumps and appurtenances, new pump discharge piping and valving with connections to active pipeline, electrical conduit and supports, miscellaneous electrical panels and wiring, miscellaneous seal water system demolition, and all other appurtenances as indicated on the plans and in the specifications.

Bidder's attention is called to Article 2 – Instructions to Bidders 3.8 requirements for Statement of Qualifications. Bidder must have a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL.

All work, start-up, testing, and restoration shall be completed by December 31, 2018. Liquidated damages shall be $300 per calendar day.

Copies of the specifications may be obtained by depositing Fifty Dollars ($50.00) with the Rock River Water Reclamation District. The amount of the deposit for each set of specifications will not be refunded.

All construction will be done in accordance with specifications on file with the Rock River Water Reclamation District, including the *General Provisions and Technical Specifications for Sanitary Sewer Construction* (Current Edition) by the Rock River Water Reclamation District of Rockford.

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount of ten percent (10%) of the total bid price. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured.

A Mandatory Pre-Bid Meeting for this project will be held on Tuesday, July 10, 2018 at 1:00 p.m. at the RRWRD Engineering Conference Room, 3501 Kishwaukee Street, Rockford, Illinois. All contractors that intend to bid on this project must attend the pre-bid meeting.

Bid documents may be obtained by contacting the Engineering Department at the Rock River Water Reclamation District, (815) 387-7660, 3501 Kishwaukee St. For more information, visit the District web site at www.rrwrd.dst.il.us. Plans and specifications are also available for viewing through the Northern Illinois Building Contractors Association, whose office is located at 1111 S. Alpine Rd, Rockford, IL.

The successful bidder will be required to furnish a satisfactory performance bond in the full amount of the bid or proposal. No bid shall be withdrawn without the consent of the District for a period of 60 days after the scheduled time of receiving bids.

The Rock River Water Reclamation District, reserves the right to reject any or all bids, or any part thereof, or to accept any bid or any part thereof, or to waive any formalities in any bids, deemed to be in the best interest of the Rock River Water Reclamation District.

Dated this 2nd day of July, 2018.

BY: Chris Black, Business Manager

Article 2 — Instructions to Bidders

1 General

1.1 Scope and Intent

This section of the contract documents is concerned with furnishing detailed information and requirements for preparing bids to prospective bidders, bidders' responsibility, the preparation and the submission of bids, basis for awarding the contract and other general information concerned with bidding and executing the contract.

1.2 Contradictions

If in the case of apparent contradiction between or among the Contract Documents, the Contract Documents shall be consulted in the following order: Addenda, Agreement, Supplementary Drawings, Instructions to Bidders, Detailed Specifications, Plans, District General Provisions and Technical Specifications for Sanitary Sewer Construction. The language in the first such document in which language regarding the conflict, error or discrepancy occurs shall control.

2 Legal Requirements

2.1 Illinois Regulations

1. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor.

   The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on standard IDOT forms.

2. Public Act 83–1030 entitled "Steel Products Procurement Act" requires that steel products used or supplied in performance of this contract or subcontract shall be manufactured or produced in the United States with three exceptions.

The provisions of this Section shall not apply:

   a. Where the contract involves an expenditure of less than $500.
   b. Where the executive head of the public agency certifies in writing that
      i. the specified products are not manufactured or produced in the United States in sufficient quantities to meet the agency's requirements, or
      ii. obtaining the specified products, manufactured or produced in the United States would increase the cost of the contract by more than 10%.
   c. When its application is not in the public interest.

3. Public Act 96-929 (30 ILCS 570) provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State

of Illinois as defined in the Act; and, further, that Illinois workers are available and capable of performing the particular type work involved.

4. Public Act 99-0933 requires that any party to a contract adopt and promulgate written sexual harassment policies that include, as a minimum, the following information:

    a. the illegality of sexual harassment
    b. the definition of sexual harassment under Illinois State law
    c. a description of sexual harassment, utilizing examples
    d. my (our) organization's internal complaint process including penalties
    e. the legal recourse, investigative and complaint process available through the Illinois Department of Human Rights and the Illinois Human Rights Commission
    f. directions on how to contact the Department and the Commission
    g. protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act

    Upon request, this information shall be provided to the Illinois Department of Human Rights and the District.

5. With regard to nondiscrimination in employment, the Contractor for this project will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations.

6. The Contractor for this project shall comply with the Occupational Safety and Health Act.

7. The Contractor for this project shall comply with the Federal Drug-Free Workplace Act.

8. Public Act 96-1416 requires the Certification of Clean Construction and Demolition Debris (CCDD) and uncontaminated soil prior to disposal at a CCDD fill site. The Contractor for this project shall comply with Public Act 96-1416 and be responsible for the certifications and any fees associated with the disposal at a CCDD fill site.

    a. In the event that contaminated soil is uncovered on the project, the Contractor shall notify the District immediately. Any extra costs resulting from the presence of contaminated soil shall be evaluated in accordance with District General Provisions & Technical Specs for Sanitary Sewer Construction; General Conditions: Article 5 – Time Provisions and Article 8 – Changes.

2.2 Americans with Disabilities Act

The Contractor for this project will comply with all applicable requirements of the Americans with Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify Rock River Water Reclamation District (District) and their representatives from all:

1. suits, claims, or actions
2. costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement
3. damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

3 General Instructions

3.1 Bidder's Responsibility

Bidders are cautioned not to submit proposals until having carefully examined the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and having made all necessary investigations to inform themselves thoroughly as to the facilities for delivering, placing and handling the materials at the site, and having informed themselves thoroughly as to all difficulties involved in the completion of all the work under this Contract in accordance with its requirements.

Bidders must examine the Plans, Specifications and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amount or quantities necessary to complete fully the work in strict compliance with the Contract Documents. The Bidder must satisfy himself by making borings or test pits, or by such methods as he may prefer, as to the character and location of the materials to be encountered or work to be performed. No pleas of ignorance of conditions that exist or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work under this Contract, as a result of failure to make the necessary examinations and investigations, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill, in every detail, all of the requirements of the Contract Documents, or will be accepted as a basis for any claims whatsoever for extra compensation or for an extension of time.

The Contractor is responsible for verifying the location of all existing utilities in the project areas.

The Bidder, therefore, shall satisfy himself by such means as he may deem proper as to the location of all structures that may be encountered in construction of the work.

3.2 Addenda and Interpretations

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any bidder orally. Every request for such interpretation must be in writing addressed to the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois. To be given consideration, such request must be received at least five (5) days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by email, fax, or certified mail with acknowledgement of receipt requested, to all prospective bidders, at the respective addresses furnished for such purposes, not later than three (3) days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addenda or interpretation shall not relieve said bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents.

3.3 Laws and Regulations

The prospective bidder is warned that he must comply with all laws of the United States Government, State of Illinois, all ordinances and regulations of the District in the performance of the work under this contract. The Bidder's attention is specifically called to that provision of the General Conditions regarding the rate of wage to be paid on the work.

3.4 Quantities Estimated Only

Bidders are warned that the estimate of quantities of the various items of work and materials, as set forth in the proposal form, is approximate only and is given solely to be used as a uniform basis for the comparison of bids. The quantities actually required to complete the contract work may be less or more than so estimated, and if awarded a contract for the work specified, the Contractor further agrees that he will not make any claim for damages or for loss of profits or for an extension of time because of a difference between the quantities of the various classes of work assumed for comparison of bids and quantities of work actually performed.

3.5 Form, Preparation, and Presentation of Proposals

For particulars as to the quantity and quality of the supplies, materials and equipment to be furnished, and the nature and extent of the work or labor to be done, prospective bidders are referred to the Contract Documents, which may be examined or obtained at the office of the District.

Each bid will be submitted upon the prescribed proposal form. All blank spaces for bid prices must be filled in, in ink, with the unit or total sum or both for which the proposal is made. If the proposal contains any omissions, erasures, alterations, additions or items not called for in the itemized proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of bid. In case of any discrepancy in the unit price or amount bid for any item in the proposal, the unit price as expressed in figures will govern. In no case is the agreement form to be filled out or signed by the bidder.

The bid must be verified and be presented on the prescribed form in a sealed envelope on or before the time and at the place stated in the Advertisement for Bids, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the bid is made. If forwarded by mail, the sealed envelope containing the proposal and marked as directed above, must be enclosed in another envelope addressed to Clerk of the Rock River Water Reclamation District, 3501 Kishwaukee Street, Rockford, Illinois, 61109 and be sent preferably by certified mail. The District will not accept facsimile generated bids.

3.6 Bid Security

Each proposal must be accompanied by the District Bid Bond form with an acceptable Bid Security attached, in the amount specified in Article One, Notice to Bidders. This sum is a guarantee that, if the Proposal is accepted, a contract will be entered into and its performance properly secured. The District's Bid Bond Form included in the bid packet must be used. No other Bid Bond form may be substituted.

Within ten (10) days after the opening of bids, the deposits of all but the three lowest bidders will be returned. The deposits of the remaining two unsuccessful bidders will be returned within three (3) days after the execution of the contract, or, if no such contract has been executed, within sixty (60) days after the date of opening bids. The deposit of the successful bidder will be returned only after he has duly executed the contract and furnished the required bond and insurance.

3.7 Affidavit of Compliance

Each proposal must be accompanied by an executed Affidavit of Compliance. A separate Affidavit of Compliance form is enclosed with the Proposal packet. Failure to submit an executed Affidavit of Compliance with the proposal may constitute sufficient cause for rejection of the bid.

3.8 Statement of Qualifications

Each proposal must be accompanied by a Statement of Qualifications certifying that the bidder is registered to do business in the State of Illinois, has a permanent business office within forty (40) miles of the District office at 3501 Kishwaukee Street in Rockford, IL, and provides documentation that the bidder possesses the appropriate financial, material, equipment, facility and personnel resources and expertise necessary to meet all contractual obligations. The bidder shall document no less than three (3) contracts for sanitary sewer system within the past five (5) years having equal or greater value to the bid being submitted. The District reserves the right to request additional information as needed to evaluate bids prior to making an award.

3.9 Comparison of Proposals

Bids on item contracts will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantities of each item, multiplied by the corresponding unit prices and including any lump sum bids on individual items, in accordance with the estimate of quantities set forth in the proposal form. Bids on lump sum contracts will be considered upon the basis of the lowest sum bid.

3.10 Acceptance of Bids and Basis of Award

No bidder may withdraw his bid after the scheduled closing time for receipt of bids, for at least sixty (60) days.

The contract will be awarded, if at all, to the lowest responsive, responsible bidder. The Rock River Water Reclamation District also reserves the right to reject any or all bids.

The bidder whose proposal is accepted shall enter into a written contract for the performance of the work and furnish the required bonds and insurance certificate within ten (10) days after written notice by the Engineering Manager of the District has been served on such bidder personally or by mailing a postpaid wrapper to such bidder at the address given in his proposal. If the bidder to whom the contract is awarded refuses or neglects to execute it or fails to furnish the required bond and insurance within five (5) days after receipt by him of the notice, the amount of his deposit shall be forfeited and shall be retained by the District as liquidated damage and not as a penalty. It being now agreed that said sum is a fair estimate of the amount of damages that the District will sustain in case said bidder fails to enter into a contract and furnish the required bond and insurance. No plea of mistake in the bid shall be available to the bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

3.10.1 Evaluation of Responsiveness

The responsiveness of bidders will be judged on the basis of the completeness of the bid submitted. To be responsive, a Bid must be submitted on the forms provided as part of the Bid Documents and comply with all the requirements of the Instruction to Bidders.

3.10.2 Evaluation of Responsibility

To be judged as responsible, the bidder shall:

a. Have adequate financial resources for performance, the necessary experience, organization, technical qualifications, and facilities, or a firm commitment to obtain such by subcontracts;
b. Be able to comply with the required completion schedule for the project;
c. Have a satisfactory record of integrity, judgment, and performance, including, in particular, any prior performance on contracts from the District;
d. Have an adequate financial management system and audit procedures, that provide efficient and effective accountability and control of all property, funds, and assets;
e. Conform to the civil rights, equal employment opportunity and labor law requirements of the Bid Documents.
f. Have satisfactorily completed no less than three (3) sanitary sewer system contracts within the past five (5) years of equal or greater value to the bid being submitted.

3.11 The Rejection of Bids

The District reserves the right to reject any bid if the evidence submitted in the statement of the bidder's qualifications, or if investigation of such bidder fails to satisfy the District that such bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all proposals will be rejected if there is reason to believe that collusion exists among the bidders. Conditional bids will not be accepted. The District reserves the right to reject any and all bids and to accept the bid which they deem most favorable to the interest of the District after all proposals have been examined and canvassed.

3.12 Insurance and Bonding

Contractor shall provide all necessary insurance and bonds required to complete the project. No more than ten (10) calendar days subsequent to the District's issuance of an award letter, the Contractor shall provide documentation to prove that he has obtained all required insurance and bonds. The District shall be the sole judge as to the acceptability of any such proof.

Contractor shall provide and maintain all insurance and bonds as required by the District.

3.12.1 General

The Contractor shall ensure that:

1. All insurance policies shall be specific to the project.

2. The insurance certificate shall state: This certifies that the insurance coverage meets or exceeds that required for RAS Pump Replacement Pilot Project (RSP-5 and RSP-6), Capital Project No. 1859.

3. The District shall be named as Additional Insured in all policies; this shall include the Owners Contractors Protective Policy option.

4. All completed operations coverages and bonds shall remain in force for a period of two (2) years following acceptance of the project and completed operations shall stay in force for two (2) years following completion of the project.

3.12.2 Insurance

The Contractor shall, for the duration of the contract and for two (2) years following project acceptance, maintain the following:

1. General Liability: $1,000,000 combined single limit per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project or the general aggregate limit shall be twice the required occurrence limit. The Contractor shall provide "XCU" coverage.

2. Automobile Liability: $1,000,000 combined single limit per accident for bodily injury and property damage including coverages for owned, hired or non‑‑owned vehicles, as applicable.

3. Workers' Compensation and Employers Liability: Workers' Compensation limits as required by statute and Employers Liability limits of $500,000 per accident and $500,000 per disease.

4. Umbrella: $2,000,000 per occurrence/aggregate for contracts valued at $500,000 or over, or $1,000,000 for contracts below $500,000. $10,000 is maximum allowable self-retained limit.

5. Errors and Omissions: If the Contractor performs professional services, he shall maintain errors and omissions insurance with a limit no lower than $1,000,000 for the duration of the contract.

The policies shall contain, or be endorsed to contain, the following provisions in the General Liability and Automobile Liability Coverage's:

a. Unless otherwise provided in paragraph "c" of this section, the District, its officers, officials, employees and volunteers shall be covered as additional insureds as respects liability arising out of activities performed by or on insured's general supervision of the Contractor, products and completed operations of the Contractor, premises owned, occupied or used by the Contractor, or automobiles owned, leased, hired or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the District, its officers, officials, employees, volunteers, or agents.

b. Unless otherwise provided in paragraph "c" of this section, the Contractor's insurance coverage shall be primary insurance as respects the District, its officers, officials, employees, volunteers, and agents. Any insurance or self-insurance maintained by the District, its officers, officials, employees, volunteers, or agents shall be excess of the Contractor's insurance and shall not contribute with it.

c. As an acceptable alternative to provisions “a” and “b” of this section, the Contractor may provide owner's and contractor's protective liability insurance with coverage limits, named insureds, and in conformity with all applicable specifications of this section.

d. Any failure to comply with reporting provisions of the policies shall not affect coverage provided to the District, its officers, officials, employees, volunteers, or agents.

e. The Contractor’s insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

f. All Coverages — Each insurance policy required by this clause shall not be suspended, voided, canceled by either party, reduced in coverage, or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to the District.

3.12.3 Best's Ratings

The District shall be the sole judge of whether or not said insurer's ratios are satisfactory. The District's decision shall be final and the District's bidding procedures contain no appeal provision.

1. Alphabetical Rating: For purposes of this Request for Bids, "insurer" shall mean any surety, insurance carrier, or other organization which proposes to provide an insurance policy or bond for the Contractor. No insurer or surety rated lower than "A-, Excellent” in the current *Best's Key Rating Guide* shall be acceptable to the District.

2. Financial Size Rating: Provided an insurer's alphabetical rating is satisfactory, the District will examine said insurer's financial size rating.

    a. If Best classifies the insurer XII or larger, said insurer shall be acceptable to the District.

    b. If Best classifies the insurer as smaller than XII, but larger than VI, said insurer shall be submitted to the District’s Business Manager and/or the District’s insurance consultant for review.

Financial Size ratings less than VII are not acceptable and will disqualify the Contractor.

3.12.4 Performance Bond and Labor & Materials Payment Bond Form

The Contractor shall provide a Performance Bond and Labor & Materials Payment Bond form acceptable to the District. The performance bond shall be for either 100% of the contract price or for the Contractor’s unit price times the estimated number of units, as applicable.

This Request for Bids contains a Performance Bond and a Labor & Material Bond form for the Contractor’s use.

If the Contractor fails to provide acceptable bonds within the specified time, he shall be in default.

3.12.5 Correction of Contractor's Insurance or Bond Deficiencies

If the District determines that the Contractor's insurance or bond documentation does not conform to these specifications, the District shall inform said Contractor of the non-conformity. If said Contractor fails to provide conforming insurance or bond documentation within five (5) calendar days of the District's deficiency notice, he shall be in default.

3.12.6 Indemnification Clause

Contractor shall protect, indemnify, hold and save harmless and defend the District, its officers, officials, employees, volunteers, and agents against any and all claims, costs, causes, actions and expenses, including but not limited to attorney's fees incurred by reason of a lawsuit or claim for compensation arising in favor of any person, including the employees, officers, independent contractors, or subcontractors of the Contractor or District, on account of personal injuries or death, or damages to property occurring, growing out of, incident to, or resulting directly or indirectly from the performance by the Contractor or subcontractor, whether such loss, damage, injury or liability is contributed to by the negligence of the District or by premises themselves or any equipment thereon whether latent or patent, or from other causes whatsoever, except that the successful bidder shall have no liability for damages or the costs incident thereto caused by the sole negligence of the District.

The indemnification shall not be limited by a limitation on amount or type of damages payable by or for the Contractor or its subcontractor under any employee benefits act including, but not limited, to the Workers Compensation Act.

No inspection by the District, its employees, or agents shall be deemed a waiver by the District of full compliance with the requirements of the Contract. This indemnification shall not be limited by the required minimum insurance coverages in the Contract.

3.13 Tax Exemption

The District is exempt, by law, from paying bidder Federal Excise Tax and Illinois Retailers' Occupational Tax. Therefore, the bidder shall exclude those taxes from his bid. The District's tax exemption number is E9992-3696-06. The bidder shall include all applicable taxes in his bid price.

Section II

Detailed Specifications

Section 00310

EQUIPMENT QUESTIONNAIRE

The Bidder shall enter in the spaces provided the names of the manufacturers of equipment which Bidder proposes to furnish, and shall submit this Equipment Questionnaire with its Proposal. Owner will review and evaluate the information before award of the Contract.

Only one manufacturer's name shall be listed for each item of equipment. Upon award of a contract, the named equipment shall be furnished. Substitutions will be permitted only if named equipment does not meet the requirements of the Contract Documents, the manufacturer is unable to meet the delivery requirements of the construction schedule, or the manufacturer is dilatory in complying with the requirements of the Contract Documents. Substitutions shall be subject to concurrence of Owner and shall be confirmed by Change Order.

Preliminary acceptance of equipment listed by manufacturer's name shall not in any way constitute a waiver of the specifications covering such equipment; final acceptance will be based on full conformity with the Contract Documents.

Failure to furnish all information requested or entering more than one manufacturer's name for any item in this Equipment Questionnaire may be cause for rejection of the Proposal.

Equipment	Manufacturer
1. Submersible Solids Handling Pumps And Appurtenances, Section 11304	_____
2. Non-Lubricated Eccentric Plug Valves, Section 15101	_____
3. Swing Check Valves, Section 15101	_____

END OF SECTION

SECTION 00700
GENERAL CONDITIONS

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

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ASSOCIATED GENERAL CONTRACTORS OF AMERICA

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CONSTRUCTION SPECIFICATIONS INSTITUTE

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

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

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order

following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation , (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

   a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

   b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

   a. reviewing and checking all such information and data;

   b. locating all Underground Facilities shown or indicated in the Contract Documents;

   c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

   d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and

as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the

Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the

certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:

   a. Such insurance shall remain in effect for two years after final payment.

   b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against

Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the

objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work. Contractor shall restrict all activities related to the performance of the Work to the area indicated on the project drawings.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a

proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a

Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party

indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when

prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor,

Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

   c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

   d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

   e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

   f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

   g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

    a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

    b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a

deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

    a. the Work has progressed to the point indicated;

    b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

    c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

    a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

    b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

    a. to supervise, direct, or control the Work, or

    b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

    c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

    d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

    e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise

or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable

part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

c. a list of all Claims against Owner that Contractor believes are unsettled; and

d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00800
SUPPLEMENTARY CONDITIONS

SCOPE. THESE SUPPLEMENTARY CONDITIONS AMEND OR SUPPLEMENT THE GENERAL CONDITIONS AND OTHER PROVISIONS OF THE CONTRACT DOCUMENTS AS INDICATED HEREIN. ALL PROVISIONS WHICH ARE NOT SO AMENDED OR SUPPLEMENTED REMAIN IN FULL FORCE AND EFFECT.

SC-1. DEFINITIONS AND TERMINOLOGY.

SC-1.01. Defined Terms.

A. Delete and replace definitions 9, 15, 17, 22, 23, 29, and 51 in Paragraph 1.01.A of the General Conditions with the following:

9. Change Order—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

15. Contractor—The individual or entity with whom Owner has entered into Agreement. The terms Contractor and CONTRACTOR are interchangeable and shall have the same meaning in the Contract Documents.

17. Drawings—That part of the Contract Documents prepared or approved by Consulting engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor Submittals are not Drawings as so defined. The terms Drawings and Plans are interchangeable and shall have the same meaning in the Contract Documents.

19. Engineer—The terms Architect, Consulting Engineer, and ENGINEER are interchangeable and shall refer to the Engineering Manager of the Rock River Water Reclamation District.

22. Hazardous Environmental Condition—The presence at the Site of hazardous materials or conditions, including, but not limited to Contaminated Environmental Media, Asbestos, Metal Bearing Protective Coatings, Paints, and Linings, PCBs, Petroleum, Hazardous Waste, Radioactive Materials, metals such as but not limited to arsenic, cadmium, chrome, cobalt, lead, and mercury, and other Hazardous Substances; in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto or cause them to come under the application of a federal, stats, or local regulation.

23. Hazardous Waste—The term Hazardous Waste shall have the meaning provided in 40 CFR 261 titled "Identification and Listing of Hazardous Waste," as amended from time to time.

29. Owner—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed. The terms Owner and OWNER and District are interchangeable and shall have the same meaning in the Contract Documents.

51. Work Change Directive—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner ordering an addition, deletion, or revision in the Work or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contracts Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

B. Add the following definitions to Paragraph 1.01.A of the General Conditions:

52. Float—The amount of time between the early start date and the late start date, or early finish date and late finish date, of any of the activities in the progress schedule.

53. Proposal—The terms "Proposal" and "Bid" are interchangeable and shall have the same meaning in the Contract Documents.

54. Resident Project Representative—In lieu of the definition set forth in Paragraph 1.01.A.36 of the General Conditions, the Resident Project Representative shall be the authorized representative or Owner, who may be assigned to the site or any part thereof.

55. without exception—The term "without exception," when used in the Contract Documents following the name of a Supplier or a proprietary item of equipment, product, or material, shall mean that the sources of the product are limited to the listed Suppliers or products and that no like, equivalent, or "or-equal" item and no substitution will be permitted.

56. Hazardous Substances—The term Hazardous Substances shall have the meaning provided in 29 CRF 1910.120 titled "Hazardous Waste Operations and Emergency Response," as amended from time to time.

57. Metal Bearing Protective Coatings, Paints, and Liners—Protective coatings, paints, and liners that contain measurable amounts of metals such as but not limited to arsenic, cadmium, chrome, cobalt, lead, or mercury.

58. Contaminated Environmental Media—Soil, sediment, ground water, or air contaminated with Hazardous Substances.

SC-2. PRELIMINARY MATTERS.

SC-2.02. Copies of Documents. Delete Paragraph 2.02.A of the General Conditions, and replace it with the following new paragraph:

A. The contractor to whom a contract is awarded will be furnished, free of charge, up to 3 copies of the Project Manual and up to 3 sets of the Drawings, together with all Addenda. Additional copies of the Project Manual and Drawings may be obtained from Owner on the following basis:

Full Set of Drawings and Project Manual - $50.00

SC-3. CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE.

SC-3.05. Reuse of Documents. Delete Paragraphs 3.05.A of the General Conditions and replace it with the following:

A. Contractor and any Subcontractor or Supplier shall not:

1. Have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Consulting Engineer or its consultants, including electronic media editions; or

2. Reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Consulting Engineer or his consultants and specific written verification or adaption by entity responsibility for those documents.

SC-3.06. Electronic Data. Delete Paragraph 3.06.A of the General Conditions and replace it with the following:

A. Except as permitted in the Submittals Procedures section of Division 1 data furnished by Owner, Engineer, or Consulting Engineer to Contractor, or by Contractor to Owner, Engineer, or Consulting Engineer that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

SC-4. AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS.

SC-4.02. Subsurface and Physical Conditions.

A. Reports and Drawings. Delete Paragraph 4.02.A of the General Conditions and replace it with the following:

Reports and Drawings:

1. No reports of explorations and tests of subsurface conditions at or contiguous to the Site were performed for this project.

A. Limited Reliance by Contractor on Technical Data Authorized. Delete Paragraph 4.02.B of the General Conditions in its entirety and replace it with the following paragraph:

No Reliance by Contractor Authorized. Owner, Consulting Engineer, and Engineer do not warrant the accuracy of the physical conditions information and drawings which are not Contract Documents. Contractor uses such information at Contractor's sole risk.

It shall be understood that the information provided is not guaranteed by Owner, Consulting Engineer, Engineer to be more than a general indication of the physical conditions likely to be found.

SC-4.04. Underground Facilities.

A. Shown or Indicated. Delete Paragraph 4.04.A of the General Conditions in its entirety and replace with the following:

Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Consulting Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Consulting Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. The cost of all of the following shall be included in the Contract Price, and Contractor shall have full responsibility for:

   a. reviewing and checking all such information and data:

   b. locating all Underground Facilities shown or indicated in the Contract Documents:

c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction: and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated. Delete Paragraph 4.04.B of the General Conditions in its entirety and replace it with the following:

Not Shown or Indicated:

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner. Owner will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If owner concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and documents such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of an could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of such adjustment in the Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

SC-4.06. Hazardous Environmental Condition at Site.

A. DELETE PARAGRAPH 4.06.A OF THE GENERAL CONDITIONS AND REPLACE WITH THE FOLLOWING PARAGRAPH:

No reports or drawings related to Hazardous Environmental Conditions at the Site are known to the Owner.

B. Delete Paragraph 4.06.B of the General Conditions in its entirety.

C. Delete Paragraph 4.06.G and 4.06.H of the General Conditions and replace with the following:

To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Consulting Engineer, Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

D. Renumber Paragraph 4.06.I of the General Conditions as Paragraph 4.06.H.

E. Add the following new Paragraph immediately after Paragraph 4.06.H of the General Conditions as renumbered above:

4.06 (I) Abatement of Hazardous Environmental Conditions at the Site is covered in the Project Requirements section.

SC-5. BONDS AND INSURANCE. DELETE ARTICLE 5 OF THE GENERAL CONDITIONS IN ITS ENTIRETY, AND INSERT THE FOLLOWING TEXT IN ITS PLACE:

ARTICLE 5 – BONDS AND INSUANCE

Bonds and Insurance requirements shall be as identified in Instructions To Bidders.

SC-6. CONTRACTOR'S RESPONSIBILITIES.

SC-6.02. Labor; Working Hours. Add the following new paragraphs immediately after Paragraph 6.02.B of the General Conditions:

C. No work shall be done between 4:00 PM and 6:30 AM except when emergency repairs are required or directed by the owner. Any work on outside of working hours or on Owner holidays requires Owner approval at least two (2) business days in advance of the proposed extended work hours. However, emergency work may be done without prior permission.

SC-6.06. Concerning Subcontractors, Suppliers, and Others. Delete Paragraph 6.06.B of the General Conditions in its entirety and insert the following two paragraphs in its place:

The Bidding Documents or the Contract Documents require the identity of certain Subcontractors, Suppliers, or other individuals or entitled to be submitted to Owner with the

Proposal, and if Contractor has submitted a list of thereof in accordance with the Bidding Documents or the Contract Documents, Owner's acceptance (either in writing or by failing to make written objection there to by the date indicated for acceptance or objection in the Bidding Documents or Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any tight of Owner or Engineer to reject defective Work.

Particular consideration will be given to the qualifications of each Subcontractor proposed on the List of Subcontractors. The use of Subcontractors proposed by Bidder and accepted by Owner prior to the Notice of Award will be required in the performance of the Work unless otherwise permitted or directed by Owner.

SC-6.07. Patent Fees and Royalties. Delete Paragraph 6.07.B of the General Conditions in it entirety, and renumber paragraph 6.07.C as paragraph 6.07.B. Add the following new paragraph immediately after Paragraph 6.07.B of the General Conditions:

Contractor shall furnish to Owner at the time of initial submittal, satisfactory evidence that Suppliers of proprietary materials, equipment, devices, or processes to be furnished or used in the performance of the Work do indemnify, keep, and save harmless Contractor from all liabilities, judgments, costs, damages, and expenses which may arise from the use of such proprietary materials, equipment, devices, or processes, furnished to Contractor for incorporation in or use in performance of the Work and their operation by Owner after acceptance of the Work. Such satisfactory evidence shall consist of patent licenses or patent releases covering proprietary materials, equipment, devices, or processes.

SC-6.09. Laws and Regulations. Add the following new paragraphs immediately after Paragraph 6.09.C of the General Conditions:

D. The Contractor shall plan, schedule, and coordinate work in consideration of Owner's safety requirements, including but not limited to personal protective equipment for arc flash.

E. Additional laws and regulations are included in the Instructions To Bidders.

SC-6.10. Taxes. Add the following new paragraph immediately after Paragraph 6.10.A of the General Conditions:

B. Pursuant to Department of Revenue, Illinois Retailer's Occupation Tax Rule 15(4), sales of materials for incorporation into Owner's real estate are exempt from retailer's occupation tax and use tax. However, sales of tools, fuel, lumber for forms, and other end use or consumption items which are not incorporated into Owner's real estate are taxable sales.

SC-6.17. Shop Drawings and Samples. Delete Paragraph 6.17 of the General Conditions in it entirety and replace it with the following:

6.17. Shop Drawings and Samples. Requirements for shop drawings, samples, and submittal procedures shall be as specified in Division 1 Submittals section. Fabrication that proceeds prior to acceptance of submittals by Engineer shall be at Contractor's Risk.

SC-6.19. Contractor's General Warranty and Guarantee. Delete Paragraphs 6.19.C.6 and 6.19.C.7 of the General Conditions and replace with the following Paragraphs 6.19.C.6, 6.19.C.7, and 6.19.C.8.

6. an inspection, test, or approval by others;

7. any correction of defective Work by Owner; or

8. any expiration of a correction period.

SC-6.20. Indemnification. Delete Paragraph 6.20 of the General Conditions in its entirety and replace it with the following:

6.20. Indemnification – Indemnification shall be as indicated in Instructions To Bidders.

SC-6.21. Delegation of Professional Design Services.

A. Delete Paragraphs 6.21.B, 6.21.C, and 6.21.D of the General Conditions in their entirety, and replace with the following Paragraphs 6.21.B, 6.21.C, and 6.21.D.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by an Illinois Licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Owner.

C. Owner shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications or approval performed by such design professionals, provided Owner has specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Owner's review and acceptance of signed and sealed certifications of performance and design criteria used when designating systems, materials, or equipment and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given

and the design concept expressed in the Contract Documents. Owner's review and acceptance of Shop Drawings and other submittals (except performance and design criteria and design drawings) will be only for the purpose stated in Division 1 Submittals Procedures section.

SC-8. OWNER'S RESPONSIBILITIES.

SC-8.01. Communications to Contractor. Delete Paragraph 8.01.A of the General Conditions in its entirety, and replace it with the following:

A. Except as otherwise provided in these General Conditions, Owner will issue communications to Contractor.

SC-8.11. Evidence of Financial Arrangements. Delete Paragraph 8.11 of the General Conditions in its entirety, and replace it with the following:

8.11. Evidence of Financial Arrangements. – Not Used.

SC-9. ENGINEER'S STATUS DURING CONSTRUCTION.

SC-9.08. Decisions on Requirements of Contract Documents and Acceptability of Work.

A. Add the following new words at the end of the first sentence of Paragraph 9.08.A of the General Conditions.

…insofar as the subject matter of any pertinent claim, dispute, or other matter falls within the realm of the technical expertise of Engineer.

B. Add the following new sentence at the end of Paragraph 9.08.A of the General Conditions:

Engineer shall not render any decision on any claims, disputes, or other matters the subject matter of which, at Engineer's sole discretion, requires legal, rather than technical, interpretation.

C. Delete 9.08.C in its entirety

SC-10. CHANGES IN THE WORK; CLAIMS.

SC-10.03. Execution of Change Orders.

A. Replace the first sentence of Paragraph 10.03.A of the General Conditions with the following:

Owner and Contractor shall execute appropriate Change Orders covering:

B. Delete Paragraph 10.03.A in its entirety.

SC-10.05. Claims.

A. Delete Paragraph 10.05.B of the General Conditions in its entirety, and replace with the following.

B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 7 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 14 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 7 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

B. Delete Paragraph 10.05.E of the General Conditions in its entirety, and replace with the following:

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Contractor appeals to the Owner's Board of Trustees within 30 days of such action or denial. All other disputes will be settled by the remedies at law.

SC-11. COST OF THE WORK; ALLOWNACES; UNIT PRICE WORK. – NO MODIFICATIONS.

SC-12. CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES. – NO MODIFICATIONS.

SC-13. TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFFECTIVE WORK.

SC-13.07. Correction Period. Add the following new paragraphs immediately after Paragraph 13.07.E of the General Conditions:

F. Nothing in this Article 13 concerning the correction period shall establish a period of limitation with respect to any other obligation which Contractor has under the Contract

Documents. The establishment of time periods relates only to the specific obligations of Contractor to correct the Work, and has no relationship to the time within which Contractor's obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than to specifically correct the Work.

G. The correct period set forth in Paragraph 13.07.A shall be 2 years in lieu of 1 year. All other provisions of Paragraph 13.07 shall remain unchanged.

SC-14. PAYMENTS TO CONTRACTOR AND COMPLETION.

SC-14.02. Progress Payments. Add the following new paragraphs immediately following Paragraph 14.02.A.3 of the General Conditions:

4. Materials and Equipment. Payments for stored materials and equipment shall be based only upon the actual cost to Contractor of the materials and equipment and shall not include any overhead or profit to Contractor.

   Partial Payments will not be made for undelivered materials or equipment.

5. Schedule and Data. During the progress of the Work, each application for Payment shall be accompanied by Contractor's updated schedule of operations or progress report, with such shop drawings schedules, procurement schedules, values of materials and equipment on hand included in application, and other data specified or reasonably required by Engineer.

6. Lien Waivers. Each application for payment shall be accompanied by lien waivers.

SC-14.07. Final Payment. Add the following new sentence at the end of Paragraph 14.07.A.2 of the General Conditions:

Consent of the surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the surety.

SC-15. SUSPENSION OF WORK AND TERMINATION. No Modifications.

SC-16. DISPUTE RESOLUTION. Delete Article 16 of the General Conditions in its entirety, and insert the following text in its place:

ARTICLE 16 – NOT USED

SC-17. MISCELLANEOUS. No Modifications.

SC-17.04. Survival of Obligations. Add the following new paragraph immediately after Paragraph 17.04.A of the General Conditions:

B. Contractor shall obtain from all Suppliers and manufacturers any and all warranties and guarantees of such Suppliers and manufacturers, whether or not specifically required by the Specifications, and shall assign such warranties and guarantees to Owner. With respect thereto, Contractor shall render reasonable assistance to Owner when requested, in order to enable Owner to enforce such warranties and guarantees. The assignment of any warranties or guarantees shall not affect the correction period or any other provisions of these Contract Documents.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 LOCATION OF WORK:

A. The work of this Contract is located at the Rock River Water Reclamation District, 3333 Kishwaukee Street, Rockford, Illinois 61109.

1.02 SCOPE OF WORK:

A. Furnish all labor, materials, equipment, and incidentals necessary and make modifications to the RAS pumping system complete and ready for operation as shown on the Drawings and specified herein.

B. The Work includes, but is not necessarily limited to, the following major items:

1. Pumping Station:

a. Demolish and dispose of one (1) existing pump house complete including concrete and curbing as indicated.

b. Remove and dispose of the 2 existing lineshaft pumps, motors, and discharge piping sequenced as necessary to maintain process functionality.

c. Stage pump discharge piping work to minimize down time for the four pumps that connect into one return activated sludge pipe. Add valving as necessary to complete work in the limited time indicated.

d. Shore existing elevated concrete deck and minimize debris falling into the clarification tank, during deck repair work.

e. Remove existing pump support steel channels, anchors, and concrete pads. Cut and chip-out the existing concrete deck as indicated for installation of new pump access hatches; chip-out surface of slab and around reinforcing steel as indicated to prepare for repair overlay of the existing deck. Overlay the concrete deck with new repair concrete decking for each of the 2 pumps and their access hatches.

f. Remove seal water system and cap/plug the water piping where connected to the main.

g. Install new submersible pumps, rail systems, discharge piping, check valves, isolation valves, hatches, and controls; perform associated electrical and instrumentation work.

h. Restore site landscaping and paving that is disturbed by the work. Restoration shall be as indicated on the drawings; if not indicated on the drawings, repair to a condition at least equal to that which existed prior to the start of the work.

1.03 WORK BY OTHERS:

A. The following work will be performed by others after completing Work of this Contract:

1. Removal of five other pump houses and their associated pumps; installation of new submersible pumps, hatches, and piping.

B. The following work will be performed by others concurrently with Work of this Contract.

1. RRWRD routine operation, maintenance, and repair activities.

C. Refer to Article 7 of the General Conditions for additional requirements.

1.04 WORK SEQUENCE:

A. Four final clarifiers return sludge through a common pipe. The work shall be sequenced to minimize the amount of time a return pipe is out of service. Contractor will be expected to have all materials on site and existing piping exposed prior to shut down of RAS pumping from a train of 4 final clarifiers. RRWRD will shut down the RAS pumps from a group of four tanks and the Contractor will be expected to drain the piping, remove existing piping, and install isolation valves as rapidly as possible. The Contractor shall work extra hours as necessary to limit down time to no more than 12 hours at a time. Contractor staffing shall be adjusted as necessary to install two isolation valves during each four tank outage.

1.05 CONTRACTOR'S USE OF PREMISES:

A. Contractor shall limit the use of the premises for performance of the Work and storage of materials and equipment so as to not disturb Owner's operations and maintenance.

B. Contractor shall coordinate with Owner necessary access for maintenance requirements.

C. Contractor shall assume full responsibility for security of all his and his subcontractors materials and equipment stored on the site.

D. Contractor shall move any stored items which interfere with operations of Owner.

END OF SECTION

SECTION 01046

CONTROL OF WORK

PART 1 - GENERAL

1.01 PLANT AND HOURS OF CONSTRUCTION:

A. Furnish plant and equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such plant appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the plant equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

B. Normal construction activity shall take place only between the hours of 6:30 a.m. to 4:00 p.m., excluding Saturdays, Sundays, and RRWRD holidays. Work outside the above time periods will be permitted only on an emergency basis and only with the approval of the Owner.

1.02 OCCUPYING PRIVATE LAND:

A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment any land outside the rights of way or property of the Owner. A copy of the written consent shall be given to the Engineer.

1.03 PIPE LOCATIONS:

A. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved to the Owner, acting through the Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

B. Small interior piping is indicated diagrammatically on the Drawings, and the exact location is to be determined in the field. Piping shall be arranged in a neat, compact, and workmanlike manner, with a minimum of crossing and interlacing, so as not to interfere with equipment or access ways, and, in general, without diagonal runs.

1.04 DIMENSION OF EXISTING STRUCTURES

A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment which is dependent on the correctness of such information.

1.05 OPEN EXCAVATIONS:

A. All open excavations shall be adequately safeguarded by providing temporary barricades, fencing, caution signs, lights, and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated material in the street, and requiring that the trench shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.06 TEST PITS:

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

1.07 INTERFERENCE WITH AND PROTECTION OF STREETS:

A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permission from the proper authorities. If any street, road, or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.

B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefor.

C. The Contractor shall, at least 48 hours in advance, notify the RRWRD in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate

with the RRWRD in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.

1.08 CARE AND PROTECTION OF PROPERTY:

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

1.09 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by Contractor at Contractor's expense.

B. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the Bid.

D. If, in the opinion of the Engineer, permanent relocation of a utility not shown is required, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid as extra work under Article 12 of the General Conditions. The Contractor shall fully cooperate with the RRWRD, and shall have no claim for delay due to such relocation.

1.10 INSPECTION OF WORK AWAY FROM THE SITE:

A. If work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in writing and

delivered to the Engineer in ample time so that the necessary arrangements for the inspection(s) can be made.

1.11 COOPERATION WITHIN THIS CONTRACT:

A. All firms or persons authorized to perform any work under this Contract shall cooperate with Contractor and his Subcontractors or trades, and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.12 CLEANUP AND DISPOSAL OF EXCESS MATERIAL:

A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

END OF SECTION

SECTION 01063

MISCELLANEOUS REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall conform to all miscellaneous requirements as herein specified.

1.02 INTERFERENCE WITH EXISTING WORKS:

A. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Engineer, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations therefrom are expressly permitted. All work of connecting with, cutting into, and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time when the demands on the facilities best permit such interference, even though it may be necessary to work outside of normal working hours to meet these requirements. Before starting work which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

   The Contractor shall make such minor modifications in the work relating to existing structures as may be necessary, without additional compensation.

B. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to meet the above requirements.

C. The Contractor shall have no claim for additional compensation by reason of delay or inconvenience in adapting his operations to the need for continuous treatment of sewage at the existing plant.

1.03 MAINTAINING FLOWS:

A. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage. To this end, the Contractor shall at his own expense, provide, maintain, and operate all temporary facilities such as dams, pumping equipment, conduits, and all other labor and equipment necessary to intercept the sewage flow before it reaches the points where it would interfere with his work, carry it past his work, and return it to the existing sewer below his work.

B. The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work, and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

C. Minimum sewage flow occurs during the night hours and the Contractor may work on the existing system at such times if he so chooses.

1.04 BURIED UTILITY WARNING AND IDENTIFICATION TAPE:

A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WASTEWATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

1.05 PROTECTION AGAINST ELECTROLYSIS:

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals.

1. Shop Drawings.

2. Product Data.

3. Samples.

4. Mock Ups.

5. Construction Photographs.

6. Construction or Submittal Schedules.

7. Operations & Maintenance Data.

B. Detailed submittal requirements will be specified in the technical specifications section.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES:

C. Shop Drawings:

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to: custom-prepared data such as fabrication and erection/installation (working) drawings of concrete reinforcement, structural details and piping layout, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications as applicable to the work.

2. All shop and working drawings shall be prepared on standard size, 24-in. by 36-in. sheets, except those which are made by changing existing standard shop or working drawings.

3. All shop drawings shall be submitted using the transmittal form furnished by the Engineer.

4. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

5. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

6. All details on shop drawings submitted for approval shall show clearly the relation of the various parts of the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

7. Submittals for equipment specified under Divisions 11, 13, 14, 15, and 16 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

8. Submittals for equipment furnished under Divisions 11, 13, 14, 15, and 16 shall include maintenance and lubrication schedules for each piece of equipment. Schedules shall be similar to the following sample schedules:

SAMPLE MAINTENANCE SCHEDULE

ITEM	ACTION	FREQUENCY	REMARKS
Sedimentation Equipment	Check removal of scum washdown; if required, remove any debris, etc.	Daily	
	Dewater, examine structure, scrape and paint all exposed walls of structure.	6 mos.	Scrape and clean
	metals, examine scraping shoes.	Repair any damage to scraping shoes.	
	Sludge Collector Drive Unit	Remove shear pin, clean off rust, grease and replace.	6 mos
	Overflow Weir	Check Serviceability	Daily

SAMPLE LUBRICATION SCHEDULE

ITEM	MANUFACTURER'S RECOMMENDATIONS	TYPE LUBRICANT	FREQUENCY
Spur and Worm Gearing	Check oil level	See below; same as for oil change	Weekly
	Change oil	75-80 NSMP Gem oil (Winter) 80-90 NSMP Gem Oil (Summer)	6 mos
	Flush out drives before oil change	Kendall Flushing oil	Prior to oil change
Gear Motors*	Change oil	Kenoil 053 R&O (Winter) Kenoil 072 R&O (Summer)	2,000 hrs

*See manufacturer's instructional manual for initial operation instructions. (IMPORTANT).

D. Product Data:

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and printed installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances including certificates of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications and recommended spare-parts listing, and printed product warranties, as applicable to the Work.

E. Samples:

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.03 CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

B. Each shop drawing, sample, and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in. X 17-in. and smaller shall be bound together in an

orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Engineer a copy of each submittal transmittal form for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall make specific mention of the deviations in the Transmittal Form furnished by the Engineer and provide a description of the deviations in a letter attached to the submittal.

D. The review and approval of shop drawings, samples, or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will not have responsibility therefor.

E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

F. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1. Manufacturer’s printed installation instructions, a part of product data submitted to the Engineer, will not be reviewed and are for informational purposes only.

1.04 SUBMISSION REQUIREMENTS:

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. All submittals shall be submitted sufficiently in advance of construction requirements to provide no less than ten business days, for review from the time received at the Engineer’s reviewing office. For submittals of major equipment, that require more than ten days to review, due to its sheer complexity and amount of detail and also requiring review by more than one engineering discipline, a letter will be sent by the Project Manager or his/her designee to the Contractor informing him/her of the circumstances and the date it is expected the submittal will be returned to the Contractor.

C. Number of submittals required:

1. Shop Drawings and Product Data: Unless otherwise stated in the respective Specifications Sections, submit one (1) electronic file or three (3) paper copies. Prior to final pay request, the Contractor shall submit two (2) complete paper copies of each approved submittal.

2. Samples: Submit the number stated in the respective Specification Sections (minimum of two).

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

   a. Contractor

   b. Supplier

   c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in. X 3-in. blank space for Contractor and Engineer stamps.

E. Each shipment of drawings shall be accompanied by a transmittal form furnished by the Engineer giving a list of the drawing numbers and the names mentioned above, along with the project information.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES:

A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of shop drawings, data, and samples will be general. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the shop drawings, data, or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. One copy of shop drawings or product data will be returned to the Contractor via email or First Class United States Postal Service if paper copies are submitted. Samples will not be returned.

E. Submittals will be returned to the Contractor under one of the action codes indicated and defined on the transmittal form furnished by the Engineer.

F. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

G. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.06 DISTRIBUTION:

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer.

1.07 GENERAL PROCEDURES FOR SUBMITTALS:

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval resubmittal (if required), coordination with other submittals, inspection, testing (off-site and on-site), purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

1.08 OPERATING AND MAINTENANCE INSTRUCTIONS AND PARTS LISTS:

A. Where reference is made in the Detail Technical Specifications to operating and maintenance and spare parts lists, the Contractor shall furnish for each piece of equipment four complete sets giving the information listed below.

1. The manual for each piece of equipment shall be a separate document with the following specific requirements:

a. Contents:

(1) Table of contents and index

(2) Brief description of each system and components

(3) Starting and stopping procedures

(4) Special operating instructions

(5) Routine maintenance procedures

(6) Clean and concise manufacturer's printed operating and maintenance instructions, adjustment, lubrication and other maintenance of equipment including: parts list, illustrations, and diagrams

(7) One copy of each wiring diagram

(8) One copy of each approved shop drawing and each Contractor's coordination and layout drawing

(9) List of spare parts, manufacturer's price, and recommended quantity

(10) Name, address, and telephone numbers of local service representatives

b. Material:

(1) Loose leaf on 60 pound, punched paper

(2) Holes reinforced with plastic cloth or metal

(3) Page size, 8-1/2-in. by 11-in.

(4) Diagrams, illustrations, and attached foldouts as required of original quality, reproduced by dry copy method

(5) Covers: oil, moisture, and wear resistant 9 X 12 size

c. Submittals to the Engineer:

B. Such instructions and parts lists shall be completely and neatly annotated so that only the specific equipment and features furnished are clearly indicated. References to other sizes and types or models of similar equipment shall be deleted or neatly lined out.

C. Such instructions and parts lists shall be delivered to the Engineer at the same time that the equipment to which they pertain is delivered to the site. Each submittal shall be accompanied by a transmittal form identifying the information included. Each submittal shall be reviewed by the Engineer for compliance with the above requirements.

D. If a submittal is acceptable, all four copies will be retained by the Engineer. If deficiencies are found, one copy will be retained by the Engineer and three copies with the deficiencies, noted, will be returned to the Contractor. The copy retained by the Engineer shall not count toward the four complete acceptable sets required herein.

E. At the Engineer's discretion, he may retain all four copies and request only supplemental information from the Contractor.

1.09 CONTENTS, EACH VOLUME:

A. Table of Contents: Provide title of Project, names, addresses, and telephone numbers of Engineer, subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses and telephone number of Subcontractors and suppliers; including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. A list of all parts for the equipment with each part identified by a functional name, the part manufacturer's name and a unique part number, (normally the part manufacturer's alpha-numeric desig-nation). A list of parts keyed by non-unique item numbers to a sectional drawing will not be adequate to fulfill this requirement.

E. All components of each system, e.g., pump motor, coupling, and drive, shall be combined in a single submittal with the above data provided for each component.

F. Drawings: Supplement product data to illustrate relations of component parts, and data applicable to installation. Delete inapplicable information.

G. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's printed instructions specified.

H. Warranties and Bonds.

1.10 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. For each Item of Equipment and Each System provide the following:

1. Description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include certified performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

2. Panelboard Circuit Directories including electrical service characteristics, controls and communications, and color coded wiring diagrams as installed.

3. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences; regulation, control, stopping, shut-down, and emergency instructions; and summer, winter, and any special operating instructions.

4. Maintenance Requirements:

a. Route procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

b. Servicing and lubrication schedule, with list of lubricant type, frequency and method of lubrication. Any components which do not require lubrication or any expendable components which are not normally serviced shall be clearly noted as such.

c. Manufacturer's printed operation and maintenance instructions.

d. Sequence of operation by controls manufacturer.

e. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

f. Lubrication and maintenance schedules shall be similar to that specified in Section 01300.

5. Control diagrams by controls manufacturer as installed.

6. Contractor's coordination drawings, with color coded piping diagrams as installed.

7. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

8. List of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

9. Test and balancing reports as specified.

10. Additional Requirements: As specified in individual product specification section.

B. Provide a listing in Table of Contents for design data, if provided by Contractor, with tabbed fly sheet and space for insertion of data.

1.11 INSTRUCTION OF OWNER PERSONNEL:

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. Where specified in technical Specification Sections for specific equipment or systems, the Contractor shall have instructions video taped while they are being given to Owner's personnel. Video taping shall be performed by a person or organization experienced in the production of tapes and shall include the entire instruction session(s) and all questions and answers. Tapes shall become the property of the Owner.

B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operations and Maintenance Manual when need for such data becomes apparent during instruction.

D. Provide a completed and filled-out Equipment Manufacturer’s Certificate of Installation, Testing and Instruction form attached to the end of this section.

1.12 SERVICES OF MANUFACTURER'S REPRESENTATIVE:

A. The Contractor shall arrange for a qualified service representative from each company manufacturing or supplying the following equipment:

B. The Contractor shall arrange for the services of qualified service representatives from the company manufacturing or supply the Submersible Solids Handling Pumps.

C. After installation of the listed equipment has been completed and the equipment is presumably ready for operation, but before it is operated by others, the

representative shall inspect, operate, test, and adjust the equipment. The inspection shall include but shall not be limited to, the following points as applicable:

1. Soundness (without cracked or otherwise damaged parts).

2. Completeness in all details, as specified.

3. Correctness of setting, alignment, and relative arrangement of various parts.

4. Adequacy and correctness of packing, sealing, and lubricants.

D. The operation, testing, and adjustment shall be as required to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.

E. On completion of his work, the manufacturer's or supplier's representative shall submit in triplicate to the Engineer a complete signed report of the result of his inspection, operation, adjustments, and tests. The report shall include detailed descriptions of the points inspected, tests and adjustments made, quantitative results obtained if such are specified, and suggestions for precautions to be taken to ensure proper maintenance. The report also shall include a Certificate of Compliance stating that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void.

F. After the Engineer has reviewed the reports from the manufacturers' representatives, the Contractor shall make arrangements to have the manufacturers' representatives present when the field acceptance tests are made.

G. Refer and conform to the additional requirements specified in Section 01400.

1.13 NAMEPLATES:

A. With the exceptions mentioned below, each piece of equipment shall be provided with a substantial nameplate of non-corrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate.

B. This requirement shall not apply to standard, manually operated hydrants or to gate, globe, check, and plug valves.

C. Each process valve shall be provided with a substantial tag of non-corrodible metal securely fastened in place and inscribed with an identification number in

conformance with the Valve Identification Schedule indicated on the drawings or furnished later by the Engineer.

1.14 LUBRICANTS:

A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this contract.

1.15 SPECIAL TOOLS:

A. For each type of equipment furnished by him, the Contractor shall provide a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

B. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

C. Special tools shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such special tools until completion of the work, at which time they shall be delivered to the Owner.

D. As directed or permitted, the Contractor shall furnish and erect one or more neat and substantial steel wall cases with flat key locks and clips or hooks to hold each tool in a convenient arrangement.

1.16 CERTIFICATION FORMS:

A. If specifically specified in other Sections of these Specifications, the Contractor shall submit the applicable certification form for each item required, and in the form attached to this Section, completely filled in and stamped.

1.17 CERTIFICATES OF COMPLIANCE:

A. Certificates of Compliance specified in the specifications shall include and mean certificates, manufacturer's certificates, certifications, certified copies, letters of certification, and certificate of materials.

B. The Contractor shall be responsible for providing Certificates of Compliance requested and specified in the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in 6 copies unless otherwise specified. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Supplier, the project name and location, and

the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Supplier from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

END OF SECTION

CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section _____ for the (Name of Project) _____ The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance with limits of $1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Rock River Water Reclamation District or Owner's representative within seven (7) days following written request therefore by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Address	Address

CERTIFICATE OF UNIT RESPONSIBILITY
For Specification Section _____

_____
(Section title)

In accordance with Section 01300, paragraph 1.08 of the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section _____ and the requirements specified herein. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified and indicated performance and design requirements.

EQUIPMENT MANUFACTURER'S CERTIFICATE OF INSTALLATION, TESTING AND INSTRUCTION

Owner - _____
(fill in)

Project - _____
(fill in description)

Contract No. _____
(fill in)

M&E No. _____

EQUIPMENT SPECIFICATION SECTION_____

EQUIPMENT DESCRIPTION_____

I_____, Authorized representative of
(Print Name)

_____
(Print Manufacturer's Name)

hereby CERTIFY that _____
(Print equipment name and model with serial No.)

installed for the subject project (has) (have) been installed in a satisfactory manner, (has) (have) been satisfactorily tested, (is) (are) ready for operation, and that Owner assigned operating personnel have been suitably instructed in the operation, lubrication, and care of the unit(s) on

Date:_____ Time:_____

CERTIFIED BY:_____DATE:_____
_____
(Signature of Manufacturer's Representative)

OWNER'S ACKNOWLEDGMENT OF MANUFACTURER'S INSTRUCTION

(I) (We) the undersigned, authorized representatives of the _____ _____ and/or Plant Operating Personnel have received classroom and hands-on instruction on the operation, lubrication, and maintenance of the subject equipment and (am) (are) prepared to assume normal operational responsibility for the equipment:

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ _____
Notary Public Name of Corporation

_____ _____
Commission expiration date Address

Seal: By: _____
Duly Authorized Official

_____
Legal Title of Official

Date: _____

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This section covers Quality Assurance and Control requirements for this contract.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors and suppliers and for assuring that the quality specified in the Specifications is achieved.

C. Refer to the Article 6 - Contractor's Responsibilities of the General Conditions, including Supplementary Conditions.

1.02 TESTING LABORATORY SERVICES:

A. All tests which require the services of a laboratory to determine mix designs and verify initial compliance with the Contract Documents, shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all initial testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other initial tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. Quality Control Testing Services: RRWRD will perform all quality control tests in the field or in the laboratory on materials being placed into the work such as concrete, asphalt mixtures, moisture-density (Proctor) and gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and testing as necessary to determine that materials and equipment conform with data previously furnished by the Contractor and conform with the Contract Documents.

D. Delivery of samples and test specimens to the testing laboratory will be made by the testing agency. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.

E. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.

F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

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

H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory. Test reports shall be submitted to the Engineer's Representative, the Owner, and the Contractor within a reasonable time after each test is completed.

1.03 QUALITY ASSURANCE:

A. Codes and Standards: Refer to Article 3 - Contract Documents, Intent, Amending, Reuse, of the General Conditions.

B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer

C. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

D. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.04 OFFSITE INSPECTION:

A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.

B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

1.05 MATERIALS AND EQUIPMENT:

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than contract documents, Contractor shall advise Engineer of the disparity and conform to manufacturer's printed instructions. In either case, Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.06 SHOP AND FIELD TESTING:

A. The Contractor is also responsible for providing the shop and field testing specified in the technical specification sections.

B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty one days notice to the Engineer so that the Engineer may witness Contractor and/or Subcontractors off site and on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.07 MANUFACTURER'S FIELD SERVICES:

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer's of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

C. Refer to Section 01300 - Operations and Maintenance Data, for additional requirements.

1.08 CERTIFICATION FORMS AND CERTIFICATES:

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 QUALITY CONTROL:

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will be made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer to supersede or void that responsibility.

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. The Contractor shall provide all temporary facilities for the proper completion of the work, as required and as specified.

1.02 SANITARY REGULATIONS:

A. The Contractor shall provide adequate sanitary facilities for the use of those employed on the Work. Such facilities shall be made available when the first employees arrive on the site of the Work, shall be properly secluded from public observation, and shall be constructed and maintained during the progress of the Work in suitable numbers and at such points and in such manner as may be required.

B. The Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or on adjacent property.

1.03 WATER SUPPLY:

A. The Contractor shall make arrangements and pay for all water necessary for completion of construction operations under this contract.

1.04 TEMPORARY HEAT:

A. If temporary heat is required for the protection of the Work from freezing conditions, the Contractor shall provide and install suitable heating apparatus, shall provide adequate and proper fuel, and shall maintain heat as required. Temporary heat at Contractor's expense.

1.05 ELECTRICAL ENERGY:

A. The Contractor shall make all necessary arrangements with the Owner for 480 volt power and pay all fees and charges for electrical energy for power and light necessary for the proper completion of the Work, for Contractor's site trailer, and during project's entire progress. The Contractor shall provide and pay for all temporary transformers, wiring, switches, connections, and meters.

B. Convenience receptacles, 120 volt single phase power, are limited in availability in the area of this work and Contractor shall provide generators as necessary for their use.

C. The Contractor shall provide sufficient electric lighting so that all work may be done in a workmanlike manner when there is not sufficient daylight.

1.06 PRECAUTIONS DURING ADVERSE WEATHER:

A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.

B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or a dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.07 CONTRACTOR'S FIELD OFFICE:

A. The Contractor can maintain a temporary field office near the work for his own use during the period of construction. The office can be located in the area designated on the drawings and where it will not interfere with the progress of the work.

B. The Contractor shall provide office space and facilities for Contractor’s staff, site records, and to accommodate progress meetings. No RRWRD building space is available for the Contractor’s use.

C. Unless otherwise directed by the Engineer, after the date of completion of the Work, the Contractor shall remove the office and all such temporary facilities from the site, the same to become his property, and leave the premises in a condition acceptable to the Engineer.

END OF SECTION

SECTION 01600

CONTROL OF MATERIALS

PART 1 - GENERAL

1.01 APPROVAL OF MATERIALS:

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Owner.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.02 BOLTS, ANCHOR BOLTS, AND NUTS:

A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. All anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel, except where otherwise specifically indicated.

C. Where non-stainless steel hardware is indicated as acceptable, the hardware shall conform to the following as appropriate.

1. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.
2. Unless otherwise specified, stud, tap, and machine bolts, and nuts shall conform to the requirements of ASTM Standard Specification for Carbon Steel Externally and Internally Threaded Standard Fasteners, Designation A307. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to AN Standard B1.1 for Unified Inch Screw Threads (UN and UNR Thread Form).
3. Bolts, anchor bolts, nuts, and washers, specified to be galvanized, shall be zinc coated, after being threaded, by the hot-dip process in conformity with the ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, as is appropriate.

D. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 in. by 4 in. by 3/8 in. or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Contractor and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

1.03 GREASE FITTINGS:

A. Provide extension fittings and tubing on all grease fittings that are installed in an inaccessible location. The extension is to be located so that equipment can be lubricated from the operating level without the use of ladders, staging, or shutting down the equipment. Tubing for grease shall be Type 316 stainless steel.

1.04 CONCRETE INSERTS:

A. Concrete inserts for hangers shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the hangers used in the inserts. Inserts for hangers shall be of a type which will permit adjustment of the hangers both horizontally (in one plane) and vertically and locking of the hanger head or nut. All inserts shall be Type 316 stainless steel.

1.05 SLEEVES:

A. Unless otherwise indicated on the Drawings or specified, openings for the passage of pipes through floors and walls shall be formed of sleeves of standard-weight, galvanized-steel pipe. The sleeves shall be of ample diameter to pass the pipe and its insulation, if any, and to permit such expansion as may occur. Sleeves shall be of sufficient length to be flush at the walls and the bottom of slabs and to project 1 in. above the finished floor surface. Threaded nipples shall not be used as sleeves.

B. Sleeves in exterior walls below ground or in walls to have liquids on one or both sides shall have a 2-in. annular fin of 1/8-in. plate welded with a continuous weld completely around the sleeve at about mid-length. Sleeves shall be galvanized after the fins are attached.

C. All sleeves shall be set accurately before the concrete is placed or shall be built in accurately as the masonry is being built.

D. Pipes passing through sleeves below ground or in water containing structures shall be sealed using double link seals. Seal bolts shall be accessible from inside of the structure.

1.06 FOUNDATIONS, INSTALLATION AND GROUTING:

A. The Contractor shall furnish the necessary materials and construct suitable concrete foundations for all equipment installed by him, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. All such equipment shall be installed by skilled mechanics and in accordance with the instructions of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, the Contractor shall make an allowance of at least 1 in. for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable nonshrinking grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamfer around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if

necessary, given a burlap-rubbed finish, and painted with at least two coats of an acceptable paint.

1.07 EQUIPMENT DRIVE GUARDS:

A. All equipment driven by open shafts, belts, chains, or gears shall be provided with acceptable all-metal guards enclosing the drive mechanism. Guards shall be constructed of galvanized sheet steel or galvanized woven wire or expanded metal set in a frame of galvanized steel members. Guards shall be secured in position by steel braces or straps which will permit easy removal for servicing the equipment. The guards shall conform in all respects to all applicable safety codes and regulations.

END OF SECTION

SECTION 01610

DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 GENERAL:

A. This Section specifies the general requirements for the delivery, handling, storage, and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY:

A. Transport and handle items in accordance with manufacturer's instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. All deliveries shall be to the Contractor storage area. Contractor deliveries shall not be made to RRWRD’s receiving department.

D. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged, or sensitive to deterioration.

E. Deliver products to site in manufacturer's sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting, and installing.

F. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

G. Provide necessary equipment and personnel to unload all items delivered to the site.

H. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION:

A. Store and protect products in accordance with the manufacturer's instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and

reviewed with the engineer. Instruction shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.

C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping, or cracking. Brick, block, and similar masonry products shall be handled and stored in a manner to reduce breakage, cracking, and spalling.

D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

1. All equipment shall be stored fully lubricated with oil, grease, and other lubricants unless otherwise instructed by the manufacturer.

2. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

3. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.

4. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested, and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

END OF SECTION

SECTION 02050

DEMOLITION AND ALTERATIONS

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Demolish and alter existing facilities as indicated on drawings, as specified, and as directed by Engineer.

B. Remove, salvage, or otherwise dispose of minor site improvements as shown on the drawings.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading.

1.03 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS.

1. Submit to Engineer for review, a demolition plan describing proposed sequence, methods, and equipment for demolition and disposal of each structure.

1.04 QUALITY ASSURANCE:

A. Demolish and remove existing construction, utilities, equipment, and appurtenances without damaging integrity of existing structures, equipment, and appurtenances that are to remain.

B. Store equipment to be salvaged for relocation where directed by Engineer, and if necessary, protect from damage during work.

C. Repair or remove items that are damaged. Repair and install damaged items at no additional compensation and to condition at least equal to that which existed prior to start of work.

D. Exercise all necessary precautions for fire prevention. Make acceptable fire extinguishers available at all times in areas where demolition work by burning torches is being done. Do not burn demolition debris on or near site.

E. Protect persons and property throughout progress of work. Proceed in such manner as to minimize spread of dust and flying particles and to provide safe working conditions for personnel.

F. Maintain circulation of traffic within area at all times during demolition operations.

G. Obtain permission from Engineer before abandoning or removing any existing structures, materials, equipment, and appurtenances.

H. Make necessary arrangements with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.01 PROPERTY MARKER DEMOLITION:

A. Provide three reference points for each survey marker and monument removed, established by a licensed civil engineer or land surveyor and record locations and designations of survey markers and monuments prior to removal.

B. Store removed markers and monuments during demolition work, and replace upon completion of work. Re-establish survey markers and monuments in conformance with recorded reference points. Forward letter to Engineer signed by licensed civil engineer or land surveyor verifying re-establishment of survey markers and monuments.

3.02 DEMOLITION:

A. Confine apparatus, storage of materials, demolition work, new construction, and operations of workmen to areas that will not interfere with continued use and operation of entire facility. Provide and maintain lights, barriers, and temporary passageways for free and safe access.

B. Wet down work during demolition operations to prevent dust from arising. Provide maximum practicable protection from inclement weather for materials, equipment, and personnel located in partially dismantled structures. Provide shoring or bracing where necessary to prevent settlement or displacement of existing or new structures. Do not overload floors. Complete demolition work on upper levels before disturbing supporting members on lower levels. Prior to return to service, remove all demolition debris from existing wastewater process tanks that are to remain in service after this project.

C. Clean cellars and tanks of materials unsuitable for fill, where below-grade portions of structures are not indicated to be removed. Demolish foundation walls to a depth of not less than two-feet below existing ground level. Break cellar and tank floors into pieces

having area not more than four-square feet with well-defined cracks through full depth of floor. Provide holes having area at least one-square foot through floors at intervals of ten-feet lengthwise and crosswise.

D. Fill cellars and tanks with acceptable solid fill resulting from removal operations and/or with suitable borrow material to level of adjacent ground. Place and compact fill in accordance with applicable requirements of Section 02210. Do not place solid fill from removal operation above an elevation one-foot below final grade.

E. Cap or plug with brick and mortar, as indicated, pipes and other conduits abandoned due to demolition.

3.03 SALVAGE:

A. RRWRD has right of first refusal for all materials removed as a result of the project.

B. Materials, equipment, and appurtenances removed, that are not designated for relocation or desired by RRWRD, become property of Contractor. Haul from site and dispose of at no additional compensation.

C. Salvage the two pumps and motors. Place removed equipment on concrete pad west of the Aeration Building as directed, adjacent to other pumps.

END OF SECTION

SECTION 02160

TEMPORARY EXCAVATION SUPPORT SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Design, furnish, and install temporary excavation support systems as required to maintain lateral support, prevent loss of ground, limit soil movements to acceptable limits, and protect from damage existing and proposed improvements including, but not limited to, pipelines, utilities, structures, roadways, and other facilities.

B. The requirement of sheeting left in place in areas indicated on the drawings does not relieve the Contractor from the responsibility of furnishing and installing proper temporary excavation support systems in other areas.

C. Common types of excavation support system include, but are not limited to, singular or multiple stages comprised of cantilevered or internally braced soldier piles and lagging, steel sheet-pile wall, timber sheet-pile wall, trench box, or combinations thereof. Trench box temporary excavation support system is only acceptable for pipe or utility trench excavations. Temporary unsupported open cut excavation with stable sloping sides is allowed where applicable.

D. Wherever the word "sheeting" is used in this section or on the contract drawings, it shall be in reference to any type of excavation support system specified except trench box.

E. Construction of the temporary excavation support systems shall not disturb the existing structures or the completed proposed structures. Damage to such structures shall be repaired by the Contractor at no additional cost to the Owner.

F. The Contractor shall bear the entire cost and responsibility of correcting any failure, damages, subsidence, upheaval, or cave-ins as a result of improper installation, maintenance, or design of the temporary excavation support systems. The Contractor shall pay for all claims, costs, and damages that arise as a result of the work performed, at no additional cost to the Owner.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

C. Section 03300: Cast-in-Place Concrete

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM):

1. A36: Standard Specification for Structural Steel

2. A328: Standard Specification for Steel Sheet Piling

3. A416: Standard Specification for Strand Steel, Uncoated Seven-Wire for Prestressed Concrete

4. A722: Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete

5. A615: Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

B. American Wood-Preserves Association (AWPA) Standards.

C. American Welding Society (AWS) Code: D1.1.

D. Federal Standard, FS TT-W-571: Wood Preservation and Treating Practices.

E. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

F. American Concrete Institute (ACI)

1. ACI 304: Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.

1.04 SUBMITTALS:

A. Shop Drawing: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Submit the following qualifications four (4) weeks prior to the construction:

a. Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.05 D.

b. Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.05 E.

c. Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.05 F, if a tieback system is utilized.

d. Qualifications of Contractor's temporary excavation support system installation supervisor as specified in Paragraph 1.05 G.

2. Submit a temporary excavation support plan stamped and signed by a Registered Professional Engineer at least two weeks prior to start of the construction. Do not submit design calculations. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities, and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods, and sequencing of construction. The plan shall include the following items as a minimum:

a. Proposed temporary excavation support system(s), details, location, layout, depths, extent of different types of support relative to existing features, and the permanent structures to be constructed, and methods and sequence of installation and removal.

b. Certificate of Design: Refer to Section 01300.

c. If utilizing a tieback system, include tieback installation procedures and criteria for acceptance of tiebacks for performance and proof tests. Submit the tieback testing results to the Engineer for information only.

d. Requirements of dewatering during the construction.

e. Minimum lateral distance from the edge of the excavation support system for use for vehicles, construction equipment, and stockpiled construction and excavated materials.

f. List of equipment used for installing the excavation support systems.

g. A plan to monitor movements of the ground adjacent to excavation support systems and adjacent structures. The plan shall include, but

not be limited to locations, details, and monitoring schedule of geotechnical instruments such as survey markers (reference points on structures).

3. Submit a Construction Contingency Plan specifying the methods and procedures to maintain temporary excavation support system stability if the allowable movement of the adjacent ground and adjacent structures is exceeded.

4. For excavation support systems left in place, submit the following as-built information prior to backfilling and covering the excavation support systems:

   a. Survey locations of the temporary excavation support systems, including coordinates of the ends and points of change in direction.

   b. Type of temporary excavation support system.

   c. Elevations of top and bottom of the excavation support systems left in place.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Conform to the requirements of the OSHA Standards and Interpretations: "Part 1926 Subpart P - Excavation, Trenching, and Shoring", and all other applicable laws, regulations, rules, and codes.

C. All welding shall be performed in accordance with AWS D1.1.

D. Prepare design, including calculations and drawings, under the direction of a Professional Engineer registered in the state where the project is located and having the following qualifications:

1. Not less than ten (10) years experience in the design of specific temporary excavation support systems to be used.

2. Completed not less than five (5) successful temporary excavation support system projects of equal type, size, and complexity within the last five (5) years.

E. Temporary Excavation Support System Installer's Qualifications:

1. Not less than three (3) years experience in the installation of similar types and equal complexity as the proposed system.

2. Completed not less than three (3) successful excavation support systems of similar type and equal complexity as the proposed system.

F. If utilizing a tieback system, employ an independent testing laboratory to test the tieback system with the following qualifications:

1. Be accredited by the American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Employ personnel conducting testing who are trained in the methods and procedures to test and monitor tieback systems of similar type and equal complexity, as the proposed system.

3. Have not less than five (5) years experience in testing of tieback systems of similar type and equal complexity as the proposed system.

4. Have successfully tested at least three (3) tieback systems of similar type and equal complexity as the proposed system.

G. Install all temporary excavation support systems under the supervision of a supervisor having the following qualifications:

1. Not less than five (5) years experience in installation of systems of similar type and equal complexity as the proposed system.

2. Completed at least five (5) successful temporary excavation support systems of similar type and equal complexity as the proposed system.

1.06 DESIGN CRITERIA:

A. Design of temporary excavation support systems shall meet the following minimum requirements:

1. Support systems shall be designed for earth pressures, hydrostatic pressure, equipment, temporary stockpiles, construction loads, and other surcharge loads.

2. Design a bracing system to provide sufficient reaction to maintain stability.

3. Limit movement of ground adjacent to the excavation support system to be within the allowable ground deformation as specified.

4. Design the embedment depth below bottom of excavation to minimize lateral and vertical earth movements and provide bottom stability. Toe of braced temporary excavation support systems shall not be less than 5 feet [1.5 m] below the bottom of the excavation.

5. Design temporary excavation support systems to withstand an additional 2 feet [60 cm] of excavation below proposed bottom of excavation without redesign except for the addition of lagging and/or bracing.

6. Maximum width of pipe trench excavation shall be as indicated on the drawings.

7. Do not cast permanent structure walls directly against excavation support walls.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Sections 01610 and as specified.

B. Store sheeting and bracing materials to prevent sagging which would produce permanent deformation. Keep concentrated loads which occur during stacking or lifting below the level which would produce permanent deformation of the material.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Structural Steel: All soldier piles, wales, rakers, struts, wedges, plates, waterstop, and accessory steel shapes shall conform to ASTM A36.

B. Steel Sheet Piling: ASTM A328, continuous interlocking type.

C. Timber Lagging Left in Place: Pressured treated per appropriate AWPA standards.

D. Tieback Tendons: Tieback tendons shall be high strength steel wire strand cables conforming to ASTM A416, or bars conforming to ASTM A722. Splicing of individual cables shall not be permitted.

E. Raker Ties: ASTM A615 Grade 60.

F. Cement Grout Materials And Admixtures For Tieback Anchorages: Grout cube strength shall be a minimum 3500 psi at 7 days and 5000 psi at 28 days.

G. Concrete: Section 03300.

H. Tamping tools adapted for backfilling voids after removal of the excavation support system.

I. Provide specific trench box sizes for each pipe and utility excavation with structural capacity of retaining soil types as described in OSHA's 29 CFR Part 1926 Subpart P.

2.02 EQUIPMENT:

A. A vibratory hammer shall be utilized for driving the temporary sheet piling.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Installation of the temporary excavation support systems shall not commence until the related earth excavation and dewatering submittals have been reviewed by the Engineer with all Engineer's comments satisfactorily addressed.

B. Install excavation support systems in accordance with the temporary excavation support plan.

C. If utilizing a tieback system, all performance and proof tests shall be conducted in the presence of the Engineer. Testing performed without the Engineer present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.

D. Do not drive sheeting within 100 feet of concrete less than seven (7) days old.

E. Carry out program of temporary excavation support in such a manner as to prevent undermining or disturbing foundations of existing structures, of work ongoing, or of work previously completed.

F. Bottom of the trench box excavation support system shall be above the pipe invert prior to installing the pipe.

G. Install and read geotechnical instrumentation in accordance with the temporary excavation support plan. Notify the Engineer immediately if any geotechnical instrumentation is damaged. Repair or replace damaged geotechnical instrumentation at the sole option of the Engineer and at no additional cost to the Owner.

H. Continuously monitor movements of the ground adjacent to excavation support systems and adjacent structures. In events of the measured movements approaching or exceeding the allowable movements, take immediate steps to arrest further movement by revising procedures such as providing supplementary bracing, filling voids behind the trench box, supporting utilities, or other measures (Construction Contingency Plan) as required.

I. Notify utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owner's permission or have the utility owner make the modifications at no additional cost to Owner.

3.02 GROUND DEFORMATION ADJACENT TO EXCAVATION SUPPORT SYSTEMS:

A. Allowable Vertical (heave/settlement) and Lateral Movements: 2 inches maximum for the trench box excavation support system and 1 inch maximum for other types of excavation support systems, at any location behind the excavation support system.

B. Monitoring personnel shall use a procedure for reading and recording geotechnical instrumentation data which compares the current reading to the last reading during data collection to eliminate spurious readings.

C. Plot the observed ground deformation readings versus time. Annotate the plots with construction loading and excavation events having an impact on the readings. Evaluate plots by means of secondary rate-of-change plots to provide early warning of accelerating ground movements.

D. Notify the Engineer when the allowable ground deformation is exceeded.

E. Implement Construction Contingency Plan under direction of the temporary excavation support system designer and the Engineer.

3.03 REMOVAL OF EARTH RETENTION SYSTEM:

A. Sheeting shall be left in place unless otherwise indicated or approved in writing by the Engineer.

B. When indicated or approved by the Engineer, remove the temporary excavation support system without endangering the constructed or adjacent structures, utilities, or property. Immediately backfill all voids left or caused by withdrawal of temporary excavation support systems with bank-run gravel, screened gravel, or select borrow by tamping with tools specifically adapted for that purpose.

C. When tiebacks are used, release tension in tiebacks as the excavation is backfilled. Do not leave tensioned tieback in place at the completion of the work.

D. The excavation support system left-in-place shall be cut-off a minimum of 2 feet below the bottom of the next higher foundation level or a minimum of 5 feet below finished grade.

E. Conduct survey of the locations and final cut-off elevations of the excavation support systems left in place.

END OF SECTION

SECTION 02210

EARTH EXCAVATION, BACKFILL, FILL, AND GRADING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Perform the following earth excavation, backfill, fill, and grading as indicated or specified:

B. Make excavations to accommodate piping, conduits, foundations, and other structures.

C. Provide materials for backfilling excavations and constructing embankments and fills as indicated and specified.

D. Construct embankments of compacted materials.

E. Grade surfaces to meet finished grades indicated.

F. Immediately notify the Engineer if suspected hazardous materials are encountered and cease operations in that part of work.

G. Remove boulders within the excavation limits.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02160: Temporary Excavation Support Systems

C. Section 02223: Screened Gravel

D. Section 02224: Bank-run Gravel

E. Section 02225: Select Borrow

F. Section 02435: Crushed Stone

G. Section 03300: Cast-in-Place Concrete

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates.

2. C136: Sieve Analysis of Fine and Coarse Aggregates.

3. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.

4. D422: Test Method for Particle-Size Analysis of Soils.

5. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 Sieve.

6. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

7. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3).

8. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.

9. D2922: Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).

10. D3017: Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

11. D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

12. D4718: Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.

13. D4944: Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Pressure Tester Method.

14. D4959: Test Method for Field Determination of Water (Moisture) Content of Soil by Direct Heating Method.

15. D5080: Test Method for Rapid Determination of Percent Compaction.

B. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

1.04 DEFINITIONS:

A. Percentage of compaction is defined as the ratio of the field dry density, as determined by ASTM D1556 to the maximum dry density determined by ASTM D1557 Procedure C, multiplied by 100.

B. Proof Roll: Compaction with a minimum of 4 passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller can not be used.

C. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.

D. Unacceptable Materials: Materials do not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.

1.05 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Qualifications of the Contractor's Independent Testing Laboratory four (4) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

2. Submit an excavation, backfilling, and filling plan at least two weeks prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities, and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods, and sequencing of construction. The plan shall include, but not be limited to, the following items:

a. Detailed sequence of work.

b. General description of construction methods.

c. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

d. Details of dust control measures.

e. Proposed locations of stockpiled excavation and/or backfill materials.

f. Proposed surplus excavated material off-site disposal areas and required permits.

g. Details of erosion and sedimentation control measures which will prevent erosion and sedimentation during the earth moving activities.

3. The following material submittals shall be submitted to the Engineer prior to backfilling and filling:

a. Screened Gravel: As specified in Section 02223.

b. Bank-run Gravel: As specified in Section 02224.

c. Select Borrow: As specified in Section 02225.

d. Crushed Stone: As specified in Section 02435.

e. Other Acceptable Materials: Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.

4. During Construction, submit written confirmation of fill lift thickness, in-place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

1.06 QUALITY ASSURANCE AND CONTROL:

A. Provide in accordance with Section 01400 and as specified.

B. Excavations shall be performed in the dry, and kept free from water, snow, and ice during construction. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material.

C. Temporary Excavation Support Systems: Provide and maintain as specified in Section 02160.

D. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Do not excavate, construct embankments, or fill until all the required submittals have been reviewed by the Engineer.

F. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines, embankments, or existing structures and pipelines.

G. Employ an independent testing laboratory to perform particle size and gradation analyses in accordance with ASTM D422, and to determine compactibility in accordance with ASTM D1557 for all the proposed backfill and fill materials, and monitoring field compaction operations. The independent testing laboratory shall have the following qualifications:

1. Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Have three (3) years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations.

3. Able to provide three (3) references from previous work.

H. Field Testing and Inspections:

1. By Owners testing laboratory as specified.

2. Location of tests mutually acceptable to testing laboratory and the Engineer or as directed by the Engineer.

3. In the event compacted material does not meet specified in-place density, re-compact material and retest this area until specified results are obtained at no additional to the Owner.

4. Testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.

I. Methods of Field Testing:

1. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922.

2. In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959.

J. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading, and embankment.

1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per:

a. Trenches under structures foundation preparation or roadways subbase: Every 1,000 lin. ft. per lift

b. Trenches in areas without structures or roadways: Every 1000 lin. ft. per alternate lift.

c. Paved Roadways: Every 200 lin. ft. per lift.

d. Paved Areas: 3,500 sq. ft. per lift.

e. Under Structure: 1,000 sq. ft. per lift.

f. Around Structures: 1,500 sq. ft. per lift.

g. Embankment Fills: 10,000 sq. ft. per lift.

2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 5,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.

3. Gradation Analysis - A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.

4. Liquid Limit, Plastic Limit and Plasticity Index - Minimum of one test per 5,000 cubic yard of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

K. Construction Tolerances:

1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.

2. Grade cut and fill areas to plus or minus 0.20 foot of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

L. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.

M. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed.

N. Dig test pits considered as incidental to the normal excavation as required to perform the work and as indicated and specified in this Section, at no additional compensation.

O. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefor, to at least as good condition as that in which they were found immediately before the work was begun.

P. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.

Q. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.

R. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

S. Restore existing property or structures as promptly as practicable.

T. If material unacceptable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, remove such material to the required width and depth as directed by the Engineer and replace it with screened gravel, select borrow, or concrete.

U. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

V. Haul away and dispose of surplus excavated materials at locations directed by the Engineer at no additional cost to the Owner.

W. During progress of work, conduct earth moving operations and maintain work site so as to minimize the creation and dispersion of dust. Furnish and spread calcium chloride if the Engineer decides that it is necessary for more effective dust control.

X. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Use only acceptable materials from excavations or borrows.

B. Provide 1,500 psi controlled low strength mix (CLSM) concrete, screened gravel, bank-run gravel, fine aggregate, select borrow, and crushed stone.

C. Provide Fine Aggregate conforming to ASTM C33.

D. Provide erosion/sedimentation control devices as indicated, including geotextile fabric.

2.02 EQUIPMENT:

A. The compaction equipment shall be selected by the Contractor, and shall be capable of consistently achieving the specified compaction requirements. The selected compaction equipment shall meet the following minimum requirements:

1. Manually operated vibratory plate compactors weighing no less than 200 pounds with vibration frequency no less than 1600 cycles per minute.

2. Vibratory steel drum or rubber tire roller weighing at least 12,000 pounds.

PART 3 - EXECUTION

3.01 SITE MAINTENANCE:

A. Roadway and Site Leveling: Grade roadway and site as to maintain them in a level unrutted condition and to eliminate puddling of surface and subsurface water.

3.02 EXCAVATION:

A. Execution of any earth excavation shall not commence until the related dewatering, excavation support systems, and backfill and fill materials submittals are reviewed by the Engineer and all Engineer's comments satisfactorily addressed.

B. Carry out program of excavation, dewatering, and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or of work previously completed under this contract.

C. Excavate to widths that give suitable room for building structures or laying and jointing piping.

D. Do not plow, scrape, or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.

E. Excavate to lines and grades indicated in an orderly and continuous program.

F. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.

G. Excavate to elevations indicated, or deeper, as directed by the Engineer, to remove unacceptable bottom material.

H. Exercise care to preserve material below and beyond the lines of excavations.

I. Place excavated material at the approved stockpile locations and in no case closer than 3 feet from edge of excavations to prevent cave-ins of bank sides.

J. Regard small, less than one-half (0.5) cubic yard, boulders, rock fragments, and concrete encountered during excavation as a normal part of in-place soils and not included for payment as rock.

K. Excavate for depressed foundations, where mat foundations are indicated as depressed. Sheet and shore existing ground so that adjacent sections of foundation mat will rest on undisturbed ground as indicated. Installation of sheeting shall be in accordance with Section 02160.

3.03 SEPARATION OF EXCAVATED MATERIALS FOR REUSE:

A. Remove existing pavement only as necessary for prosecution of work.

B. Carefully remove loam and topsoil from excavated areas. Store separately for further use or furnish equivalent loam and topsoil as directed.

C. Carefully remove acceptable material from excavated areas and store separately for further use as backfill material.

3.04 TRENCH EXCAVATION:

A. When pipe is to be laid in gravel bedding or concrete cradle, excavate trench by machinery to, or just below designated subgrade. If material remaining at bottom of trench is disturbed, re-compaction shall be required.

B. When pipe is to be laid directly on bottom of trench, do not excavate lower part of trenches by machinery to subgrade. Remove remainder of material to be excavated just before placing of pipe by use of hand tools. Form a flat or shaped bottom, true to grade, so pipe will have a uniform and continuous bearing. Support on firm and undisturbed material between joints, except for limited areas where use of pipe slings have disturbed bottom.

3.05 DEPTH OF TRENCH:

A. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations.

3.06 WIDTH OF TRENCH:

A. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

B. Excavate trenches with approximately vertical sides between springline of pipe and elevation 1 ft. above top of pipe.

3.07 TRENCH EXCAVATION IN FILL:

A. Place and compact material to top of fill or to a minimum height of 1 ft. above top of pipe, whichever is less, when pipe is to be laid in embankment or other recently filled material. Take particular care to ensure maximum consolidation of material under pipe location. Excavate pipe trench as though in undisturbed material.

3.08 EXCAVATION NEAR EXISTING STRUCTURES:

A. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.

B. Excavate test pits when determination of exact location of pipe or other underground structure is necessary for doing work properly.

3.09 REMOVAL OF SUBSURFACE OBSTRUCTIONS:

A. Remove indicated subsurface structures and related obstructions to extent shown.

B. Promptly notify the Engineer when any unexpected subsurface facilities are encountered during excavation such as utility lines and appurtenances, walls, and foundations.

3.10 UNAUTHORIZED EXCAVATION:

A. When the bottom of any excavation for structures is taken out beyond limits indicated or specified, backfill with screened gravel and crushed stone wrapped with non-woven geotextile fabric or with 1,500 psi CLSM concrete.

3.11 REUSE AND DISPOSAL OF SURPLUS EXCAVATED MATERIALS:

A. Reuse surplus acceptable excavated materials for backfill; deposit neatly and grade so as to make or widen fills, flatten side slopes, or fill depressions; or legally dispose off-site; all as directed or permitted and without additional compensation.

3.12 SUBGRADE PREPARATION AND PROTECTION:

A. Remove loam and topsoil, loose vegetable matter, stumps, and large roots from areas upon which embankments will be built or material will be placed for grading. Shape subgrade as indicated on drawings, and prepare by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.

B. As directed by the Engineer, over-excavate unacceptable materials below the foundation subgrade. Backfill the over-excavation with compacted screened gravel or crushed stone wrapped with non-woven geotextile fabric. In no case shall the screened gravel be placed directly on the exposed subgrade prior to placing the geotextile fabric.

C. Proof roll the foundation subgrade prior to backfilling and filling operation, or placing foundation concrete.

D. Proof roll the pipe trench foundation subgrade prior to backfilling and filling operation, or placing soil-supported pipeline.

E. Utilize excavating equipment equipped with a toothless or smooth edged, excavating bucket to expose the pipe trench foundation subgrade to avoid disturbance of the bearing surface. Tamp the exposed subgrade with the excavating bucket prior to backfilling and filling operation, or placing soil-supported pipeline.

3.13 CARE AND RESTORATION OF PROPERTY:

A. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

B. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.

C. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to effect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

D. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.

E. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

3.14 BACKFILLING - GENERAL:

A. Do not place frozen materials in backfill or place backfill upon frozen material. Remove previously frozen material or treat before new backfill is placed.

B. Do not place, spread, roll, or compact fill material during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.

C. Do not use puddling, ponding, or flooding as a means of compaction.

3.15 MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS:

A. Select Borrow, and Fine Aggregate:

1. Dump and spread in layers not to exceed 8-inches uncompacted thickness.

2. Compact, fill, and backfill under structure and bedding for pipes (from below pipe to spring line) to not less than 95 percent modified Proctor. Compact to not less than 90 percent in other areas unless otherwise indicated.

B. Screened Gravel and Crushed Stone:

1. Dump and spread in layers not to exceed 8-inches uncompacted thickness.

2. Compact using self propelled vibratory steel drum or rubber tire rollers with a minimum of 4 passes in directions perpendicular to one another in open areas. In small areas, use manually operated vibratory plate compactors with a minimum of 4 passes.

C. Bank-run Gravel and Acceptable materials for use as non-structural fill:

1. Dump and spread in layers not to exceed 12-inches uncompacted thickness.

2. Compact to not less than 90 percent modified Proctor unless otherwise indicated.

D. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

3.16 STRUCTURAL FILL AND BACKFILL UNDER STRUCTURES:

A. Compact fill and backfill under structures and pavements with screened gravel, crushed stone, select borrow, or fine aggregate as specified and indicated.

3.17 NON-STRUCTURAL BACKFILL AROUND STRUCTURES:

A. Use acceptable materials for non-structural backfill around structures and compacted as specified and indicated.

B. Conduct hydraulic testing as soon as practicable after structures are constructed and other necessary work has been done. Start backfilling promptly after completion of tests.

C. Deposit material evenly around structure to avoid unequal soil pressure.

D. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage.

3.18 BACKFILLING PIPE TRENCHES:

A. General:

1. Begin backfilling and proceed until completed after: the pipes and conduits have been laid, joints have acquired maximum degree of hardness, pipelines and conduits have successfully passed tests and inspections as required in the Specifications, and concrete or masonry structures within the trench have reached their design strength to support all loads.

2. Backfill and compact indicated material under, around, and above pipes, conduits, and other structures to the indicated or specified compaction density requirement. Utilize compaction devices which will not damage the pipe, conduit, or structure within the trench.

3. Do not drop backfill material into trench from a height of more than 5 ft. or in a manner which will damage the pipe, conduit, or other structure within trench.

B. Pipe Trenches:

1. Materials:

a. From below pipe to 1 ft. above spring line: Use screened gravel or crushed stone as indicated.

b. One foot above pipe to finished grade or to pavement subbase: Use bank-run gravel or acceptable materials, unless otherwise indicated.

2. Compacting Around Pipes: Compact material around circumference of pipe and the area between the trench wall and the pipe by hand tamping in 6 inch layers.

3. Compacting Above Pipe: Compact material by hand tamping. If trench width is wide enough to accommodate power tools and the compacted material over the pipe will support the load of the power tools without damage to the pipe, use rollers or other powered compaction equipment able to more readily achieve compaction requirements.

3.19 MATERIAL FOR FILLING AND EMBANKMENTS:

A. Use acceptable materials for filling and building embankments.

3.20 PLACING AND COMPACTING EMBANKMENT MATERIAL:

A. Compact fill material as specified and indicated.

B. Perform fill operation in an orderly and systematic manner using equipment in proper sequence to meet the specified compaction requirements.

C. Place fill on surfaces which are free of unacceptable materials.

D. Begin filling in lowest section of work area. Grade surface of fill approximately horizontal but provide with sufficient longitudinal and transverse slope to allow for runoff of surface water from every point.

E. Conduct filling so that no obstruction to drainage from other sections of fill area is created at any time.

F. Install temporary dewatering sumps in low areas during filling operation where excessive amounts of rain runoff collect.

G. Reduce moisture content of fill material, if necessary, in source area by working it over under warm and dry atmospheric conditions. A large disc harrow with two to three foot diameter disks may be required for working soil in a drying operation.

H. Compact uniformly throughout. Keep surfaces of fill reasonably smooth and free from humps and hollows which would prevent proper and uniform compaction. Do not permit hauling equipment to follow a single track on the same layer but direct equipment to spread out to prevent over-compaction in localized areas. Take care in obtaining thorough compaction at edges of fill.

I. Slightly slope surface of fill to ensure drainage during periods of wet weather. Do not place fill while rain is falling or after a rain-storm until the Engineer considers conditions satisfactory. During such periods and upon suspension of filling operations for any period in excess of 12 hours, roll smooth the surface of fill using a smooth wheel static roller to prevent excessive absorption of rainfall and surface moisture. Prior to resuming compaction operations, remove muddy material off surface to expose firm, compacted material, as determined by the Engineer.

J. When fill is placed against an earlier fill or against in-situ material under and around structures, including around piping beneath structures or embankments, slope junction between two sections of fill, 1 vertical to 1.5 horizontal. Bench edge of existing fill 24-inches to form a serrated edge of compact stable material against which to place the new fill. Ensure that rolling extends over junction between fills.

K. When fill is placed directly upon another older fill, clean surface thoroughly of debris and remove any loose material. Then proof-roll the entire old surface.

L. After spreading each loose lift to the required thickness and adjusting its moisture content as necessary, roll with sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of

sufficient overlap will insure complete coverage and uniform compaction of an entire lift. Do not make additional passes until previous pass has been completed.

M. In case material of any fill sinks and weaves under roller or under hauling units and other equipment, required degree of compaction is not being obtained. Reduce the moisture content. If such sinking and weaving produces surface cracks, suspend operations on that part of the embankment until it becomes sufficiently stabilized. Ideal condition in fill is that attained when the entire fill below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as roller passes. Spread out rolling operations over maximum practicable area to minimize condition of sinking and weaving.

N. If due to defective workmanship, compaction obtained over any area is less than that required, remedy condition at no cost to Owner. If additional rolling or other means fail to produce satisfactory results, remove material in that area down to area of satisfactory density. Perform removal, replacement, and re-rolling without additional compensation.

3.21 COMPACTION CONTROL OF BACKFILL, FILL, AND EMBANKMENT:

A. Compact to density specified and indicated for various types of material. Control moisture content of material being placed as specified or if not specified, at a level slightly lower than optimum.

B. The soil testing laboratory shall provide inspection during filling or backfilling operations to ensure compaction of screened gravel or crushed stone.

C. Moisture control may be required either at the stockpile area, pits, or on embankment or backfill. Increase moisture content when material is too dry by sprinkling or other means of wetting uniformly. Reduce moisture content when material is too wet by using ditches, pumps, drainage wells, or other devices and by exposing the greatest possible area to sun and air in conjunction with harrowing, plowing, spreading of material, or any other effective methods.

3.22 ALLOWANCE FOR SHRINKAGE:

A. Build embankments or backfill to a height above finished grade which will, in the opinion of the Engineer, allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

B. Supply specified materials and build up low places as directed, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

END OF SECTION

SECTION 02223

SCREENED GRAVEL

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact screened gravel as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D422: Test Method for Particle-Size Analysis of Soils.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Gradation test result from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D422.

D. Material testing frequency and requirements as specified in Section 02210.

PART 2 – PRODUCTS

2.01 MATERIAL:

A. Screened gravel: Gradation and physical property requirements of screened gravel shall conform to ASTM C33, Coarse Aggregate number 67.

B. Screened gravel shall be free from roots, leaves, and other organic materials, and free of ice, snow, frost, and frozen soil particles.

C. Crushed rock of equivalent size and grading may be used instead of screened gravel.

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

END OF SECTION

SECTION 02224

BANK-RUN GRAVEL

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact bank-run gravel as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. D422: Test Method for Particle-Size Analysis of Soils.

2. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 Sieve.

3. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Gradation and compaction test results from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D422. Soil compaction test shall be performed in accordance with ASTM D1557 Procedure C.

D. Material testing frequency and requirements as specified in Section 02210.

PART 2 – PRODUCTS

2.01 MATERIAL:

A. Bank-run gravel shall be obtained from approved natural deposits and unprocessed except for the removal of deleterious materials and stones larger than the maximum size permitted.

B. Bank-run gravel shall be unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles, and other fine or harmful substances.

C. Bank-run gravel: Inorganic granular material meeting the following gradation:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
6 in.	100
2 in.	80 - 100
No. 4	20 - 65
No. 200	0 – 12

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and where indicated on the drawings.

END OF SECTION

SECTION 02225

SELECT BORROW

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Provide and compact select borrow as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D422: Test Method for Particle-Size Analysis of Soils.

3. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 Sieve.

4. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3).

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Gradation and compaction test results from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D422. Soil compaction test shall be performed in accordance with ASTM D1557 Procedure C.

D. Material testing frequency and requirements as specified in Section 02210.

PART 2 - PRODUCT

2.01 MATERIAL:

A. Use only material free from roots, leaves, and organic matter, and free of ice, snow, frost, and frozen soil particles.

B. Select borrow shall meet the following gradation:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
3 in.	100
1-1/2 in.	70 - 100
3/4 in.	50 - 85
No. 4	30 - 50
No. 50	10 - 25
No. 200	0 - 5

C. Soil particles shall conform to the physical property requirements of ASTM C33.

PART 3 – EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

END OF SECTION

SECTION 02435

CRUSHED STONE

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide and compact crushed stone as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM) Publications:

1. C33: Specification for Concrete Aggregates

2. D422: Test Method for Particle-Size Analysis of Soils.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Gradation test result from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.

2. Submit a 20-lb. sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified.

B. Qualifications of the independent soil testing laboratory as specified in Section 02210.

C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D422.

D. Material testing frequency and requirements as specified in Section 02210.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. Crushed Stone: Gradation and physical property requirements of screened gravel shall conform to ASTM C33, Coarse Aggregate number 67.

B. Crushed stone shall be free from roots, leaves, and other organic materials, and free of ice, snow, frost, and frozen soil particles.

PART 3 - EXECUTION

3.01 PLACEMENT AND COMPACTION:

A. Specified in Section 02210 and as indicated on the drawings.

END OF SECTION

SECTION 02480

LANDSCAPING

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide loaming, fertilizing, seeding, planting, and related work as indicated and specified.

1.02 REFERENCE STANDARD:

A. American Standard for Nursery Stock.

1.03 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Certify, invoice, or order plants and seed for each shipment grown within 300 miles of Winnebago County Illinois, free of disease and insect pests. Submit certificates to Engineer.

2. Prior to placement of any mulch, deposit, at a location on site suitable to Engineer, 1/2 cu. yd. sample of mulch for examination. After mulch sample is reviewed by the Engineer, provide mulch conforming to accepted sample.

3. Submit to Engineer a sample of proposed soil separator mat and manufacturer's specification for mat.

4. Submit with seed, certificates concerning seed mixture, purity, germinating value, and crop year identification.

5. Submit test samples of loam to a certified soils consultant to determine fertilizer and lime requirements and return two copies of results for implementation.

6. Submit list of plant material to be used and source.

7. Prior to end of maintenance period, furnish two copies of written maintenance, instructions for maintenance and care of installed plants and lawn areas.

1.04 QUALITY ASSURANCE:

A. Ability to Deliver:

1. Investigate sources of supply and make assurances that plants will be supplied as indicated in Schedule of Plant Material in sizes, variety and quality noted and specified before submitting bid.

2. Failure to take this precaution will not relieve responsibility for furnishing and installing plant material in accordance with Contract requirements and without additional expense to OWNER.

B. Inspection:

1. Upon delivery and before planting, Engineer will inspect plants.

2. Inspection and approval by Engineer of plants is for quality, size and variety only and in no way impairs the right of rejection for failure to meet other requirements during progress of work.

C. General:

1. Provide only nursery grown plants having been transplanted at least once and growing in a nursery for at least two years.

2. Allow Engineer to determine fitness of any plant.

3. Provide container grown stock in containers long enough for root system to develop sufficiently to hold soil together firm and whole when removed from container. Use no plants loose in the container.

4. Check plant material prior to commencing of planting operations. Plant no material prior to inspection by Engineer. Notify Engineer at least 48 hours in advance of all planned planting operations and identify specific material and its location.

5. Furnish suitable quantities of water, hose and appurtenances.

6. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.

7. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.

8. Repair or replace seeded areas, plants, shrubs, and trees which, in judgment of Engineer, have not survived and grown in a satisfactory manner, for a period of one year after acceptance.

9. Provide as specified seedings or plantings replacements of the same type and size as specified.

10. Dry loam test samples to constant weight at temperature of 230 deg. F, plus or minus 9 degrees.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610.

B. Preparation for Delivery:

1. Balled and Burlapped (B & B) Plants:

a. Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development of plant.

b. B & B Plants: Originate from soil which will hold a good ball and be wrapped with burlap or similar approved material, bound with twine or cord in such manner as to hold balls firm and intact.

c. Ball Sizes: Not less than standard established by the American Association of Nurserymen for B & B stock.

C. Delivery:

1. Deliver fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law.

2. Delivery plants with legible identification labels:

a. Label trees, evergreens, shrubs, and ground cover with waterproof labels which will remain legible for at least 60-days.

b. Label with correct plant name and size as indicated in Plant List.

3. Protect plants during delivery to prevent damage to roots or desiccation of leaves.

4. Notify Engineer of delivery schedule in advance so plant material may be inspected at jobsite.

D. Storage:

1. Store plants in ground or other acceptable media if not to be planted within 4-hrs.

2. Protect roots of plant material from drying or other possible injury.

3. Water plants as necessary until planted.

E. Handling:

1. Do not drop plants.

2. Do not pick up container or B & B plants by stem or trunks.

1.06 JOB CONDITIONS:

A. It is the intent of this specification that existing trees within grading and seeding limits, not disturbed by building operations, be saved and protected, except where specified to be removed. Clear trees required to be removed only after approval by Engineer. Engineer directs variations required in grading on the job.

B. Planting Seasons:

1. Recommended Spring Planting Season: From time soil can be satisfactorily worked until following dates at end of planting season:

a. Evergreens - May 1.

b. Trees and Shrubs - May 15.

c. Lawns - May 15.

2. Recommended Fall Planting Season: Commence and terminate at time listed below:

a. Evergreens - August 20 to September 30.

b. Trees and Shrubs - From dormancy to November 30.

c. Lawns - August 1 to October 1.

C. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.

D. Protection:

1. Protect seeded and planted areas against damage by trespass and other causes.

2. Protect work until accepted.

3. Replace, repair, restake, or replant as directed by Engineer, and at own expense, seeding or planting which is damaged.

4. If planting is done after lawn preparation, protect lawn areas, repair damage resulting from planting operations.

E. Wherever landscape work must be executed in conjunction with construction of other work, arrange a schedule of procedure that will permit execution of landscape work as specified.

1.07 WARRANTY:

A. Provide in accordance with the Contract Documents.

B. Guarantee new plant material through one full growing season after plants are installed.

1. Guarantee plants replaced under this for one full growing season from date of replacement.

2. Repair damage to plants or lawns during plant replacement.

C. Guarantee lawn areas for duration of one full year after seeding to be alive and in satisfactory growth at end of guarantee period.

1. For purpose of establishing an acceptable standard, scattered bare spots, none of which is larger than 1 sq. ft. will be allowed up to a maximum of 3% of lawn area.

PART 2 - PRODUCTS

2.01 PLANTS:

A. Provide plants in accordance with ANSI Standard for Nursery Stock, Designation Z60.1 (most current year of issue).

B. Plant Material: Vigorous, healthy, well-formed upper growth and dense, fibrous and large root system, and free of insect or mechanical damage. Grown under climatic conditions similar to those in project locality.

C. Plants, except those specified as container grown, balled in burlap with root ball formed of firm earth from original and undisturbed soil.

1. Ball width, depth, and lacing as specified in SCHEDULE OF PLANT MATERIAL. Do not accept balled and burlapped plants with broken or loose balls, or of "manufactured" earth or peat humus.

2.02 BONE MEAL:

A. Commercial raw bone meal, finely ground and containing a minimum of 1 percent nitrogen and 18 percent phosphoric acid.

2.03 STAKES:

A. Wood stakes, minimum of 2-in. by 2-in. square and 8 feet in length, of uniform size, straight, reasonably free from knots, treated with wood preservative and painted green.

2.04 WIRE:

A. Two strands No. 14-gage galvanized soft ferrous wire, twisted, for tree guying.

2.05 HOSE COLLAR:

A. Good quality reinforced rubber hose of minimum 1/2-in. inside diameter and green in color, for protecting tree bark from supporting wires.

2.06 TREE WRAP:

A. Quality, heavy, waterproof crepe paper manufactured for this purpose. Width of material not less than 6 inches, and wrapped from bottom with minimum 2 inch overlap.

2.07 ANTIDESICCANT:

A. Acceptable antidesiccant emulsion which provides a film over plant surfaces permeable enough to permit transpiration.

B. Applied to evergreen trees, shrubs and all deciduous plant material. Application made prior to transport-ation from nursery if deciduous trees are leafed out at time of digging. The rate and method of application shall be in accordance with the manufacturer's recommendations.

2.08 MULCH:

A. Shredded pine bark free of wood chips, stones, branches or other deleterious material. Bark shredded in strips not larger than 3 inches in any dimension and aged for period of not less than six months after removal from original logs.

2.09 METAL EDGE STRIPS AND STEEL STAKES:

A. 1/4-in. by 5-inch steel plate edge strips, painted green.

B. 16-in. tapered steel stakes.

2.10 MAT:

A. 1/4-in. to 1/2-in. thick mat consisting of lime or silicate glass fibers with average fiber diameter to 9 microns and 2-in. to 4-in. strands of fiber bonded with phenol formaldehyde resin, 100 percent textile glass fiber, roll type, water permeable with a minimum thickness of 1/4-in., a maximum thickness of 1/2-in. and a density of not less than 3 pounds per cubic foot.

2.11 LOAM:

A. Fertile, friable, natural topsoil typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Mixture of sand, silt and clay particles in equal proportions. Free of stumps, roots, heavy or stiff clay, stones larger than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.

B. Not less than 4 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.

C. Six inches of topsoil, hauled to the site, shall be placed over all disturbed areas requiring seeding. Adequate topsoil is not available in site.

2.12 LIME, FERTILIZER AND SEED:

A. Ground agricultural limestone containing not less than 85 percent of total carbonates.

B. Commercial type, uniform in composition, free flowing, conforming to state and federal laws, and at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight: Nitrogen 10 percent, Phosphorus 10 percent, Potash 10 percent.

C. Turf grass seed, inside perimeter fence, clean, high in germinating value and latest year's crop mixture as follows:

Name	Minimum proportion by weight	Percent purity	Percent germination
Kentucky bluegrass	20%	87%	85%
Merion Kentucky bluegrass	20%	87%	85%
Red Chewings Fescue	45%	98%	85%
Manhattan rye	15%	98%	90%

D. Turf grass seed, outside perimeter fence, clean high in germinating value and of the latest year's crop mixed as follows:

Name	Minimum proportion by weight
Creeping Red fescue	50%
Domestic ryegrass	20%
Redtop	5%
Kentucky bluegrass	25%

E. Weeds shall not exceed 0.25 percent.

2.13 SOD:

A. Established, nursery grown Kentucky or Merion Bluegrass sod, vigorous, well rooted, healthy turf, free from disease, insect pests, weeds, other grasses, stones, and any other harmful or deleterious matter.

B. Sod harvested by machine at uniform soil thickness of approximately 1 inch but not less than 3/4 of an inch. Measurement for thickness excludes top growth and thatch. Prevent tearing, breaking, drying or any other damage.

2.14 CRUSHED STONE:

A. Crushed stone made from light colored granite. Stone screened to insure uniformity of size. No flat, elongated stone used. Size of stone in mowing strips and other areas as indicated on drawings, conforming to following requirements:

Size of square screen	Percent passing
1-1/4 inch	95% minimum
3/4 inch	15% maximum

2.15 PEAT MOSS:

A. Shredded, loose, substantially free of mineral and waste matters.

B. Minimum organic matter by weight on a dry basis: 80 percent.

PART 3 - EXECUTION

3.01 PLANTING PITS:

A. Excavate with vertical sides and in accordance with following requirements:

1. Excavate tree pits to minimum of 2 feet greater in diameter than root ball of tree and sufficiently deep to allow for 1-foot thick layer of planting soil mixture below root ball.

2. Plant shrubs in pits 12 inches greater in width than diameter of root ball or container and minimum of 18 inches deep below finished grade, or as necessary to properly set plant at finished grade.

B. Adjust depth of planting beds and pits to provide minimum of 8 inches of planting soil mixtures under roots of all plants.

C. Set plants in center of pits, plumb and straight and at level that top of root ball is 1 inch lower than surrounding finished grade after settlement.

D. Compact topsoil mixture thoroughly around base of root ball to fill all voids, when plant material is set. Cut all burlap and lacing and remove from top 1/3 of root ball. Do not pull burlap from under any root ball. Backfill tree and shrub pits halfway with planting soil mixture and thoroughly puddle before backfilling tree or shrub pit. Water tree or shrub, again, when each backfill operation is complete.

3.02 PLANTING SOIL MIXTURE:

A. Thoroughly mix all loam used in backfilling planting pits, with peat moss at rate of 2 parts loam to 1 part peat moss, to obtain required planting soil mixture.

3.03 BONE MEAL:

A. Add bone meal to planting mixture used for backfilling tree and shrub pits in following amounts:

Quantity (lb)	Plant size	
Shrubs*	¾	all
Minor trees	1	3'-4' hgt.
1-1/2	4'-5' hgt.	
2	5'-6' hgt.	
3	6'-8' hgt.	
5	8'-10' hgt.	
7	10'-12' hgt.	
Major trees	5	2-1/2" to 3" cal.
7	3" to 4-1/2" cal.	

*Do not apply bone meal to rhododendrons and azaleas

3.04 PLANTING:

A. Thoroughly compact topsoil planting mixture around root balls and water. Immediately after plant pit is backfilled, form a shallow saucer slightly larger than pit with ridge of soil to facilitate and contain watering. After planting, cultivate soil in all shrub beds between shrub pits. Grub out sod or other growth and remove from bed area. Rake bed area smooth and neat and outline. Mulch all tree pits and shrub beds with a minimum of 3 inches of shredded pine bark mulch as indicated on drawings. Do not use admixture of wood chips in mulch.

3.05 SECURING AND PROTECTING:

A. Install tree guying and staking as indicated in details.

B. Install hose collars for protecting tree bark.

3.06 PRUNING:

A. Prune each tree and shrub in accordance with American Association of Nurserymen standards to preserve natural form and character of plant.

B. Remove all dead wood, suckers and broken or badly bruised branches. In addition, remove 1/4 to 1/3 of remaining wood. Do all pruning with clean, sharp tools by workmen thoroughly familiar with this type of work. Paint cuts in excess of 1 inch in diameter with acceptable tree paint. Cover all exposed cambium, as well as other exposed living tissue, with paint. Do not remove leaders.

C. Apply antidesiccant to all evergreen trees and shrubs and to all deciduous plant materials which are leafed out at time of planting. Follow manufacturer's recommendations regarding rate and method of application.

3.07 BARK MULCH SURFACES:

A. Mulch, with shredded pine bark, all tree pits, shrub pits and beds, and all areas planted with ground cover, immediately after planting operations are completed.

1. For tree and shrub pits and beds, provide a minimum 3 in. of mulch.

2. For ground cover beds, provide a minimum 2 in. of mulch.

B. Limit mulching for trees and individual shrubs to pit area inside of saucer and for shrub, tree and ground cover beds and panels planted with multiple trees. Define limits of beds in turf areas or where no building wall or curb exists by installed metal edging as indicated.

3.08 METAL EDGE STRIPS:

A. Install metal edge strips around all edges of mowing strips and planting beds as indicated. Fasten metal edge strips securely in place with tapered steel stakes driven through slots punched in strip at 30-inch intervals. Set edge strips to finished grades indicated.

3.09 MOWING STRIPS AND AREAS OF CRUSHED STONE:

A. Construct mowing strips adjacent to all exterior building and structure walls where indicated on drawings. Provide mowing strips with metal edge strips.

B. Install mat under crushed stone and pin in place.

C. Place 6-in. minimum layer of crushed stone between edge strip and building or structure. Consolidate stone by means satisfactory to Engineer.

3.10 LOAM:

A. Spread loam on areas to be seeded, to required 6-inch depth, fine grade and compact.

3.11 LIME, FERTILIZER AND SEEDING:

A. Apply lime by mechanical means at rate of 50 pounds per 1,000 sq. ft.

B. Apply fertilizer at rate of 50 pounds per 1,000 sq. ft.

C. Remove weeds or replace loam and reestablish finish grades,if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 4 pounds per 1,000 sq. ft. on calm day, by mechanical means. Do not "Hydro-Seed" unless otherwise permitted or required by Engineer. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.

D. Water lawn areas adequately at time of sowing and daily thereafter with fine spray, and continue throughout maintenance and protection period.

E. Loam, lime, fertilize and seed required areas outside of perimeter same as lawn areas. Apply seed at rate of 80 pounds per acre. Rake seed lightly, after sowing, into top 1/4 in. of loam, and compact by suitable rollers weighing 100 to 150 pounds per linear foot of width.

3.12 SOD:

A. Install sod not more than 48 hours after cutting. Provide lime, fertilizer, etc, preparation for sod same as stated above for seed.

3.13 CRUSHED STONE:

A. Place crushed stone to depth of 6 inches, and thoroughly consolidate by means of suitable vibrator or mechanical tamper. Add stone, as necessary, after tamping or vibrating to finish depth of 6 inches.

3.14 CLEAN-UP:

A. Remove soil or similar material which has been brought onto paved areas, keeping these areas clean.

B. Upon completion of planting, remove excess soil, stones and debris which has not previously been cleaned up and legally dispose of off-site.

C. Prepare lawns and planting areas for final inspection.

D. Protect slopes and embankments against erosion until work is accepted. Repair eroded portions of seeded or sodded areas by refilling, resodding, remulching and reseeding as required by condition and to satisfaction of Engineer. Protection may be by installation of sod strips or other methods.

3.15 MAINTENANCE - SEEDED AREAS AND PLANTING:

A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.

B. Begin maintenance immediately after each planting and continue until final acceptance of work. Water, mulch, weed, prune, spray, fertilize, cultivate and otherwise maintain and protect all plants.

C. Reset settled plants to proper grade and position, and restore planting saucers and remove dead material. Tighten and repair guys. Correct defective work as soon as possible within guarantee period.

END OF SECTION

SECTION 02615

DUCTILE-IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide and test ductile-iron pipe and fittings, as indicated and specified.

B. Provide related materials as indicated and specified.

C. Options:

1. For joints in buried exterior pipelines, provide either push-on or mechanical-joint.

2. For piping exposed, as in buildings and galleries, provide flanged or rigid-joint, grooved-coupled pipe and fittings.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

C. Section 02223: Screened Gravel

D. Section 02224: Bank Run Gravel

E. Section 03300: Cast-in-Place Concrete

F. Section 15101: Valves, Gates, Hydrants, and Appurtenances

1.03 REFERENCES:

A. American National Standards Institute, Inc. (ANSI) Standards:

1. A21.4: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. A21.10: Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.

3. A21.11: Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe Fittings.

4. A21.15: Flanged Ductile-Iron Pipe with Threaded Flanges.

5. A21.50: Thickness Design of Ductile-Iron Pipe.

6. A21.51: Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.

7. A21.53: Ductile-Iron Compact Fittings, 3-in through 16-in. for Water and Other Liquids.

8. B16.1: Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

9. B16.21: Nonmetallic Flat Gaskets for Pipe Flanges.

10. B16.42: Ductile Iron Pipe Flanges and Flanged Fittings.

B. American Society for Testing and Materials (ASTM) Publications:

1. A307: Carbon Steel Bolts and Studs, 60,000 psi Tensile.

2. C283: Test Method for Resistance of Porcelain Enameled Utensils to Boiling Acid.

3. D1248: Polyethylene Plastics Moulding and Extrusion Materials.

C. American Water Works Association (AWWA) Standards:

1. C606: Grooved and Shoulder Joints.

D. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Publications:

1. SP-58: Pipe Hangers and Supports, Materials Design and Manufacture.

2. SP-69: Pipe Hangers and Supports Selection and Application.

E. Steel Structures Painting Council (SSPC):

1. SP.6: Commercial Blast Cleaning.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Piping layouts in full detail.

2. Location of pipe hangers and supports.

3. Location and type of backup block or device to prevent joint separation.

4. Large scale details of wall penetrations and special castings.

5. Schedules of all pipe, fittings, special castings, couplings, expansion joints, and other appurtenances.

B. Certificates: Sworn and notarized certificates in duplicate of shop tests showing compliance with appropriate standard.

C. Manufacturer's Literature:

1. Catalog cuts of joints, couplings, harnesses, expansion joints, gaskets, fasteners, and other accessories.

2. Brochures and technical data on coatings and lining's and proposed method of application.

1.05 QUALITY ASSURANCE:

A. Inspect and test at foundry according to applicable standard specifications.

B. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Visually inspect before installation.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610.

PART 2 - PRODUCTS

2.01 PIPE:

B. Ductile Iron:

1. Design conforming to ANSI A21.50.

2. Manufacture conforming to ANSI A21.15 or ANSI A21.51.

3. Thickness class, unless otherwise indicated or specified:

a. Minimum Thickness Class 52.

b. Minimum thickness Class 53 for use with flanged pipe.

c. Minimum thickness for use with grooved couplings conforming to AWWA C606 except minimum thickness Class 56 for ductile-iron pipe 18 in. and larger.

2.02 PIPE FOR USE WITH COUPLINGS:

A. As specified above except ends shall be plain.

B. With sleeve couplings, ends cast or machined at right angles to axis.

C. With grooved type coupling:

1. Ductile-Iron of thickness class specified above.

2. Grooved End dimensions conforming to AWWA C606 for flexible or rigid joints to suit joint requirements.

2.03 FITTINGS:

A. Provide fittings conforming to ANSI A21.10, at least Class 150.

B. Provide all bell push-on or mechanical-joint fittings unless otherwise indicated or specified.

C. Face and drill flanged fittings conforming to ANSI A21.10 except special drilling or tapping as necessary for correct alignment and bolting.

D. If flanged fittings are not available under ANSI A21.10 provide fittings conforming to ANSI B16.1 in 125 lb. pressure class.

E. Provide standard base fittings where indicated.

F. Provide grooved-end fittings ductile-iron conforming to ANSI A21.10 (AWWA C110) for center-to-face dimensions.

1. End preparation for grooved-ends conforming to AWWA C606 for flexible or rigid joints as required by type of joint.

2. Minimum wall thickness of grooved fittings 12 inch and smaller conforming to ANSI A21.53 (AWWA C153).

3. Minimum wall thickness of grooved fittings larger than 12 inch conforming to ANSI A21.10 (AWWA C110).

2.04 WALL CASTINGS:

A. Provide size and type indicated.

B. Wall Castings: Conform to requirements of ANSI A21.10 or fabricate of Class 53 ductile iron pipe with screwed on flanges and welded on waterstop.

C. Provide water stop centered in wall. Waterstop minimum 1/2 in. thick by 1-1/2 in. high for pipes 12 in. and smaller, 3/4 in. thick by 2 in. high for pipes 14 in. to 24 in. and 1 in. thick by 2 in. high for pipes 30 in. and larger. Weld water stops on in factory under controlled conditions to ensure adequate strength to permit waterstop to absorb thrust up to the pressure rating of the pipe.

D. On flanged wall castings, provide space between the wall and flange to permit mounting the nuts on the flange bolts.

E. Locate mechanical joint wall castings with space between the bell and the wall to insert the follower bolts.

F. Fabricated wall pipe of Schedule 40 Type 316 stainless steel may be substituted for wall castings specified above. Provide with waterstops of above dimensions and welded continuously on both sides of stop. Flanges of Type 316 stainless steel. Bolts for connection to buried pipe Type 316 stainless steel. Provide flange insulation gaskets, sleeves, and washers for all flanges.

2.05 ADAPTERS:

A. Furnish and install for joining pipe of different types, unless solid sleeves indicated.

1. Provide ends conforming to above specifications for appropriate type of joint, to receive adjoining pipe.

2. Joining two classes of pipe may be of lighter class provided annular space in bell-and-spigot type joints is sufficient for jointing.

2.06 JOINTS:

A. Provide mechanical joint or push-on joint pipe with necessary accessories, conforming to ANSI A21.11.

1. Provide gasket composition suitable for exposure to liquid within pipe.

2. Provide mechanical joint gaskets with copper tips to provide electrical continuity.

3. Provide serrated brass wedges for push-on joints to provide electrical continuity; two per joint for pipe 12-in. and smaller and four per joint for larger pipe.

B. Provide pipe flanges and accessories conforming to ANSI A21.15.

1. Provide flat faced flanges.

2. Provide 1/8 in. thick, full faced gaskets suitable for exposure to liquid within pipe.

C. Provide restrained joint on all buried pipe and fittings. Provide restrained joint which is:

1. Pipe joints capable of being deflected.

2. Designs using field welding are not acceptable.

3. Manufacturers:

a. American Cast Iron Pipe Co. Flex-Ring.

b. U.S. Pipe TR FLEX.

c. Clow Super-Lock.

d. Megalug Series 1100 by EBAA Iron Inc.

e. Or acceptable equivalent.

2.07 FLEXIBLE CONNECTIONS:

A. Use as specified or indicated:

1. Sleeve-type couplings

2. Grooved couplings

3. Mechanical-joint pipe and/or fittings

2.08 SLEEVE TYPE COUPLINGS:

A. Furnished by pipe supplier.

B. Pressure rating at least equal to that of related pipeline.

C. Manufactured by Dresser Mfg. Div.; Rockwell International; R. H. Baker & Co., Inc.; or acceptable equivalent product.

D. Couplings for buried pipe: Cast iron sleeve or steel sleeve and retainer with fusion bonded epoxy coating, Dresser Style 53 or 153, Rockwell Style 431, Baker Series 228, or acceptable equivalent product. Provide couplings with Type 316 stainless steel bolts and nuts.

E. Couplings for exposed pipe: Steel; Dresser Style 38, Rockwell Style 411, Baker Series 200, or acceptable equivalent product. Provide couplings with steel bolts and nuts.

F. Furnish with pipe stop removed.

G. Provide with gaskets of composition suitable for exposure to liquid within pipe.

H. Provide gaskets with copper tips for electrical continuity through joints.

2.09 GROOVED COUPLINGS:

A. Conform to AWWA C606.

B. Minimum pipe wall thickness specified under "Pipe For Use With Couplings".

C. Where grooved couplings are indicated to provide for expansion or flexibility, cut pipe grooves to provide necessary expansion or flexibility.

D. Where grooved couplings are used instead of flanged joints, joint to be of rigid type with pipe grooves cut to bring pipe ends together. Beam strength of joint shall be equal to or greater than that of flanged joint.

2.10 FILLING RINGS:

A. Provide where necessary.

B. Materials, workmanship, facing, and drilling, conforming to 125-lb. ANSI Standard.

C. Suitable length with nonparallel faces and corresponding drilling, if necessary, for correct assembly of adjoining piping or equipment.

2.11 CONNECTIONS - TAPPED:

A. Provide watertight joint with adequate strength against pullout. Use tapered thread taps.

B. Maximum size of taps in pipe or fittings without bosses not to exceed that listed in appropriate table of Appendix to ANSI A21.51 based on:

1. 3 full threads for gray iron.

2. 2 full threads for ductile iron.

C. Where size of connection exceeds that given above for pipe, provide boss on pipe barrel or use tapping saddle. Make tap in flat part of intersection of run and branch of tee or cross, or connect by means of tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, as indicated or permitted.

2.12 STANDARD LINING AND COATING:

A. Inside of pipe and fittings: Provide double thickness cement lining and bituminous seal coat conforming to ANSI A21.4.

B. Outside of pipe and fittings within structures: Clean and apply one shop coat (current product equivalent) Koppers Pug Primer made by Koppers Co.; Chem-Prime 37-77 made by Tnemec Co.; or acceptable equivalent.

C. Outside surfaces of castings to be encased in concrete: Leave bare, do not use coating.

D. Machined surfaces cleaned and coated with suitable rust-preventative compound at shop.

E. Outside of other pipe and fittings: Standard bituminous coating conforming to appropriate AN Standard.

2.13 GASKETS, BOLTS, AND NUTS:

A. Provide ring rubber gaskets with cloth insertion for flanged joints, neoprene faced phenolic for insulating gaskets.

1. Gaskets 12 inches in diameter and smaller, 1/16 inch thick.

2. Larger than 12 inches in diameter, 1/8 inch thick.

B. Make flanged joints with:

1. Bolts.

2. Bolt studs with nut on each end.

3. Studs with nuts where flange is tapped.

4. Plastic bolt sleeves and washers for insulating joints.

C. Number and size of bolts conform to same ANS as flanges.

D. Provide bolts and nuts, except as specified or indicated, Grade B, ASTM A307.

E. Provide bolt studs and studs of same quality as machine bolts.

F. Flanged joints for wall castings flush with masonry made up with Type 316 stainless steel stud bolts and nuts.

G. Submerged flanged joints made up with Type 316 stainless steel bolts and nuts.

2.14 PAINTING:

A. Provide shop coats specified under Standard Lining and Coating.

B. Coat pipe hangers and supports with one shop coat of rust inhibitive primer.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

A. Visually inspect.

3.02 HANDLING AND CUTTING:

A. Mark pipe and fittings "Rejected" and remove from site when cracked or has received a severe blow.

B. If permitted, cut on sound barrel at a point at least 12 in. from visible limit of crack, at Contractor's expense.

C. Machine cut with milling type cutters, knives, or saws. Snap cutters, torch, or hammer and chisel NOT ALLOWED. Examine for possible cracks.

D. Chamfer cut ends if used for push-on joints.

3.03 INSTALLATION:

A. Piping Support:

1. Furnish and install supports to hold piping at lines and grades indicated.

2. Support pipe and appurtenances connected to equipment to prevent any strain imposed on equipment.

3. Support piping within buildings and structures from floors, walls, ceilings or beams. For floor support, use saddle stands or concrete or brick piers as indicated or permitted. Shape pipe saddles to fit pipe and be capable of screw adjust-ment. Construct brick and concrete piers to conform accurately to the bottom one-third to one-half of pipe. Support piping along walls by wall brackets with attached pipe

rolls, saddles or with adjustable hanger rods. Support piping from ceilings with rod hangers of type capable of screw adjustment and with adjustable concrete inserts or beam clamps.

4. Use hangers and supports conforming to MSS-SP-58.

5. Place supports to provide uniform slopes without sagging. Locate per MSS-SP-69 with at least two hangers for each pipe section. Locate hangers adjacent to joints, direction changes, and branch connections.

6. Back up bends, tees, and other fittings in pipelines buried in ground with Class B concrete placed against undisturbed earth. If soil does not provide firm support, provide bridle rods, clamps, and accessories to brace fitting properly. Coat bridle rods, clamps, and accessories with two coats of an acceptable bituminous paint after assembly.

B. Pipe and Fittings:

1. Remove and replace defective pieces.

2. Clear of all debris and dirt before installing and keep clean until accepted.

3. Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.

4. Provide firm bearing along entire length of buried pipelines.

5. Do not allow deflection of alignment at joints to exceed permissible deflection as specified below:

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*		
Size of pipe, in	Push-on joint	Mechanical joint
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20	11	11
24	11	9

* Maximum permissible deflection for 20-ft. lengths; for other lengths in proportion.

a. For mechanical joint, push-on joint, or similar pipe, clean bell of excess tar or other obstruction and wipe out before inserting next pipe spigot. Shove new pipe into place until properly seated and hold securely until joint is completed.

b. Set castings to be encased in concrete accurately with bolt holes, if any, carefully aligned. Clean off rust and scale before setting.

C. Temporary Plugs: When pipe laying not in progress, close open ends of pipe with temporary watertight plugs. If water in trench, do not remove plug until danger of water entering pipe passed.

D. Socket Pipe Clamps, Tierods, and Bridles: Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, provide suitable socket pipe clamps, tierods, and bridles. Use bridles and tierod at least 3/4 inch in diameter except where they replace flange bolts of smaller size with nut on each side of flange pairs. Coat clamps and tierods or bridles with two coats of bituminous coating after assembly and let dry before backfilling.

E. Appurtenances: Set valves, fittings, and appurtenances as indicated.

3.04 JOINTS AND COUPLINGS:

A. Push-on Joints:

1. Insert gasket into groove bell. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end.

2. Insert chamfered end into gasket. Force pipe past it until it seats against socket bottom.

B. Bolted Joints:

1. Remove rust-preventive coatings from machined surfaces.

2. Clean pipe ends, sockets, sleeves, housings, and gaskets and smooth all burrs and other defects.

3. Use torque wrench to tighten to correct range of torque not to exceed values specified below:

TORQUE RANGE VALUES

Nominal pipe size, in	Bolt diameter, in	Range of torque, ft-lb
3	5/8	40-60
4-24, incl.	3/4	75-90
30, 36	1	100-120
42, 48	1-1/4	120-150

C. Flanged Joint:

1. Make up tight.

2. Do not put strain on nozzles, valves, and other equipment.

D. Mechanical Joints:

1. Wire brush surfaces in contact with gasket and clean gasket.

2. Lubricate gasket, bell, and spigot with soapy water.

3. Slip gland and gasket over spigot, and insert spigot into bell until seated.

4. Seat gasket and press gland firmly against gasket.

5. After bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint by torque wrench. Torque bolts to values specified above.

E. Sleeve-Type Coupling:

1. Clean pipe ends for distance of 8 inches.

2. Use soapy water as gasket lubricant.

3. Slip follower and gasket over each pipe to a distance of 6 inches from end and place middle ring on pipe end until centered over joint.

4. Insert other pipe end into middle ring and bring to proper position in relation to pipe laid.

5. Press gaskets and followers into middle ring flares.

6. After bolts inserted and nuts made fingertight, tighten diametrically opposite nuts by use of torque wrench of size and torque specified below:

TORQUE

Nominal pipe size, in	Bolt diameter, in	Range of torque, ft-lb
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65
30-36 (3/8 in. mid ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

7. After assembly and inspection and before backfill, coat exterior surfaces of buried couplings with heavy-bodied bituminous mastic.

F. Grooved Couplings:

1. Clean grooves and other parts.

2. Coat ends of pipe and outside of gasket with soft soap or silicone and slip gasket over one pipe end.

3. Bring pipes to correct position and center gasket over pipe ends with lips against pipe.

4. Place housing sections, insert bolts, and tighten nuts until housing sections in metal-to-metal contact.

5. After assembly and inspection and before backfilling, coat exterior surfaces of buried couplings, including bolts and nuts, with heavy-bodied bituminous mastic.

G. Tapped Connection:

1. Drill and tap normal to longitudinal axis.

2. Drilled by skilled mechanics using proper tools.

3. Use only tapered threads.

H. Electrical Conductors:

1. Install pipes so terminal strips are aligned.

2. Install jumper strips and tighten bolts.

3.05 TESTING:

A. Clean of all dirt, dust, oil, grease, and other foreign material, before conducting pressure and leakage tests.

B. Pressure and Leakage Tests:

1. Conduct combined pressure and leakage test in pipelines.

2. Furnish and install temporary testing plugs or caps; pressure pumps, pipe connections, meters, gages, equipment, and labor.

3. Test when desired and comply with specifications.

4. Test pipelines in excavation or embedded in concrete before backfill or placing of concrete and test exposed piping before field painting.

5. Fill section of pipe with water and expel air. If hydrants or blowoffs are not available at high points for releasing air, make necessary taps and plug after test completion.

6. Maintain section full of water for 24 hours before conducting combined pressure and leakage test.

7. Conduct pressure and leakage test consisting of first raising water pressure (based on elevation of lowest point of section under test and corrected to gage location) to pressure in psi numerically equal to pipe pressure rating, but not more than 100 psi.

8. If unable to achieve and maintain specified pressure for one hour with no additional pumping, section fails test.

9. If section fails pressure and leakage test, locate, uncover, and repair or replace defective pipe, fitting, or joint, at no additional expense and without time extension. Conduct additional tests and repairs until section passes test.

10. Modify test procedure only if permitted by Engineer.

3.06 PAINTING:

A. Field painting, per Standard Lining And Coating.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE:

A. This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work.

1.02 SUBMITTALS:

A. All submittals of drawings and data shall be in accordance with the Submittals Procedures section.

PART 2 - PRODUCTS

2.01 LIMITING REQUIREMENTS:

A. Unless otherwise specified, concrete shall be controlled within the following limiting requirements:

Cement Content	At least 564 lbs per cubic yard.
Maximum Water-Cement Ratio	The maximum water-cement ratio shall be 0.42 on a weight basis, or, if fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.
Fly Ash Content	At the option of Contractor, fly ash may be substituted for up to 25 percent of the Portland cement, on the basis of 1.0 lbs of fly ash added for each lb of cement reduction.
Concrete Strength	4,500 psi minimum compressive strength at 28 days.
Air Content	6 percent ±1.5 percent.
Coarse Aggregate	Maximum nominal coarse aggregate size,

	1 inch.
Admixtures	A water-reducing admixture and an air-entraining admixture shall be included in all concrete. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.
Consistency	Workable, without segregation, with slump not more than 4 inches when concrete is placed.
Mixing	In accordance with ASTM C94.

B. Slump: Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by Engineer, slump of concrete without a superplasticizer shall not exceed 4 inches. Slump of concrete with a superplasticizer, or a midrange water reducer, shall not exceed 8 inches.

C. Total Air Content. The total volumetric air content of concrete after placement shall be 6 percent ±1.5 percent. Air-entraining admixture may be omitted from concrete for interior slabs which are to be trowel finished.

D. Admixtures. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations and acceptable to Engineer. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. A midrange water reducer or a superplasticizer may be used at Contractor’s option. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.

E. Strength. The minimum acceptable compressive strengths, as determined by ASTM C39, shall be:

Age	Minimum Compressive Strength
7 days	3,375 psi
28 days	4,500 psi

Cylinders shall be 6 inches diameter by 12 inches high for concrete mixes using a maximum nominal aggregate size of 1 inch or larger. Cylinders may be either 6 inches diameter by 12 inches high, or 4 inches diameter by 8 inches high for concrete mixes using a maximum nominal aggregate size of less than 1 inch. The average compressive strength shall be determined from the results of at least three

cylinders when using 4 inch diameter cylinders, and at least two cylinders when using 6 inch diameter cylinders. All tests shall be performed using the same sized cylinders for the duration of the work.

2.02 MATERIALS:

Cement	ASTM C150, Type II, low alkali.
Fly Ash	ASTM C618, Class F or Class C, except loss on ignition shall not exceed 4 percent.
Fine Aggregate	Non-reactive, clean, natural sand, ASTM C33.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, class 4S, except that clay and shale particles shall not exceed 1 percent.
Water	Potable.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
Superplasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Mechanical Connector (Couplers or Form Savers)	Classified Type 2 per ACI 318. Use only where indicated on the drawings.

Expandable Waterstops, permitted only at locations indicated on Drawings	Hydrophilic; bentonite free, chemically modified rubber. Adeka “Ultra Seal MC-2010MN” or Greenstreak “Hydrotite CJ-1020-2K”. Adhesive as recommended by the manufacturer.
Sealant for expandable waterstop	Adeka “Ultra Seal P-201” or Greenstreak “Leakmaster”.
Expansion Joint Material	Sponge rubber expansion joint material, ASTM D1752 Type I, as indicated on the drawings.
Forms	
Plywood Product	Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Form Coating	Nonstaining and nontoxic after 30 days. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Evaporation Reducer	Dayton Superior “AquaFilm Concentrate J74”, Euclid "Eucobar", L&M Chemical "E-Con", BASF "Confilm", or Sika "SikaFilm".
Membrane Curing Compound and Floor Sealer	ASTM C1315, Type I, Class A, minimum 25 percent solids, acrylic, non-yellowing, unit moisture loss 0.40 kg/m^2 maximum in 72 hours. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Polyethylene Film	Product Standard PS17 or ASTM D4397, 6 mils or thicker.

2.03 PRELIMINARY REVIEW:

A. Reports covering the source and quality of concrete materials and the concrete proportions proposed for the work shall be submitted to Engineer for review before any concrete is placed.

2.04 FORMS:

A. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment. Forms shall be thoroughly cleaned and coated before concrete is placed and shall not be removed until the concrete has attained sufficient strength to safely support all loads without damage.

2.05 REINFORCEMENT:

A. Reinforcement shall be accurately formed and positioned, and shall be maintained in proper position while the concrete is being placed and compacted. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connectors shall be used only as indicated on the drawings.

PART 3 - EXECUTION

3.01 PLACEMENT:

A. Concrete shall be conveyed to the point of final deposit and placed by methods which will prevent segregation or loss of the ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Unless otherwise authorized, compaction shall be by immersion-type vibrators. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

B. Polyethylene Film. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 sieve, such surfaces shall be covered with polyethylene film. Joints in the film shall be lapped at least 4 inches and taped.

3.02 WATER STOPS:

A. Each water stop shall be continuous throughout the length of the joint in which it is installed. Water stops shall be clean, free from coatings, and shall be maintained in proper position until surrounding concrete has been deposited and compacted.

3.03 FINISHING:

A. Fins and other surface projections shall be removed from all formed surfaces, except exterior surfaces that will be in contact with earth backfill. Surface voids and recesses resulting from removal of form ties shall be filled with mortar. Unless otherwise specified, unformed surfaces shall be given a float finish and deck surfaces shall be broom finished for texture.

B. Application of Evaporation Reducer.
    1. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight may be protected with an evaporation reducer. The evaporation reducer shall form a continuous film on the surface of fresh, plastic concrete to reduce evaporation.
    2. Immediately following screeding, evaporation reducer shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon, in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray the product at approximately 40 psi with a suitable nozzle as recommended by the manufacturer.
    3. The sprayable solution shall be prepared as recommended by the manufacturer.
    4. Under severe drying conditions, additional applications of evaporation reducer may be required following each floating or troweling, except the last finishing operation.

C. Sidewalks.
    1. Concrete surfaces shall be screeded to the proper elevation and contour. All aggregates shall be completely embedded in mortar. Screeded surfaces shall be given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface. Initial floating shall be followed by a second floating at the time of initial set.
    2. Floated surfaces shall be given a light broom finish, using a horsehair broom, to provide a nonslip surface. Brooming shall be done at right angles to the length of the walk.
    3. Sidewalks shall be edged using a 3 or 4 inch wide edging tool with a 1/8 inch corner radius. Edger lap marks at corners of each slab shall be carefully removed. False joints shall be provided at right angles to the length of the walk, using a grooving tool with 1/8 inch radius. The finished edge on each side of the joint shall be the same width as the edging tool used. False joints shall divide each sidewalk into square sections.
    4. The finished surface of all sidewalks shall be neat in appearance, shall be sloped to drain, and shall not pond water.

D. Curb and Gutter.

1. Concrete Curb and gutter shall be finished to the shape indicated on the drawings. After the forms have been removed, all exposed edges shall be rounded, using an edging tool with a 1/8 inch corner radius. Exposed surfaces shall be float finished and given a light broom finish applied at right angles to the curb at the time of initial set, using a horsehair broom.

3.04 CURING:

A. Concrete shall be protected from loss of moisture for at least 7 days by membrane curing or by water curing. Membrane curing compound shall be applied as recommended by the manufacturer. Water curing shall be in accordance with ACI 308.1.

B. Keep concrete moist and at an average daily temperature of at least 50 degrees Fahrenheit, for at least 7 days following placement. If hourly temperature is allowed to drop below 50 degrees Fahrenheit during the 7 days after placement, the cure time shall be extended to compensate for the cold and shall be per the Engineer's request.

3.05 COLD WEATHER CONCRETING:

A. Concrete work during cold weather shall be in accordance with the recommendations of ACI 306R and as indicated herein.

B. Submit a cold weather concreting plan for approval. The plan shall address all aspects of the process including batch plant activities, delivery, placement, curing, freeze protection, temperature monitoring, and recording of data.

C. Subgrade and steel shall be heated to at least 40 degrees Fahrenheit and maintained at this temperature until arrival of concrete. Placement over frozen subgrade is not acceptable.

D. Heat water and aggregate at the batch plant so concrete arrives on site at least at 55 degrees Fahrenheit.

E. Accelerating admixtures are not acceptable.

F. Maintain surface of fresh concrete above 50 degrees Fahrenheit for at least 7 days.

G. Contractor shall record temperatures of concrete off the truck and at multiple locations on each pour. Record temperatures first thing in the morning, at noon, and at end of the work day during the first 10 days after pouring. Recording on weekends and holidays is not required. Keep records and submit to Engineer within 14 days of concrete placement.

3.06 HOT WEATHER CONCRETING:

A. Concrete work during hot weather shall be in accordance with the recommendations of ACI 305R and as indicated herein.

B. Submit a hot weather concreting plan for approval. The plan shall address all aspects of the process including batch plant activities, delivery, placement, and curing.

C. Cool surfaces of subgrade and reinforcing steel and inserts to approximately 90 degrees Fahrenheit prior to concrete placement. Provide shelter as necessary to shade the concrete area from direct sun and wind.

D. Temperature of delivered concrete shall not exceed 90 degrees Fahrenheit. Water addition to the mix on site for cooling purposes is not an acceptable method of cooling the mix.

E. Keep placed concrete continuously moist for at least 24 hours following placement. Following curing procedures.

3.07 REPAIRING DEFECTIVE CONCRETE:

A. Defects in concrete surfaces shall be repaired to the satisfaction of Engineer. All concrete which is honeycombed or otherwise defective shall be cut out and removed to sound concrete, with edges cut square to avoid feathering.

B. Concrete repair work shall conform to Article 5.3.7 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of surrounding concrete. Repair work shall be adequately cured.

3.08 OWNER'S FIELD CONTROL TESTING:

A. Field control tests shall be performed by Engineer or Owner's testing laboratory personnel, at the expense of Owner. Contractor shall provide access to all facilities and the services of one or more employees as necessary to assist with the field control testing.
   1. Air Content. An air content test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Air content shall be determined in accordance with ASTM C231.
   2. Slump. A slump test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.
   3. Test Cylinders. Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39. Compressive strength tests will be evaluated in accordance with ACI 318 and as specified herein.

4. One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of four six inch diameter cylinders. One cylinder shall be tested at 7 days, and two shall be tested at 28 days. The fourth shall be retained in the event an additional break is necessary. All concrete required for testing shall be furnished by, and at the expense of, Contractor.

End of Section

SECTION 11304

SUBMERSIBLE SOLIDS HANDLING PUMPS AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide, inspect, and test two (2) submersible solids handling pumps, motors, and appurtenances as indicated and specified.

1.02 RELATED WORK:

A. Section 01300: Submittals

B. Section 01400: Quality Assurance

C. Section 01600: Control Of Materials

D. Section 01610: Delivery, Storage, And Handling

E. Section 02615: Ductile Iron Pipe & Fittings

F. Section 15370: Process Piping and Appurtenances

1.03 REFERENCES:

A. ANSI: American National Standards Institute.

1. ANSI B16.1: Standard for Cast Iron Pipe Flanges and Flanged Fittings, 125 lb.

2. ANSI B16.10: Face-to-Face and End-to-End Dimensions of Ferrous Valves.

B. ASTM: American Society for Testing Material.

1. ASTM A48: Specification for Gray Iron Castings.

2. ASTM A126: Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

3. ASTM A322: Specification for Carbon and Alloy Steel Bars.

4. ASTM A536: Specification for Ductile-Iron Castings.

5. ASTM A743: Specification for Castings, Iron-Chromium, Iron-Chromium Nickel, and Nickel-Base Corrosion-Resistant for General Application.

C. AWWA: American Water Works Association.

1. AWWA C500: Standard for Gate Valves, 3 in. through 48 in. NPS, for Water and Sewage System.

2. AWWA C509: Standard Specifications for Resilient-Seated Gate Valves, 3 in. through 12-in. NPS, for Water and Sewage Systems.

D. Anti-Friction Bearing Manufacturers Association (AFBMA):

1. Standard 9-90 Load Ratings and Fatigue Life for Ball Bearings.

2. Standard 11-90 Load Ratings and Fatigue Life for Roller Bearings.

E. Hydraulic Institute, Current Edition.

F. NEMA: National Electrical Manufacturer's Association.

1.04 SYSTEM DESCRIPTION:

A. Pump capacities and operating data are indicated herein.

B. Pumps are to move return activated sludge from final clarifier tanks.

C. Motors to be submerged under all normal operating conditions.

D. Pumps will be operated automatically through an existing variable frequency drive based on controls actuated by changes in plant influent flow rates and operator inputs.

1.05 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Certified shop and erection drawings.

2. Data regarding pump and motor characteristics and performance:

a. Prior to fabrication and testing, include in data guaranteed performance curves based on actual shop tests of mechanically similar pump, showing they meet specified requirements for head, capacity, horsepower, efficiency, and NPSH. For units of same size and type, provide curves for a single unit only.

b. Provide catalog performance curves at required speed showing maximum and minimum impeller diameters available.

c. Results of certified performance and witness tests as specified.

d. Submit curves for guaranteed performance, certified test, and witness tests on 8-1/2-in. by 11-in. sheets, with one curve per sheet.

3. Shop drawing data for accessory items.

4. Templates or certified setting plans, with tolerances, for anchor bolts.

5. Manufacturer's literature as needed to supplement certified data.

6. Operating and maintenance instructions and parts lists.

7. Certified results of hydrostatic testing.

8. Certified results of dynamic balancing.

9. Bearing temperature operating range for the service conditions specified.

10. List of recommended spare parts other than those specified.

11. Bearing Life: Certified by the pump manufacturer.

12. Pump shop test results.

13. Motor shop test results.

14. Recommendations for short and long-term storage.

15. Shop and field testing procedures and equipment to be used.

16. Special tools.

17. Schematic control and power wiring diagrams.

18. Manufacturer’s product data and specifications for painting.

19. Provide a scaled drawing showing the pumps and motors, including equipment weights, lifting attachments, and clearances for equipment removal and maintenance.

20. Material Certification:

a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.

B. A copy of the contract mechanical process, electrical, and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with "No changes required" or provide a statement that no changes are required.

1. Failure to include all drawings, or a statement applicable to the equipment specified in this section, will result in submittal return without review until a complete package is submitted.

C. Location of nearest authorized motor service center.

1.06 QUALITY ASSURANCE:

A. Provide in accordance with Section 01400 and as specified herein.

B. All pumps shall be the product of one manufacturer.

C. Pumps shall be manufacturer's standard cataloged product and modified to provide compliance with drawings, specifications, and service conditions specified and indicated.

D. Welding: In accordance with latest applicable American Welding Society Code or equal.

E. Shop tests as specified.

F. The Contractor shall obtain the pumps, motors, guide rails, hatches, controls, and control panels from a single pump manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.

G. Services of Manufacturer's Representative as stated in Section 01300 and specified herein.

H. Provide services of factory-trained Service Technician, specifically trained on type of equipment specified:

1. Service Technician must have a minimum of five (5) years of experience, all within the last seven (7) years, on the type and size of equipment.

2. Service Technician must be present on site for all items listed below. Person-day requirements listed are exclusive of travel time, and do not relieve Contractor of the obligation to place equipment in operation as specified.

3. Installation: Supervise location of anchor bolts; setting, leveling, alignment, field erection; coordination of piping, electrical, and miscellaneous utility connection:

   a. 1 person-day for first pump.

4. Functional Testing: Calibrate, check alignment, and perform a functional test with secondary wastewater. Tests to include all items specified.

   a. 1 person-day, one trip for first pump installed.

5. Field Performance Testing: Field performance test equipment specified.

   a. 1 person-day, one separate trip, for first pump installed (or as otherwise requested by Engineer).

6. Vendor Training: Provide classroom and field operation and maintenance instruction including all materials, slides, videos, handouts, and preparation to lead and teach classroom sessions.

   a. 1 person-day, one separate trip, after first pump is installed.

7. Credit to the Owner, all unused service person-days specified above, at the manufacturer's published field service rate.

8. If manufacturer requires factory service technician to place each pump or controls into service for warranty or other reasons, the manufacturer shall provide such services based on the assumption that each pump will be placed into service individually on separate events and at no additional cost to Owner. Any additional time required of the factory trained service technician to assist in placing the equipment in operation, or testing, or to correct deficiencies in installation, equipment, or material shall be provided at no additional cost to the Owner.

I. If equipment proposed is wider or longer than the specified unit, provide all structural, architectural, electrical, and mechanical revisions at no additional cost to the Owner.

1.07 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610 and as specified herein.

B. Shipping:

1. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of components.

2. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

3. Deliver spare parts to Owner along with the equipment.

C. Receiving:

1. Inspect and inventory items upon delivery to site.

2. Store and safeguard equipment, material, and spare parts in accordance with manufacturers written recommendations and instructions.

1.08 SPECIAL REQUIREMENTS:

A. Refer to the applicable specification sections with regard to providing the following:

1. Foundations, Installations, and Grouting as specified in Section 01600.

2. Lubricants as specified in Section 01300.

3. Special Tools as specified in Section 01300.

4. Bolts, Anchor Bolts, and Nuts as specified in Section 01600.

5. Concrete Inserts and Sleeves as specified in Section 01600.

6. Protection against electrolysis as specified in Section 01063.

7. Nameplates as specified in Section 01300.

8. Operating and maintenance manual specified in Section 01300.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Flygt

B. ABS

C. The design is based on Flygt equipment, which provides the minimum allowable requirements. All changes required as a result of using a different manufacturer's equipment are the responsibility of the Contractor and require RRWRD approval.

2.02 PUMP CONSTRUCTION:

A. Pumps: Solids Handling single-stage, submersible centrifugal pumps.

B. Each pump capable of delivering 2,000 gpm at 16 feet TDH with at least 68% pump efficiency at this design point and capable of delivering 1,000 gpm at 6.5 feet TDH at a stable reduced speed without overheating and without other operational issues.

C. Pump Volute, Casing, Fronthead, and Backhead:

1. Cast iron ASTM A48 minimum Class 35B capable of prolonged resistance to abrasive action of solids and foreign matter contained in pumped liquid.

2. Provide lifting devices on pump/motor assembly for handling.

a. Type 316L stainless steel.

3. Provide ribs or reinforcing as required to withstand the specified hydrostatic test pressure, to prevent deflection caused by hydraulic thrust, and to support the motor.

4. Pump discharge to be 10" diameter.

5. Face and drill flanges of discharge connections in accordance with 125-lb. ANSI Standard.

6. Provide components with machined registered concentric shoulder fits for precision alignment. Equipment without registered fits is not acceptable.

D. Impeller:

1. Type: Single suction, semi-open, multi-vane, back swept, screw shaped, non-clog solids handling.

2. Provide vanes having wide suction and waterways and well rounded entrances that will pass solids and stringy materials without clogging. Pumps capable of passing a minimum 3-inch diameter sphere.

3. Impellers provided shall be a proven design and shall not be greater than 95% of the maximum diameter impeller available at the indicated pump rating point.

4. Material to be hardened ASTM A532 Alloy III A 25% chrome cast iron.

5. Key-seat and hold impeller to shaft by a corrosion resistant streamlined bolt or locknut capable of holding in event of motor reversal under full torque.

6. Statically and dynamically balance each impeller.

E. Wearing Rings:

1. Provide on impeller and in pump volute at suction side.

2. Wearing Rings: Shall be of hard iron high chrome and hardness that will protect the impeller and volute, with the impeller ring (if so equipped) generally wearing prior to the volute ring.

3. Clearance adjustable with a trim screw.

2.03 MOTORS:

A. Provide motors as specified and required.

B. Horsepower rating of motors: Not less than maximum brake horsepower requirements of pumps under any condition of operation specified and indicated without operating in the motor service factor.

C. Maximum motor design speed not to exceed 1,200 rpm.

D. Enclosure: Explosion proof, submersible, Class 1, Division 1 Group D.

E. In addition to the requirements for bearings, provide pump motors with ball or roller bearings. Provide vertical motors with at least one bearing designed specially for thrust. Provide ball or roller bearings, in accordance with AFBMA Standard 9-90 and Standard 11-90; minimum L-10 life of 50,000 hours or as specified.

F. Operate without overheating at the speeds specified and indicated.

G. Service Factor: 1.15

H. Nominal and minimum efficiencies per NEMA MG1.

I. Rating: 15 horsepower, 460 volt, 3 phase, 60 hertz.

J. Motor Construction:

1. Provide electric submersible NEMA B design squirrel cage induction motors.

2. Provide all components housed in an air filled cast-iron watertight enclosure sealed by O-rings and shall have rabbet joints with a large overlap.

3. Insulate stator-winding and lead with moisture resistant Class H insulation rated for 180 deg. C duty temperature. Stator shall be insulated with the trickle impregnation process with winding fill factor greater than 95%.

4. Provide inverter duty rated motor per NEMA MG1 Part 31.

5. Class F insulation and de-rating the motors for VFD operation will not be allowed.

6. Motor shaft: Type 431 stainless steel per ASTM A479, one piece integral pump/motor shaft.

7. Dynamically balance rotor to within NEMA vibration limits.

8. All hardware: Type 316 stainless steel.

9. Provide all multi-conductor cables in sufficient length to extend from pump motor to a junction box above top of wet well plus 5 feet as indicated. Power cables shall be shielded, for use with a VFD. Cable sizes shall be in accordance with NEC specifications.

10. Cables and cable seals shall be water-tight and suitable for at least 50’ continuous submergence in wastewater.

11. Seals:

    a. Provide two separate tandem-mounted mechanical seals with the upper and lower seals mounted to rotate in the same direction.

    b. Upper Seals:

        (1) Provide seal completely immersed in an oil bath sealing the oil chamber and motor housing.

        (2) Materials: Corrosion and abrasion resistant with tungsten-carbide faces, one face rotating and once face stationary.

    c. Lower Seals:

        (1) Provide lower seal with mating faces immersed in the oil bath sealing the pump volute and oil chamber.

        (2) Materials: Tungsten carbide rotating and stationary faces.

(3) Provide a cover extending completely over the lower seal spring.

d. Springs: Type 316 stainless steel.

e. Elastomers: Viton.

f. Provide a seal lubricant chamber. The seals shall not rely on the pumped fluid for lubrication.

12. Moisture and Temperature Probes:

a. Provide a moisture detection system to detect moisture past the upper mechanical seal prior to entering the motor stator cavity. Moisture detection shall alarm at the pump control panel and shall include all the required control components to drive and control the moisture sensor with a one piece cable from pump to panel. Provide conduit and cable from pump to control panel.

b. Provide O-ring sealed plugged fill and drain inspection ports.

c. Provide 3 thermal switches embedded in the stator, one for each phase, for monitoring stator temperature. Stator over temperature shall alarm at the pump control panel and shall include all required control components to drive and control motor temperature.

d. Moisture detection or over temperature shall shut down pumps, indicate condition, and alarm.

13. Integral Pump/Motor Bearings:

a. Provide a minimum of two bearings permanently lubricated but capable of being regreased.

b. Two row angular contact ball bearings. Upper bearing for radial loads and lower bearing for both thrust and radial forces.

c. Minimum L-10 bearing life of 50,000 hours at all conditions on pump curve.

14. Provide all mating surfaces machined and fitted with O-rings. All fittings shall be metal to metal contact between each machine surface.

15. Provide a Type 316 lifting attachment and hardware capable of lifting the entire pump and motor assembly.

16. Motors shall conform to UL quality assurance specifications and be manufactured by an ISO-9001 company.

17. Motors with written 5-year manufacturer's warranty against defects in materials and workmanship for all equipment supplied, including specific schedule of the manufacturer's terms, covering both parts and labor.

2.04 DISCHARGE BASE:

A. Provide an ASTM A48 Class 35B cast iron discharge base assembly including a 90 degree elbow and base to support the entire weight of the pump and motor
B. Base shall secure the lower end of the guide rails.

C. Provide base with 125-lb ANSI flange discharging vertically.

D. Provide base machined to receive sliding bracket of pump discharge.

E. Provide metal to metal seat that is self-cleaning, non-clogging, and non-sparking UL listed explosion-proof. Non-metallic sealing methods are not acceptable.

F. Provide anchors for bolting to concrete floor; anchors shall be Type 316 stainless steel, secured with epoxy adhesive.

2.05 GUIDERAIL ASSEMBLY:

A. Furnish Schedule 40 Type 316L stainless steel guide rails for each pump discharge assembly. Rail size to be manufacturer's standard but not less than 2-inch diameter rails.

B. Provide intermediate supports as required for guide rails; supports to be Type 316L stainless steel. Maximum spacing between supports 10 feet.

C. Furnish a Type 316L stainless steel top guide rail retainer bracket to support the guide rails. Bracket to be attached to top slab of wet well.

D. Provide Type 316 stainless steel chain of sufficient length, to reach from pump to top of wet well plus 6 feet and of strength for lifting pump and motor. Provide chain designed for attachment to lifting lugs provided on motor and to the guide rail retainer bracket.

2.06 ACCESS HATCHES:

A. Hinged plate cover and frame of sufficient size for removal of pumps. Minimum acceptable size is indicated on drawings however if a different pump is used, the cover shall be sized to provide at least 4" of clearance on all sides of the pump. Single or double leaf cover as required.

B. Aluminum angle frames with welded strap anchors for securing in concrete. Miter corners, weld joints, grind welds smooth where exposed.

C. Aluminum tread plate covers with acceptable nonskid surface, reinforced with aluminum bars welded to underside of cover details. Covers fit neatly and accurately in frames.

D. Hinged: Hinge covers to frames with stainless steel, heavy duty plain bearing hinges and stainless steel pins. Attach hinges to covers and frames with stainless steel machine screws, provide flush lift handles made from 1/2-in. dia. 6061-T6 alloy rod. Provide quick release latching device to hold leaf in open position.

E. Fall protection shall be integral to the cover.

F. Mill finish, bituminous coating applied to exterior of the frame for protection from contact with Portland cement concrete.

G. Hatch loading capacity:

1. 300-lbs per square foot.

H. Provide a latching lock to secure the cover in the closed position. Lock to be operated from the outside by a removable key wrench and a fixed handle for operation from inside the cover.

I. Provide all hooks and brackets for guide rails, lifting chain, power, and control cables.

2.07 HARDWARE: All pump hardware and ancillary equipment hardware shall be Type 316 stainless steel.

2.08 CONTROL SYSTEM:

J. Instrumentation and Control:

1. Each pump will be powered through an existing ABB variable frequency drive, located in a building remote from the pump. The VFD shall communicate with and provide pump power through a pump manufacturer provided local pump control panel, for each pair of pumps.

2. Pump manufacturer to provide a Pump Control Panel, NEMA 4X Type 316 stainless steel with a local disconnect for each pump, 120 volt power from a relay in the plant control system, solid state, reset buttons, relays, switches, contacts, indicating and alarm lights, and all necessary appurtenances, factory wired to provide a complete operating set of control. One pump can be off-line and the other pump fully functional Provide intrinsically safe relays.

a. Red running lights
b. Green off lights
c. Amber alarm lights

K. Equipment, cabinets and all devices provided shall be of the heavy-duty type, rated for continuous 24 hour industrial duty. The system shall consist of currently in production products of a single manufacturer wherever possible.

L. Panels furnished under this section shall be of the design and arrangement as indicated and specified. The pump panel's control switches and indicating lights shall be mounted on the outside of the panel door when feasible. Access doors (or access panels), shall have continuous Type 316 stainless steel hinges, with quick opening latching devices.

1. Surfaces containing instruments shall be fabricated from 11 gauge Type 316 stainless steel, reinforced to prevent wracking or distortion.

2. Provide terminal strips numbered with the signal termination numbers indicated on the approved shop drawings. Provide wire numbers indicated on wires at terminal blocks and all connections.

3. Partition intrinsically safe wiring separately from all other wiring. Provide a protective cover with labeling to cover the intrinsically safe wires.

4. Provide electronic equipment of the manufacturer's latest design and coated to prevent contamination by dust, moisture, or fungus. Provide field mounted equipment and system components suitable for dusty, humid, corrosive conditions.

5. Number wiring in accordance with the numbering system used on the approved instrument drawings.

6. Group wiring within the panel accordance to function, and harness together for each pump, or place within ducts and secured to the panel structure.

7. Provide wiring as specified in ISA S-5.4.

8. Provide DPDT switches with contacts rated for 600 VA minimum.

9. Design the system, and equipment used therein, to resume normal operation without manual intervention, following resumption of power after a power failure.

10. Provide protection for 120 VAC operated equipment. Protect panels, cabinets, groups of field equipment, and other equipment enclosures against damaging disturbances by individual isolation transformers, surge suppressors, or gas-tube suppressors.

11. Where required to maintain intrinsically-safe rating, passive devices designed for the purpose, shall be installed according to the equipment, or device manufacturer's instructions. Safety barriers shall not require any external voltage supply, and shall include series resistors and fuses, and shunting zener diodes that will limit the

transfer of energy to levels classified as "intrinsically safe" by Factory-Mutual.

12. Mount all panel components to allow one pump access for servicing, calibration, adjustments, testing, and removal, without the removal of other equipment and while the other pump remains fully functional.

13. Provide internal panel components mounted directly on the inside surfaces, but on removable plates made of the same material and finish as the panel, of a thickness to provide support for mounted components.

14. Attach identification labels to all internal components.

15. Provide pushbuttons oil-tight, heavy-duty momentary contact pushbuttons, rated for 10 amperes at 120 VAC. Supply with the quantity of poles required for the application.

16. Rotary selector switches used for controlling 120 VAC, shall be oil-tight, heavy-duty, maintained contact type rated for 10 amperes at 120 VAC. Rotary switches used for low level control signals shall have gold contacts rated for "dry contact" duty.

17. Provide print storage pocket(s) on inside panel surface to hold all documents to be used in servicing the equipment.

18. Provide oil-tight, heavy duty, transformer-operated pilot lights, with average life of 10,000 hours.

19. Panel relays shall be plug-in, with transparent covers, and shall contain an indicating light to indicate its' operation. Contacts shall be rated for 10 amperes at 120 VAC. Life expectancy shall be 10 million operations.

20. Provide solid-state timers of the plug-in, digital type with output contacts rated for 10 amperes at 120 VAC. Life expectancy shall be 10 million operations.

21. Provide 14 AWG copper, panel wire, control wire, and 12 AWG power wire, type THWN stranded copper, and insulated for 600 volts.

22. Provide terminal strips in existing panel for pump power. Extend pump power wires from existing panel to new pump control panel, without splicing. New wiring to match size of existing power wires. Wiring to each pump shall be easily disconnected from inside the local pump control panel to facilitate pump removal, while the other pump remains fully operational.

23. Provide terminal blocks of corrosion proof material such as nickel plated copper. Provide AC and DC control terminals suitable for #12 AWG or larger wire.

Provide terminals for DC analog signals suitable for #16 AWG wire.

24. Wire colors shall be assigned as follows:

    a. AC Power . . . . . Black

    b. AC Neutral or Common . . . . . White

    c. AC Control . . . . . Red

    d. DC Control . . . . . Blue

    e. Equipment or Panel Ground. . . . . Green

    f. Externally Powered Circuits . . . . Orange

25. Provide internal wiring troughs of the plastic, open-side type with snap-on covers. The open sides shall permit wire movement without disconnecting it.

26. Wire connectors shall be the hook-fork type, with non-insulated barrel to allow inspection of crimp integrity.

27. Direct interlock of equipment is not acceptable.

28. Use only one side of each terminal block row for internal wiring. Use the other side for field wiring. Do not locate terminal blocks within 6 inches of any panel at right angles to them.

29. Provide all relays not provided under other Divisions but required for properly providing the control function defined in this Section.

    a. An example of this requirement is: ON and OFF pilot lights may be controlled by a single pair of wires from a single contact for both conditions; a relay will therefore be required to provide NO and NC contact for both pilot lights. Such relays shall be mounted in their respective control cabinets, and shall be clearly marked as being powered outside of the panel's normal circuit breaker.

30. Provide engraved 1 inch by 3 inch lamicoid nameplates, black letters on white background, for all flush mounted panel equipment.

31. All AC and DC powered devices in panels shall have current fuses or circuit breakers. All protective devices shall be located in groups at one location in the panel. All devices shall be labeled. AC and DC fuse banks or circuit breaker banks shall be in separate locations of the panel.

32. For all signals to be transferred to/from another panel, provide current isolators (analog) or dry relay contacts (discrete) wired out to terminal blocks.

33. Push Button and Selector Switch Stations:

    a. Provide pushbutton and selector switch stations designed for heavy-duty service and with momentary or maintaining contacts as indicated or as necessary for starting and stopping of equipment with 10 amp contact ratings.

34. Circuit Breakers:

    a. Provide manually operable circuit breakers and provide thermal-magnetic, inverse-time-limit overload, and instantaneous, short-circuit protection. U.L. listed circuit breakers conforming to NEMA Standard ABI.

35. Alarms:

    a. Individually sensed and visually indicated locally.

        (1) High temperature, each pump motor

        (2) Moisture detection, each pump motor

    b. Provide alarm contacts for remote common alarm.

36. Provide terminal board for all-external circuits

2.09 SHOP TESTING:

A. Pump Tests:

1. Hydrostatically test each pump casing under a hydrostatic head of 75 psi or 150 percent of rated shutoff head, whichever is greater.

2. Provide certified performance tests as specified for all pumps.

3. Testing.

    a. Run pump at full speed rating point for 60 minutes prior to start of any testing.

    b. Full speed test: Test pump at specified conditions and take not less than six operating points between shut-off and run out. Take readings to determine flow, differential pressure, rpm, horsepower, and efficiency. Also, operate each pump for not less than one hour and take readings to determine that the pump will operate as specified and indicated without cavitation at the specified minimum head condition with not more than the specified NPSH available.

c. Reduced speed tests: generate a family of curves for pump operation at various speeds, including a curve at speed that satisfies the low flow design point.

4. Run all tests in accordance with the latest standards of the Hydraulic Institute and as specified.

5. In the event that specified tests indicates that pump or motor will not meet specifications, The Engineer has the right to require complete witnessed tests for all pumps, and motors at no additional cost to the Owner.

6. Repeat tests until specified results are obtained.

7. Correct or replace promptly all defects or defective equipment revealed by or noted during tests.

2.10 SHOP PAINTING:

A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, manufacturers standard paint.

1. Color: Manufacturer's standard coating system and color.

B. Surface preparation, mixing and application and safety requirements shall be in accordance with the paint manufacturer's printed instructions.

C. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.

D. SPARE PARTS:

A. Provide spare parts that are identical to and interchangeable with similar parts installed.

1. Two complete sets of mechanical seals.

2. Two complete sets of gaskets.

3. For each set of pumps of the same size and performance.

a. One set of all special tools required for maintenance and repair.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Install all items in accordance with printed instructions of manufacturers, as indicated and specified.

3.02 FIELD TESTING:

A. Test removal and replacement of pumps to prove the pumps are properly installed and aligned.

B. After installation of pumping equipment, and after inspection, operation, testing and adjustment have been completed by manufacturer's field service technician, conduct running test for each pump in presence of the Engineer to determine its ability to deliver its rated capacity under specified conditions. During tests, observe and record head, capacity, motor inputs. Immediately correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner. Repeat tests until specified results are obtained. Contractor to provide all labor, piping, equipment, flowmeters, test gauges, and materials for conducting tests.

C. Adjust secondary functions such as alarm actuations during initial calibration, and demonstrated after system is placed in service.

D. Conduct process calibration, such as volumetric drawdown tests on flows and level measurements, on all measuring systems. Document for records and submit to Engineer.

3.03 FIELD TOUCH-UP PAINTING:

A. After installation and approved testing by the Engineer, Contractor shall apply touch-up paint to all scratched, abraided and damaged shop painted surfaces. Coating type and color shall match shop painting.

END OF SECTION

SECTION 15056

PIPE SUPPORTS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide a complete system of pipe supports with necessary inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, and accessories as indicated and specified.

1. Design and provide all support systems for piping, except where supports are specifically designed and shown on the drawings.

2. Design and provide all temporary pipe supports required during construction.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02615: Ductile Iron Pipe and Fittings

C. Section 03300: Cast-in-Place Concrete

D. Section 15370: Process Pipe and Appurtenances

1.03 REFERENCES:

A. American Institute of Steel Construction (AISC) Manual for Steel Construction.

B. American Society for Testing and Materials (ASTM) Publications:

1. A36: Specification for Structural Steel.
A500 GR B Tube Steel.

2. E165: Practice for Liquid Penetrant Inspection Method.

3. E709: Practice for Magnetic Particle Examination.

4. A307: Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

5. A312: Type TP304L stainless steel.

6. A572: Specification for Steel Plate.

C. American National Standards Institute (ANSI):

1. B31.1: Power Piping Code.

D. American Welding Society (AWS) Code:

1. A2.0: Structural Welding Code D1-1-7.

E. Manufacturer's Standardization Society (MSS):

1. MSS SP-58: Pipe Hangers and Supports - Materials and Design.

2. MSS SP-69: Pipe Hangers and Supports - Selection and Application.

3. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.

F. National Association of Expansion Joint Manufacturers.

1.04 DEFINITIONS:

A. Anchor: Unless modified by the words "moment resisting", an anchor is understood to transmit only axial forces to the structures.

B. Guide: Transmits radial loads to the structure, and permits axial movement.

C. Hanger: Use where pipe loads are supported from above.

D. Support: Usually refers to devices transmitting pipe loads to structure located below the pipe, such as piers and stanchions. Broadly refers all devices for carrying pipe loads.

E. Support Element: There are three categories:

1. Structural attachment, such as welded beam clips, beam clamps, plate bolted to concrete, concrete insert, or other device for transmitting support loads to the structure.

2. Pipe wall attachments, such as clevises, clamps, U-bolts, insulated shoes, etc. which are in contact with the pipe itself.

3. Support components, exclusive of above, such as spring cans, rods, turnbuckles, miscellaneous steel, nuts and bolts that join the structural attachment to the pipe wall attachment.

1.05 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Shop and erection drawings stamped and signed by a Professional Engineer registered in Illinois.

2. Shop drawing data for accessory items.

3. Prior to fabrication, submit a copy of the Contractors piping drawing indicating location of pipe supports, identified by hanger mark numbers.

4. Pipe support drawings specified in paragraph 2.03 B, prior to fabrication.

a. Indicate all welds, both shop and field, by Standard Symbols as specified in AWS D1.1-1.7.

5. Pipe stress analysis performed prior to pipe support design.

6. Welding Procedure: Submit description as required to illustrate each welding procedure to be performed in the specified work.

7. Welding Equipment: Submit descriptive data for welding equipment, including type, voltage and amperage.

8. Qualification for Welders: Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If recertification of welders is required, retesting is the Contractor's responsibility at no additional cost to the Owner.

9. Pipe support manufacturer's qualifications as specified in paragraph 1.06.D herein.

a. List of at least five (5) successful pipe support projects and current addresses and telephone numbers of persons in charge of representing the owner or the owner of those construction projects during the time of pipe support design and installation.

b. Qualifications of manufacturer's Registered Professional Engineer who stamps and seals shop drawings and designs.

1.06 QUALITY ASSURANCE:

A. Pipe supports: Conform to the requirements of Manufacturers standardization Society; MSS-SP-58, MSS-SP-69, MSS-SP-89 and paragraphs 120 and 121 of ANSI B31.1 and as specified and indicated.

B. Structural concrete designs: Conform to the requirements of Section 03300. Concrete strength: 4,500 PSI unless noted otherwise.

C. Conform to the requirements of AISC Manual for Steel Construction for miscellaneous steel and supplementary steel. Tube steels are A500 Grade B, wide flange A-36, Plates A-572 or equal. Stainless steel structural members to conform to ASTM requirements for T-304 or T-316 as indicated.

D. Pipe Support Manufacturer Qualifications:

1. Fabricator must submit a written quality assurance program.

2. Have a minimum of 5 years experience in the design of pipe supports.

3. Have completed at least 5 successful pipe support projects of equal size, complexity, and systems as project specified and indicated.

4. Retain the services of a Professional Engineer Registered in Illinois with a minimum of 10 years experience in the design of pipe supports.

1.07 DELIVERY, STORAGE, AND HANDLING:

A. Provide in accordance with Section 01610.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Anvil International

B. Bergen-Paterson.

C. Carpenter-Paterson.

D. Or an acceptable equivalent product.

2.02 MATERIALS:

A. Provide materials used in pipe supports compatible with pipes to which they are attached.

B. Allowable materials: As indicated in ANSI B31.1 Appendix A and MSS-SP-58 Table 2.

C. Provide Type 316L stainless steel for pipe supports, hangers, guides, restraints, and anchors that are submerged, in wetted areas in channels, or in chemically corrosive atmospheres.

D. Provide only new material. Previously used and/or scrap material is not acceptable.

E. Provide tube steels that are A500 Grade B, wide flange A-36, Plates A-572, or equal.

2.03 DESIGN OF PIPE SUPPORTS:

A. Location of pipe supports: As indicated for piping 30-inch and larger. 24-inch and smaller is the responsibility of the Contractor.

B. Provide detailed drawings of each pipe support. Each drawing to contain enough information to verify the pipe support design and to manufacture the device. As a minimum submit:

1. Scaled details of the device with dimensions.

2. A table of applied forces and/or moments.

3. A complete bill of materials.

4. An isometric showing the applied forces and moments.

5. A unique identification number and revision level.

6. Stamp of a Registered Professional Engineer experienced in pipe support design as specified in paragraph 1.06.D.

7. Detailed connections to existing structure.

8. Shop and field welds.

C. Provide pipe supports designed in accordance with the design loads indicated for 30-inch and larger; 24-inch and smaller will also include the following loads:

1. Gravity Force: This force includes the weight of pipe, pipe contents, valves, equipment, insulation, etc.

2. Thermal Expansion Force: This force is developed by the restraint of free end displacement of the piping.

3. Hydrostatic Forces: This force is developed by internal pressure during operation of the piping system.

D. Provide pipe supports that do not overload or overstress the piping, equipment, or structure that they are supporting or are attached to. Allowable pipe stress to be within ANSI B31.1 code allowables.

E. Provide support, guide, and anchor flexible couplings and expansion joints in accordance with the coupling and joint manufacturer's specifications.

F. For piping 30-inch and larger, the deviation of pipe support locations from contract drawings must meet with Engineer's approval.

G. Where possible, provide pipe supports designed using manufacturer's standard catalog products.

1. Provide pipe supports with individual means of adjustment for alignment.

2. Furnish pipe supports complete with appurtenances including locking and adjusting nuts.

3. Hanger rods: subject to tension loads only.

4. Where lateral or axial pipe movement occurs, provide hangers for the necessary swing without exceeding 4 degrees. Provide base pipe supports designed using pipe slides; the bearing surfaces shall have 0.06 coefficient of friction, or less.

5. Provide concrete inserts capable of supporting the design loads.

6. Provide metal framing systems to support piping 2 inches and smaller.

7. Provide insulated pipe supported using rigid load bearing insulation with minimum 16 gage shields to fit between the insulation and the support. Shields to encompass minimum 1/3 of the pipe circumference and be minimum 12 inches in length.

8. Provide load bearing insulation capable of supporting the load, as a minimum on the bottom 90 degrees of the pipe support. Adjust to avoid interference of steel structures.

9. Provide miscellaneous and supplementary steel as needed.

10. Do not support pipe from other pipe, conduits, metal stairs, or equipment.

11. Chain, strap, T-bar, perforated bar, and/or wire hangers are not acceptable.

12. Contact between piping and dissimilar metals such as hangers, building structural work, or equipment subject to galvanic action is not acceptable.

H. Provide thrust anchors to resist thrust due to changes in diameter or direction or dead ending of pipelines. Anchorage required wherever bending stresses exceed allowable for pipe. Wall pipes may be used as thrust anchors only if so designed.

I. Pipe Wall Attachments:

1. Types 2, 5, 6, 7, 12, 26, 36, 37 shall not be used.

2. For copper pipe - Type 9, 10, 11, may be used up to 2", on uninsulated pipe. Copper plated. For larger than 2" and for insulated pipe, Types 1, 3, 4, 24, 38, 40 may be used.

3. For ductile iron pipe, Types 1, 3, 24, 38, 39, 40, 42 may be used.

4. For steel and stainless steel, Types 1, 3, 24, 35, 38, 39, 40, 42, 43, 44, 45, and 46 may be used. For stainless steel, Type 24, 35 and 39 must be stainless T304 or 316. Other types in contact with pipe wall may be Type 304 or 316, or may be isolated from the pipe wall with minimum 22 ga stainless steel shim stock wrapped around the pipe and held in place with stainless steel draw bands.

J. Structural Attachments:

1. Female threaded inserts shall not be used.

2. Types 19, 20, 25, 27, 34 shall not be used.

3. Forged Typed 23 may be used. Cast or formed sheet metal Type 23 shall not be used.

4. For all piping systems Types 18, 22, 28, 29, 30, 31, 32, 33 are acceptable.

5. Plate bolted and grouted to concrete with stud anchors similar to Hilti "Qwik Bolt" or "HVA" are acceptable.

6. Devices embedded in concrete such as Type 18 and patent systems (Unistrut or equal) are acceptable, when utilized in accordance with manufacturers recommendations and approved by Engineer.

K. Use concrete piers to support pipe as indicated and specified, or as approved by Engineer.

L. Support components shall be as required by MSS-SP-58.

2.04 FABRICATION:

A. Provide pipe supports formed in accordance with paragraph 5.1 of MSS-SP 58.

B. Provide welding in accordance with Structural Welding Code.

C. Provide dimensional tolerances as specified in paragraph 2 of MSS-SP-89.

D. Provide threading and tapping in accordance with paragraph 3.2.5 of MSS-SP-89.

2.05 SHOP PAINTING:

A. No painting required as all pipe supports shall be constructed of Type 316 stainless steel or hot dipped galvanized steel.

PART 3 - EXECUTION

3.01 GENERAL:

A. Perform welding in accordance with Structural Welding Code: Except that welding pipe wall attachments to pipe shall be governed by ANSI/ASME B31.1.

1. Visually inspect welding while the operators are making the welds and again after the work is completed. After the welding is completed, hand or power wire brush welds, and clean them before the Engineer makes the check inspection. The Engineer shall inspect welds with magnifiers under light for surface cracking, porosity, and slag inclusions; excessive roughness; unfilled craters; gas pockets; undercuts; overlaps; size; and insufficient throat and concavity. The Engineer shall inspect the preparation of groove welds for throat opening for snug positioning for back-up bars.

2. Nondestructive evaluation of welds connecting structural steel members subjected to critical stresses: Perform in accordance with the weld quality and standards of acceptance in AWS D1.1.

3. Magnetic Particle Inspection: Perform in accordance with ASTM E 709.

4. Liquid Penetrant Inspection: Perform in accordance with ASTM E 165.

5. Weld areas containing defects exceeding the standards of acceptance in accordance with AWS D1.1, Section 3.7. Provide additional testing of the repaired area at no additional cost to the Owner, as required by Engineer.

6. Test locations: As selected by the Engineer.

B. Proceed with installation of pipe supports only after required building structural work has been completed and concrete support structure has reached its 28-day compressive strength as specified in Section 03300.

C. Install pipe supports; comply with MSS SP-69. Group parallel runs of horizontal piping to be supported together on trapeze type hangers.

D. Install pipe supports to provide indicated pipe slopes. Do not exceed maximum pipe deflections allowed by ANSI B31.1.

E. For exposed continuous pipe runs, install pipe supports of same type and style as installed for adjacent similar piping.

F. Install pipe supports to allow controlled movement of piping systems. Permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

G. Piping to be free to move when it expands or contracts except where fixed anchors are indicated. Where hanger rod swing length cannot be provided or where pipe movement based on expansion of 1 inch per 100 feet for each 100 degree F change in temperature exceed 1/2 inch, provide sliding supports.

H. Prevent contact between dissimilar metals. Where concrete or metal pipe support is used, place 1/8 inch thick teflon, neoprene rubber, or plastic strip under piping at point of bearing. Cut to fit entire area of contact between pipe and pipe support.

I. Prevent electrolysis in support of copper tubing by use of pipe supports which are copper plated or plastic coated. Electrician's tape is not an acceptable isolation method.

J. Apply an antiseize compound to nuts and bolts on all pipe supports.

K. Locate reinforcing steel with x-ray in concrete support structure prior to drilling.

3.02 INSTALLATION OF BUILDING ATTACHMENTS:

A. Support piping from structural framing, unless otherwise indicated.

B. Concrete Inserts:

1. Locate inserts so that total load on insert does not exceed manufacturer's recommended maximum load.

2. Use expansion anchors to anchor support to hardened concrete or completed masonry.

3.03 THRUST ANCHORS AND GUIDES:

A. Thrust Anchors:

1. Center thrust anchors between expansion joints and between elbows and expansion joints for suspended piping. Anchors must hold pipe rigid to force expansion and contraction movement to take place at expansion joints and/or elbows and to preclude separation of joints.

2. Restraining rod size and number shall be as indicated.

B. Pipe guides: provided adjacent to sliding expansion joints in accordance with recommendations of National Association of Expansion Joint Manufacturers.

3.04 PIPE SUPPORT:

A. Where piping of various sizes is to be supported together, space supports for largest pipe size and install intermediate supports for smaller diameter pipe.

B. Provide minimum of 2 pipe supports for each pipe run unless approved by the Engineer.

C. Where piping connects to equipment, support by a pipe support and not by equipment.

D. Arrange pipe supports so that there is no interference with maintenance or removal of equipment.

E. Unless otherwise indicated or authorized by Engineer, place piping running parallel to walls approximately 1-1/2 inches out from face of wall and at least 3 inches below the ceiling.

F. Pedestal pipe supports: adjustable with stanchion, saddle, and anchoring flange. Provide grout between baseplates and floor.

G. Piping supports for vertical piping passing through floor sleeves: hot dipped galvanized steel riser clamps.

H. Support piping to prevent strain on valve, fitting, or equipment. Provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, adjacent to nonrigid joints, and where otherwise indicated. Do not install pipe supports in equipment access areas or bridge crane runs.

I. Stacked horizontal runs of piping along walls may be supported by a metal framing system attached to concrete insert channels.

J. Do not support piping from other piping.

3.05 GALLERY AND TUNNEL PIPING:

A. Support piping by a metal framing system. Extend framing across gallery or tunnel and down both walls or columns to floor.

B. Maintain 3 feet clear around all equipment and devices in all trades.

3.06 INSULATED PIPING:

A. Attach clamps, including spacers, to piping with clamps projecting through insulation; do not exceed allowable pipe stresses.

B. Where low compressive strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields. For pipe 8 inch and over, install wood insulation saddles.

C. Where insulation without vapor barrier is indicated, install protection saddles on piping 2 inch and larger.

END OF SECTION

SECTION 15101

VALVES, HYDRANTS, AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide valves, hydrants, and miscellaneous piping appurtenances as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

C. Electrical work and equipment specified herein to conform with requirements of applicable electrical sections.

1.03 REFERENCES:

A. American Society for Testing and Materials (ASTM):

1. ASTM A48: Specification for Gray Iron Castings.

2. ASTM A126: Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

3. ASTM A536: Specification for Ductile-Iron Castings.

4. ASTM B61: Standard Specification for Steam or Valve Bronze Castings.

5. ASTM B62: Standard Specification for Composition Bronze or Ounce Metal Castings.

6. ASTM B98: Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.

7. ASTM B271: Standard Specification for Copper-Base Alloy Centrifugal Castings.

8. ASTM B584: Standard Specification for Copper Alloy Sand Castings for General Applications.

9. ASTM D1785: Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.

B. American National Standards Institute (ANSI):

1. ANSI B2.4: Hose Coupling Screw Threads.

2. ANSI B16.1: Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, 800.

3. ANSI B16.4: Cast-Iron Threaded Fittings, Class 125 and 250.

4. ANSI B16.10: Face-to-Face and End-to-End Dimensions of Ferrous Valves.

C. American Water Works Association (AWWA):

1. AWWA C500: Standard for Gate Valves, 3 in. through 48 in. NPS, for Water and Sewage System.

2. AWWA C502: Standard for Dry-Barrel Fire Hydrants.

3. AWWA C503: Standard for Wet-Barrel Fire Hydrants.

4. AWWA C507: Standard for Ball Valves, Shaft- or Trunnion - Mounted - 6 in. through 48 in. - for water pressures up to 300 psi.

5. AWWA C509: Standard Specifications for Resilient-Seated Gate Valves, 3 in. through 12-in. NPS, for Water and Sewage Systems.

D. American Wood-Preserver's Association (AWPA):

1. C18: Standard for Pressure Treated Material in Marine Construction.

2. P2: Standard for Creosote and Creosote Solutions.

E. Steel Structures Painting Council (SSPC):

1. SP10: Surface Preparation Specifications, No. 10 Near White Blast Cleaning.

F. Aluminum Association (AA):

1. Aluminum Alloy and Temper Designation.

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Submit manufacturer's specifications, catalog data, descriptive matter, illustrations, certified shop drawings, wiring, diagrams, etc.

2. Operating and maintenance instructions and parts lists.

1.05 QUALITY ASSURANCE:

A. Provide the services of the manufacturer's representative in accordance with Section 01300 for the following:

1. Motor operated valves

B. Suitable-type enclosures for specified atmospheres.

C. Single manufacturer for gate and check valves.

D. Contractor responsible for verifying outside diameter of pipe to be tapped.

E. Engineer reserves right to test motor operated valve controls by placing an obstruction in valve opening and attempting to close valve.

F. Painting:

1. Shop coats compatible with and made by same manufacturer as field applied coats. All coating surface preparation and coating use, mixing, application, and curing in accordance with current printed instructions of coating manufacturer.

2. Coatings in contact with potable water, in any part of municipal water system, suitable for use with potable water, approved for such use by USFDA or other appropriate authorities and not to impart harmful chemicals, taste, or odor to water.

G. Brass or lamicoid valve identification tags, minimum 1 sqare inch stamped or engraved.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610.

PART 2 - PRODUCTS

2.01 GATE VALVES - 4-INCH AND LARGER:

A. General:

1. Non-potable water service: Use solid wedge, resilient seat gate valves.

2. Metallic seated valves: Conform to AWWA C500 except as herein modified.

3. Resilient seated valves: Conform to AWWA C509 except as herein modified.

4. Use bronze grades A, D, or E of AWWA C500 or C509 for wetted bronze parts.

5. Working water pressure: Minimum:

Valve Size	Pressure
4 to 12-in.	175 psi
14-in. and larger	150 psi
14 to 24-in.	150 psi
30-in. and larger	120 psi

6. Exposed valves: Flanged OS&Y valves. Face-to-face dimensions to comply with ANSI B16.10 and flanges with ANSI B16.1.

7. Buried valves: Mechanical joint ends, non-rising stem valves with operating nut in lieu of hand wheel. Provide gate boxes, steel extension stems or universal-joint operating rods with 2-in. square operating nuts at upper end with coupling connected to valve stem to bring operating nut to within 3 feet of ground surface.

8. Provide counterclockwise rotation to open valves (on non-potable water).

9. Provide handwheels with arrow and word "open" to indicate open direction.

10. Provide geared operators for all valves 8-inch and larger. Gearing shall be steel with enclosed cases. Provide bevel gears where required by position of valve. Provide buried valves with totally enclosed gear cases to enclose both the gears and valve stuffing box and provide gasketed stainless steel removable cover plates with stainless steel fasteners to allow access to the stuffing box.

11. Provide conventional packing in OS&Y valves.

12. Provide conventional packing or double O-rings in non-rising stem valves.

13. Valves capable of being repacked or O-ring replaceable while under pressure.

14. Provide corrosion resistant steel bolts and bronze nuts for stuffing box follower.

B. Solid Wedge Gate Valves:

1. Manufacturers: Apollo Valves; Crane Co.; M&H; Walworth Co; Stockham Valves and Fittings Co.; or acceptable equivalent product.

C. Resilient Seat Gate Valves:

1. Manufacturers: Clow Corp.; M&H; Kennedy Div.; American-Darling Valve Div.; or acceptable equivalent product.

2. Provide resilient seats of materials that are resistant to liquid in valve.

2.02 GATE VALVES - 3-INCH AND SMALLER:

A. Manufacturers: Apollo Valves; Crane Co.; Walworth Co.; Jenkins Bros.; or acceptable equivalent product.

B. 200-lb. WOG minimum bronze valves having screwed or solder-joint ends, union bonnet, rising stem, inside screw, solid wedge gate with silicon bronze stem. ASTM B62, body material.

2.03 SWING CHECK VALVES:

A. Valves 3-in. and larger:

1. Manufacturers: APCO Valves; Apollo Valves; Crane Co.; M&H Division; American-Darling Valve Div.; Mueller Co.; or acceptable equivalent product.

2. Iron-body, bronze mounted, full opening swing check valves with bolted covers.

3. Flanged ends faced and drilled to ANSI B16.1.

4. Working water pressure as follows:

Size	Pressure
3 to 12 inches	175 psi
14-in. and larger	150 psi

5. Wetted bronze parts shall contain less than 16 percent zinc.

6. Equip with outside lever and counter weights.

B. Valves 2-1/2 in. and smaller:

1. Manufacturers: Crane Co.; Walworth Co.; Stockham Valves and Fittings Co.; or acceptable equivalent product.

2. Screwed ends, 200-lb. WOG minimum, 158 bronze or all-brass swing-check valves. Screw-on cap and renewable composition discs.

3. Wetted bronze parts shall contain less than 16 percent zinc.

2.04 NON-LUBRICATED ECCENTRIC PLUG VALVES:

A. Manufacturers: DeZurik, Inc.; Val-Matic Valve & Mfg. Co.; or acceptable equivalent product.

B. Non-lubricated, eccentric type with resilient seats are required for all sludge process services including RAS and WAS.

C. Bodies of cast iron, ASTM A126 Class B with bolted bonnets. Suitable for 175 psi working pressure for valves 12-in. and smaller and 150 psi for valves 19-inch. and larger.

D. Port areas of valves 20-in. and smaller not less than 80 percent of pipe area. Port areas of valves 24-in. and larger not less than 70 percent of pipe area.

E. Valve seats of Neoprene or Buna-N synthetic rubber. Seat material shall coat the plug or shall be held by a stainless steel seat ring and shall be held attached to the valve with self-locking stainless steel screws.

F. Provide valves with coated plugs with mating seats of 90 percent, minimum, pure nickel welded into the body of valves 3-in. and larger.

G. Provide valves with seats clamped to valve with mating seat of 90 percent, minimum, pure nickel welded to the valve, or coat the valve body with thermally bonded nylon and coat the valve plug and bonnet with thermally bonded epoxy.

H. Upper and lower plug journal bearings either thermally bonded epoxy coatings, or removable, permanently lubricated stainless steel bushings for valves 20-in. and smaller; and bronze bearings with stainless steel bushings for valves 24-in. and larger.

I. Stem seals of either adjustable multiple V-packing or multiple point contact rubber rings. Stem seals replaceable without valve disassembly.

J. Flanged ends faced and drilled 125-lb. AN Standard for exposed valves 3-inches and larger; screwed ends on smaller valves. Mechanical joint ends for buried valves.

K. Valves 6-inches and under: wrench operated except as specified or indicated. Valves 8-inches and larger: gear operated with handwheels. Gear operators: totally enclosed worm gear or traveling nut type, permanent lubrication, watertight and dustproof, with adjustable open and closed stops and plug position indicator.

L. Buried or submerged valves: Provide gear operator with operating nut and valve box or handwheel as indicated. Gear operator to be totally enclosed with gasketed stainless steel covers with stainless steel fasteners for access to valve packing.

M. Provide gear operators for all valves with valve centerlines 6 feet 6-inches or higher above operating floor. Furnish with chain wheel, chain guides and galvanized chain that reaches to within 3 feet of floor.

N. Provide one wrench for each six wrench-operated valves and at least one wrench for each operating station. Provide gear operator for valves where lack of space prevents wrench operation. Provide wrench of sufficient length for easy operation at rated working pressure.

O. Provide motor operators where indicated. Motor operators as hereinafter specified under Electric Motor Operator.

2.05 BALL VALVES:

A. Manufacturers: Apollo Valves; Henry Pratt Co.; or acceptable equivalent product.

B. Provisions:

1. Rubber-seated ball valves, shaft or trunnion-mounted, used in lieu of cone valves of hydraulically operated plug type, complete with hydraulic cylinder, control devices, piping, and all necessary appurtenances. All ball valves product of one manufacturer.

2. Conditions of service, valve controls, materials, workmanship, and testing as specified.

3. Conform to AWWA C507 except as herein modified.

4. Body: Cast iron or ductile iron, flanged ANSI B16.1 with support legs or pads; Class 150.

5. Plug: Cast iron or ductile iron, with full unobstructed circular port diameter.

6. Seats: Single or double seated, mounted on body plug, resilient seat to be Buna-N or other synthetic elastomer resistant to oil and grease. Wearing surfaces to be 316 stainless steel. Droptight shutoff in both directions.

7. Bearings: Bronze sleeve type, zinc free, permanently lubricated. Provide two-way thrust bearing.

8. Shafts: Stainless steel, chrome moly steel or monel, keyed or pin connected to plug.

9. Seals: O-ring bearing seals and O-ring or split-V-type packing shaft seal.

10. Cast in raised letters on body, size of opening, name of maker, year of manufacturer, and working pressure for which designed.

2.06 HOSE GATES:

A. Manufacturers: Walworth Co.; Jenkins Bros.; or acceptable equivalent product.

B. For 1-1/4-in hose: Assembly of 1-1/4-in. bronze gate valve, bronze pipe nipple and male cam and groove coupling as specified in Section 15370.

C. For 3/4-in. hose: 175-lb. minimum WOG, ASTM B62 bronze, solid wedge nonrising-stem gate or angle valve, female standard pipe thread on inlet and male hose thread on outlet, bronze cap and brass chain. Threads ANSI B2.4.

2.07 POLYVINYLCHLORIDE (PVC) VALVES:

A. Manufacturers: Celanese Piping Systems, Inc.; Chemtrol; Harvel Plastics, Inc.; Walworth Co.; or acceptable equivalent product. Single manufacturer for valves, fittings and adjacent pipe.

B. Materials: All-plastic construction, socket-ends, of ball, check (swing or ball acceptable), needle, angle or diaphragm type with Viton seals and Teflon seats, except diaphragm type valves with metal bonnet and stem parts.

C. Diaphragms for chlorine solution service of reinforced rubber (neoprene not acceptable for this service).

D. 125 psi (nonshock) minimum rating at 75 deg. F; ASTM D1785, Type I, Grade 1.

2.08 TAPPING SLEEVES AND VALVES:

A. Manufacturers: Mueller Co.; M&H Valve & Fittings; Clow Corporation; or acceptable equivalent product.

B. Tapping sleeves and valves consist of split cast-iron sleeve tee with mechanical joint ends on main, flange on branch, and tapping type gate valve with one flange end and one mechanical joint end. Valve conforming to requirements for gate valves specified in this Section and furnished with 2-in. square operating nut.

2.09 CURB STOPS:

A. Manufacturers: Mueller Co. (Oriseal type); Ford Meter Box Co. (Ball-valve type); Hayes Mfg. Co. (Type 4008-CF); or acceptable equivalent product.

B. Minneapolis pattern, bronze stops with threaded ends, bronze stem and key, bronze ball or plug, O-ring port and stem seals.

C. Combined cap and tee handle to accommodate threaded service box.

2.10 CORPORATION STOPS:

A. Manufacturers: Clow Corporation; Mueller Co.; or acceptable equivalent product.

B. Materials: Bronze with a lapped, ground key. Inlet thread of steep taper type. Outlet connections to suit type of pipe or tubing connected.

2.11 FIRE HYDRANTS:

A. Manufacturers: Kennedy Valve Mfg. Co.; Kupferle Foundry Co.; Mueller Co.; or acceptable equivalent product.

B. Conform to requirements of AWWA C502 for automatic drain type dry barrel fire hydrants.

C. Provide 5-1/4 -in. valve with 6-in. mechanical joint or push on joint connections suitable for 6 ft. of bury.

D. All bronze alloy parts exposed to water shall be made from grade A, D or E bronze.

E. Provide "Traffic" or "Breakaway" barrel.

F. Provide one 4-1/2-in. pumper connections and two 2-1/2-in. hose connections. Hose and pumper connection threads National Standard 2 Hose Screw Threads.

G. Valve opened by turning valve counterclockwise direction. Pentagonal operating nut 1-1/2-in. from point to opposite flat at the bottom of the nut.

2.12 FLUSHING HYDRANTS:

A. Manufacturers: Josam Mfg. Co.; Zurn Industries, Inc.; Wade Inc.; Kupferle Foundry Co.; or acceptable equivalent product.

B. Provide freeze proof cast brass hydrant with brass casing, removable brass operating parts, neoprene plunger, aluminum shield, 2 inch threaded hose connection, and wheel operator. Provide hydrant for 6 foot depth of bury.

2.13 ELECTRIC MOTOR OPERATORS:

A. Manufacturers: EIM Actuation Products (TEC2); Rotork (IQ3).

B. Each motor operator includes an electric motor, reduction gearing, and limit controls. Gears totally enclosed in a waterproof and dustproof housing with integrally cast mounting for motor, and separate compartment with removable cover for limit controls.

C. Provide a strip heater in the compartment.

D. Motor operator designed for use with the project required valves.

E. Size motor operator to fully open or fully close the butterfly valve in a period of time no greater than 60 seconds.

F. Each operating unit capable of being operated manually.

G. Reduction unit of the worm-gear type, worm and planetary spur type, modified planetary type, or acceptable reduction unit of the spur-gear type. Spur gear with cut teeth. If worm gears are used, worm shaft operates in ball or roller bearings and be machine cut, ground and highly polished; worm wheel of bronze and with a large contact area. The worm, spur gears, and all shafts of heat-treated steel and accurately machined. The output or driving shaft operates in bronze bearings or in ball or roller bearings. Make provisions to take the thrust in both directions.

H. The operator controlled locally and be a remote signal as specified under Section 13200.

I. Provide local control of operator by a pushbutton station with buttons for OPEN, STOP, and CLOSE. Provide red and green indicating lights on operator. The green light lighted when the valve becomes completely opened; the red light when the valve becomes completely closed. Both red and green lights lighted during operation at intermediate positions or when operator is stopped at any intermediate position. Control circuits operate on 120-volt, single-phase, 60-Hertz current, supplied by a suitable control transformer.

J. All contacts and operating parts made of noncorrodible metal.

K. Provide pushbutton station as a separate enclosure attached to the adjacent structure. Each unit includes a fuse enclosed with the station to protect the operator.

L. Enclose pushbuttons in a watertight case with a suitable door and latch and without a lock. The control circuits operate on 120-volt, single-phase, 60-Hertz current.

M. Limit controls for operators, positive in action and ensuring tight seating and full openings. Design mechanism to minimize drift or overtravel and to open or close gate or valve to a fixed, predetermined point at every operation. Controls disconnect driving mechanism from stem. Controls of either the geared-limit or torque-limit type, but capable of ready adjustment for predetermined limits of opening and closing travel.

N. Operating units fully wired at the factory and furnished complete with terminal strips for external power and control connections.

O. Provide high torque, totally enclosed reversing motors of standard make and with grease packed bearings. Motor starting torques equal to 2-1/2 times the running torque. Motor speed not to exceed 1800 rpm.

P. Motor operates on 480 volt, three-phase, 60-Hertz electrical power.

2.14 VALVE BOXES:

A. Manufacturers: Clow Corporation; Mueller Co.; or acceptable equivalent product.

B. Materials:

1. Valve boxes adjustable, telescoping, heavy-pattern type of cast iron. Designed and constructed to prevent direct transmission of traffic loads to pipe or valve. Adjustable through at least 6 in. vertically without reduction of lap between sections to less than 4 in. Inside diameter at least 4-1/2 in. Lengths as necessary for depths of valves or stops with which boxes are used. Top of cover flush with top of box rim. Cast arrow and word OPEN to indicate direction of turning to open valve in top of valve covers.

2. Curb boxes for curb stops, cast iron extension type, Minneapolis pattern base, diameter to suit curb stop size; flush cover marked WATER.

2.15 FLOOR BOXES

A. Manufacturers: Clow Corporation; Mueller Co.; Coldwell-Wilcox Co.; or acceptable equivalent product.

B. Cast iron with bronze bushing, sized to accommodate extension stem and suitable for installation in concrete floor. Provide bronze cover with recesses cast or drilled for inserting spanner-type wrench for removal of cover. Suitable wrench for removal of cover furnished with box.

2.16 FLOORSTANDS:

A. Furnished by gate or valve manufacturer.

B. Crank-operated type with either single or double gear reduction depending upon lifting capacity required. Provide with threaded cast bronze lift nut to engage operating stem. Tapered roller bearings above and below flange on operating nut to support both opening and closing thrusts. Floorstands to operate at rated capacity with not greater than 40-lb. pull on crank or hand wheel. Gears, where required, of steel with machined cut teeth designed for smooth operation. Pinion shafts on crank-operated floorstands, either single

or double ratio, supported on tapered roller bearings or other approved bearings. All components totally enclosed in cast-iron case and cover. Positive mechanical seals on operating nut and pinion shafts to exclude moisture and dirt and prevent leakage of lubricant. Lubricating fittings for lubrication of all gears and bearings. Floorstands having cast-iron pedestal with input shaft or hand wheel, arrow with word OPEN.

C. Provide clear, rigid, plastic stem covers for rising stem valves and gates. Provide floorstands for use with portable operators with removable hand wheels or cranks.

2.17 BENCHSTANDS:

A. Furnished by gate or valve manufacturer.

B. Benchstands similar to floorstands except provided with cast-iron base in lieu of pedestal for mounting at any convenient height.

2.18 T-HANDLE OPERATING WRENCHES:

A. Furnished by gate or valve manufacturer.

B. T-handle operating wrenches provided in lengths necessary to permit operation of all valves by operators of average height working in normal positions.

C. Provide one wrench for every six (6) wrench operated valves (one minimum).

2.19 PAINTING:

A. For ferrous surfaces not submerged (TWO SHOP COATS) of Pug Primer made by Koppers Co., Inc.; Carboline admiral AD-1567 Primer made by Carboline Company; Tnemec 77 Chem-Prime made by Tnemec Co.; Chromox 13R50 Primer made by Mobil Chemical Co.; or acceptable equivalent product.

B. For ferrous surfaces submerged (ONE SHOP COAT) Koppers 654 Primer made by Koppers Co., Inc.; Carboline 193 Primer made by Carboline Co., Inc.; or acceptable equivalent product.

C. Application:

1. Paint equipment and appurtenance in shop before exposure to weather and after thorough cleaning to remove all rust, dirt, grease, and other foreign matter.

2. Blast clean submerged ferrous surfaces, including full height of sluice gates, to near-white metal in accordance with SSPC-SP10, immediately before painting.

3. Paint surfaces in shop upon cleaning as follows:

a. Shop finish with asphalt varnish all interior surfaces of all hydrants, iron body gate valves, exterior surfaces of buried or submerged valves and gates, and miscellaneous piping appurtenances.

b. Shop prime submerged ferrous surfaces immediately after blast-cleaning to near-white metal, with one coat of polyamide epoxy having not less than 43 percent solids content by volume, applied to a min. of 3 mils dry film thickness.

c. Shop prime non-submerged ferrous surfaces with two coats of primer.

4. Shop coat ferrous surfaces, not painted, with grease or other protective coating.

2.20 PAINTING:

A. Provisions:

1. Shop finish interior surfaces of all hydrants, iron body gate valves, the exterior surfaces of buried or submerged valves and gates, and miscellaneous piping appurtenances with asphalt varnish.

2. Apply coats of paint filler and enamel or other acceptable treatment customary with manufacturer, to floorstands and similar parts customarily shop finished.

PART 3 - EXECUTION

3.01 GENERAL:

A. Prior to installation, protect stored valves and appurtenances from damage due to exposure to sunlight, heat, dirt, debris, freezing and thawing, vandalism, etc.

B. Clean all debris, dirt, gravel, etc, from inside of piping before placing valves in place.

C. Erect and support valves in respective positions free from distortion and strain on appurtenances during handling and installation. Inspect material for defects in workmanship and material. Clean out debris and foreign material from valve openings and seats, test operating mechanisms to check proper functioning, and check nuts and bolts for tightness. Repair, valves and other equipment which do not operate easily or are otherwise defective.

D. Set plumb and support valves adequately in conformance with instructions of manufacturer. Shim valves mounted on face of concrete vertically and grout in place. Install valves in control piping for easy access.

E. Provide sleeve type coupling or flexible type grooved coupling on downstream side of buried valves to assist in valve removal.

F. Provide valves with extension stems where required for convenience of operation. Provide extension stems for valves installed underground and elsewhere so that operating wrench does not exceed 6 ft. in length.

G. Provide chain wheel operators on all valves 4-in., and larger where handwheel or lever exceeds 6-ft., 6-in. above floor or operating platform. Provide geared operator where required to position chainwheel in vertical position.

H. Chain of chain operators to extend within 3 ft. of operating floor. Provide two S-shaped hooks for each chain to enable chain to be hooked away from personnel traffic.

3.02 GATE VALVES:

A. Install gate valve stem as indicated or with stems between horizontal and vertical up. Valves installed with stems below horizontal not allowed.

3.03 CHECK VALVES:

A. Install swing check valves horizontally in pipeline carrying sewage or sludge.

3.04 PLUG VALVES:

A. Install valves in horizontal sewage and sludge piping with shaft horizontal such that in open position, plug located in upper part of valve body. Valves oriented so that in closed position, plug is at downstream end of valve.

3.05 HYDRANTS:

A. Set plumb, and center buried valve and valve box. Tamp earth fill carefully around valve box to a distance of 4 ft. on all insides of box, or to undisturbed trench face, if less than 4 ft. At least same depth of cover on hydrant and connecting pipe as distribution main. Set hydrant upon slab of stone or concrete not less than 4 in. thick and 14 in. square. Firmly wedge side of hydrant opposite pipe connections against vertical face of trench with concrete thrust block. Not less than 7 cu. ft. of broken stone placed around base of hydrant at location of drain holes. Backfill around hydrants as specified under Section 02210. Clean hydrant and valve interiors of all foreign matter before installation and inspect in opened and closed positions.

3.06 FLOORSTAND OPERATORS AND STEM GUIDES:

A. Set floorstand operators and stem guides so stems run smoothly in true alignment. Anchor guides firmly to walls. Check distances from centerlines of gates to operating level or base of floorstand and adjust if necessary to suit actual conditions of installation.

3.07 VALVE BOXES:

A. Provide valve box for each buried stop and valve.

B. Set box so top is flush with finished surface and so box does not bear on valve, stop, or pipe.

3.08 PAINTING:

A. Touch-up abraded areas of shop coat with paint of same type as shop coat, even to extent of applying entire coat if necessary, and clean deteriorated surfaces, before applying touch-up coat.

B. Apply painting when temperature not less than 40 deg. F. and humidity not greater than 85 percent or if rain has not been forecast, unless otherwise permitted by Engineer.

3.09 SPARE PARTS:

A. Provide suitable lever or wrench for each six wrench-operated plug valves and at least one wrench for each operating station. Wrenches or wheels and chains of suitable size and sufficient length for easy operation of valves at rated working pressure.

END OF SECTION

SECTION 15370

MISCELLANEOUS PROCESS PIPING AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Provide and test all miscellaneous pipe, fittings, and appurtenances as indicated and specified.

1.02 RELATED WORK:

A. Division 1: General Requirements

B. Section 02210: Earth Excavation, Backfill, Fill, and Grading

C. Section 02615: Ductile-Iron Pipe and Fittings

1.03 REFERENCES:

A. American Welding Society: AWS B3.0

B. Manufacturer's Standardization Society: MSS SP-69

1. ASTM A47: Standard Specification for Malleable Iron Castings

C. American Society for Testing and Materials:

1. ASTM A53: Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless

2. ASTM A105: Standard Specification for Forgings, Carbon Steel, for Piping Components

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

4. ASTM 181: Standard Specification for Forgings, Carbon Steel, for General Purpose Piping

5. ASTM 197: Standard Specification for Cupola Malleable Iron

6. ASTM A307: Standard Specification for Carbon Steel Externally Threaded Standard Fasteners

7. ASTM B43: Standard Specification for Seamless Red Brass Pipe, Standard Sizes

8. ASTM B62: Standard Specification for Composition Bronze or Ounce Metal Castings

9. ASTM B75: Standard Specification for Seamless Copper Tube

10. ASTM B88: Standard Specification for Seamless Copper Water Tube

11. ASTM D1330: Standard Specification for Rubber-Sheet Gaskets

12. ASTM D1599: Standard Test for Short-Time Rupture Strength of Plastic Pipe, Tubing and Fittings

13. ASTM D1785: Standard Specification for Polyvinylchloride (PVC) Plastic Pipe, Schedules 40, 80 and 120

14. ASTM D2564: Standard Specification for Solvent Cements for Polyvinylchloride (PVC) Plastic Pipe and Fittings

15. ASTM D2855: Standard Practice for Making Solvent Cemented Joints with Polyvinylchloride (PVC) Pipe and Fittings

D. American National Standards Institute:

1. ANSI B16.1: AN Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800

2. ANSI B16.3: AN Standard for Malleable Iron Threaded Fittings, Class 150 & 300

3. ANSI B16.9: AN Standard for Factory-Made Wrought Steel Buttwelding Fittings

4. ANSI B16.15: AN Standard for Cast Bronze Threaded Fittings, 125 and 250 lb

5. ANSI B16.18: AN Standard for Cast Copper Alloy Solder-Joint Pressure Fittings

6. ANSI B16.22: AN Standard for Wrought Copper and Bronze Solder-Joint Pressure Fittings

7. ANSI B16.26: AN Standard for Cast Copper Alloy Fittings for Flare Copper Tube

1.04 SUBMITTALS:

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTALS:

1. Submit manufacturer's certificates of conformance.

2. Submit certified copies of test reports.

1.05 QUALITY ASSURANCE:

A. Provide manufacturer's certification that materials meet or exceed minimum requirements as specified.

B. Reject materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, and acid solder.

C. Pipe-joint compound, for pipe carrying flammable or toxic gas, must bear approval of Underwriters' Laboratories or Factory Mutual Engineering Division.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Provide in accordance with Section 01610.

B. Receiving:

1. Inspect and inventory items upon delivery to site.

2. Store and safeguard material in acceptable place and manner.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. 250 WSP Unions: Brass or bronze unions for joining nonferrous pipe, malleable brass or bronze-seated iron or steel unions for joining ferrous pipe, PVC unions for joining PVC pipe.

B. Solid String or Wire Solder: 95 percent tin and 5 percent antimony, inside piping; and silphos solder, underground piping.

C. Flanged Joints: Bolt and nuts, Grade B, ASTM A307-78; bolt number and size same as flange standard; studs - same quality as machine bolts; 1/16-in. thick rubber gaskets with cloth insertions; rust-resistant coatings.

D. Sleeve Type Couplings or Fittings: 3/4-in. tierods, 3/4-in. bridles, pipe clamps.

E. Temporary Plugs: Plugs or caps; watertight plugs for exterior buried piping.

F. Sleeve-Type Couplings: Style 38 couplings, manufactured by Dresser Mfg. Div., Bradford, PA; Style 411 couplings, manufactured by Rockwell International, Municipal & Utility Div., Pittsburgh, PA; Series 200 coupling manufactured by R.H. Baker & Co., Inc., Los Angeles, CA; coupling with galvan-ized steel bolts, nuts and liquid exposure type gaskets or acceptable equivalent product.

G. Fiberglass pipe, glass reinforcement and resin; dielectric bushings.

H. Wall Sleeve Seals: Compression type units with molded rubber links and bolt holes, elongated backup washers, Type 316 stainless steel nuts and bolts.

I. Flexible Connections: Flanged spool type, Standard class 1 180 deg. F maximum service, single filled arch with synthetic rubber tube and cover, steel-ring reinforced asbestos or synthetic fiber carcass, with flanges drilled to 150-lb. ANSI B16.5 Standard; Garlock Style 204, or acceptable equivalent product.

2.02 STEEL PIPE AND FITTINGS:

A. ASTM A120

B. Materials:

1. Carbon steel, ASTM A120, Schedule 40, seamless or electric resistance welded, black or galvanized as indicated.

C. Joints:

1. Pipe 2-1/2 in. and smaller made up with screwed joints using malleable-iron fittings, black or galvanized, to match pipe. Pipe larger than 2-1/2-in. made up with welded joints and butt-weld steel fittings. Flanged connections to equipment and valves made with 150-lb. welding-neck flanges. Flat faced flanges.

D. Fittings:

1. Butt welding type of carbon steel to match pipewall thickness, ASTM A234, conforming to ANSI B16.9 standards; use all long radius ells on piping carrying sludge, with cleanouts where indicated.

2. Screwed type of 150-lb. malleable iron, black or galvanized to match the pipe, ASTM A197 or A47, conforming to ANSI B16.3. Unions of 150-lb. malleable iron with brass to iron seat.

E. Flanges: Forged steel, ASTM A181, slip-on or welding neck type, drilled and faced 150-lb. 1/16-in. raised face ANSI B16.5 Standard; flat-face, welding neck type ANSI B16.1 Standard for all connections to valves and equipment.

F. Gaskets: For flanged joints, 1/16 in. thick, rubber, with cloth insertion ring gaskets.

G. Hangers and Supports: Pipe supports with accessories; MSS SP-58; MSS SP-69; vertical adjustment hangers with expansion anchors. Stainless steel or galvanized per location.

H. Testing Material: Furnish testing plugs or caps, pressure pumps, pipe connections, meters, gages, other equipment and labor.

I. Coating and Adhesive:

1. Manufacturer: Polyethylene coating X-Tru-Coat manufactured by Republic Steel Corp., Cleveland, OH; plastic coating manufactured by Pipe Line Service Corp., Franklin Park, IL; or acceptable equivalent product.

2. Coat buried steel pipe with factory-applied coating of polyethylene, bonded to pipe with hot applied elastic adhesive. Coating and adhesive with minimum thickness, as recommended by coating manufacturer. Field coating of welded joints and field repairs to factory-applied coating made with pressure-sensitive tape and primers recom-mended by manufacturer of polyethylene coating.

3. Shop Coat: Steel hangers and supports with approved zinc chromate primer and compatible with field finish coats.

2.03 COPPER TUBING:

A. Materials:

1. Type L copper tubing in building, drawn-temper with cast-bronze or wrought-copper, soldered joint fittings. Type K buried tubing drawn temper for sizes larger than 1 in.; tubing 1 in. and smaller Type K annealed temper. ASTM B88.

B. Joints: Soldered

C. Fittings: Cast-bronze

1. Cast Bronze Solder - Joint Pressure Fittings: ANSI B16.18

2.04 POLYVINYLCHLORIDE PIPE:

A. Material:

1. Pipe: ASTM D1785, Type I, Grade 2, Schedule 80 normal impact pipe of rigid unplasticized virgin polyvinylchloride.

B. Joints and Fittings: Solvent, socket-weld coupling; flanges not permitted.

C. Flanges (where required for connection to valves or equipment): Socket-weld type of same material and classification as pipe assembled with Type 316 stainless steel bolts, nuts and washers.

D. Gaskets: 1/16-in. full-face chlorine-resistant rubber.

E. Solvent: ASTM D 2564.

F. Solvent Cement: ASTM D 2564.

G. Thread Lubricant: As recommended by manufacturer of pipe or fittings.

2.05 SLEEVE TYPE COUPLINGS:

A. Manufacturer: Style 38 couplings made by the Dresser Mfg. Div., Bradford, PA; Rockwell Style 411 couplings made by Rockwell International, Municipal & Utility Div., Pittsburgh, PA; Baker Series 200 made by R.H. Baker & Co., Inc., Los Angeles, CA; or acceptable equivalent product.

B. Provisions: Couplings provided with galvanized steel bolts and nuts and gaskets of composition suitable for exposure to liquid within pipe.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Ensure interior lines parallel to building walls wherever possible. Install piping to accurate lines and grades, and support by acceptable hangers spaced as necessary, but not more than 8 ft. apart. Pipe supports specified under Section 15052 except horizontal runs of polyvinylchloride piping continuously supported on epoxy-coated lightweight steel channel with maximum channel hanger spacing of 5 ft. and vertical runs supported with clamps at a maximum spacing of 3 ft. on center. Where temporary supports are used, ensure rigidity, to prevent shifting or distortion of pipe. Provide for expansion where necessary.

B. Support piping laid in trenches in trench on bed of selected backfill material which maintains desired line and grade.

C. Pitch all piping toward low points. Provide for draining low points.

D. Before assembly, remove all dirt and chips from inside pipe and fittings and from threads.

E. After cutting to final lengths, ream ends of steel pipe and ream copper tubing to remove burrs.

F. Clean-cut threads of all long tapered screwed joint. Make up screwed joints with acceptable pipe-joint compound applied to male threads only.

G. Disjoint entirely, joints which are required to be backed off. Wipe clean, threads of both pipe and fittings. Apply new joint compound. Reassemble connection.

H. No close nipples allowed.

I. Prepare solder joints for copper tubing by cleaning ends of tubing and inner surfaces of fittings with steel wool until bright. Give cleaned surfaces thin coating of acceptable soldering flux, and insert tubing end into fitting as far as possible. Heating and finishing of joint done in accordance with recommendations of manufacturer of the fittings, using solid string or wire solder composed of 50 percent tin and 50 percent lead inside, and 95 percent tin and 5 percent antimony underground. Use of cored solder not permitted.

J. Cut and burr flared joints for copper tubing. Slip sleeve nut on tubing and flare end with flaring tool. Take care not to crack or split flared portion. If inspection reveals damage, cut flare off and make new flare. Seat flared end squarely on fitting and tightened nut.

K. Use dielectric bushings or unions when ferrous pipes join nonferrous pipes carrying liquid either underground or elsewhere.

L. Use sufficient number of unions for dismantling of all water pipe, valves, and equipment. 250 WSP Unions made of brass or bronze for joining nonferrous pipe and malleable iron or steel with brass or bronze seats for joining ferrous pipe.

M. Welding in accordance with AN Standard B31 and AWS B3.0.

N. Install welding fittings on all welded lines. Make changes in direction and intersection of lines with welding fittings. Do not miter pipes to form elbows or notching of straight runs to form tees, or any similar construction. Do not employ welder who has not been fully qualified in above specified procedure and so certified by approved welding bureau or similar locally recognized testing authority.

O. Install fiberglass pipe in strict accordance with the manufacturer's instructions. Coat field cut ends with resin. Apply successive layers of glass reinforcement and resin to butt and wrapped joints. Cure in accordance with manufacturer's recommendations.

P. Make flanged joints with bolts; bolt studs with nut on each end; or studs with nuts where one flange is tapped. Number and size of bolts conforming to same AN Standard as flanges. Grade B bolts and nuts conforming to ASTM A307. Bolt studs and studs of same quality as machine bolts. Ring gaskets of rubber with cloth insertion, 1/16-in. thick gaskets. Before flanged pieces are assembled, remove rust-resistant coatings from machined surfaces, clean gaskets and smooth all burrs and other defects. Make up flanged joints tight, care being taken to prevent undue strain upon valves or other pieces of equip-ment.

Q. Install tierods, pipe clamps or bridles when sleeve type couplings or fittings are used in piping system where indicated, and at changes in direction or other places as necessary, to prevent joints from pulling apart under pressure. Bridles and tierods at least 3/4-in. in diameter, except where tierods replace flange bolts of smaller size, in which case fit with nut on each side of pair of flanges.

3.02 INSTALLATION OF COPPER PIPING:

A. Inspection:

1. Examine areas to receive piping for:

a. Defects that adversely affect execution and quality of work.

b. Deviations beyond allowable tolerances for piping clearances.

2. Start work only when conditions are satisfactory.

B. Piping Layout:

1. Complete installation to present neat orderly appearance.

2. Do not block openings or passageways with piping.

3. Run piping parallel to walls of building.

4. Keep piping free from contact with structure or installed items.

5. Allow clearances for expansion and contraction of pipe.

6. Anchor horizontal runs over 50 ft. (15.3 m) at midpoint to force expansion equally toward ends.

C. Workmanship:

1. Examine pipe and fittings before installation to assure no defective materials are incorporated.

2. Keep inside of pipe and fittings free of dirt and debris.

D. Placement:

1. Vertical Piping:

a. Secure at sufficiently close intervals to keep pipe in alignment and to support weight of pipe and contents.

b. Install supports at each floor or vertically at intervals of not more than 10 ft. (3 m).

c. If piping is to stand free of support, or if no structural element is available for support during construction, secure in position with wooden stakes or braces fastened to pipe.

2. Horizontal piping, suspended:

a. Support at sufficiently close intervals to maintain alignment and prevent sagging.

b. Support 1-1/4-in. or smaller pipe at 6-ft. (1.8 m) intervals.

c. Support 1-1/2-in. or larger pipe at 10-ft. (3 m) intervals.

d. Install hangers at ends of runs or branches and at each change of direction or alignment.

3. Horizontal piping, underground:

a. Lay piping on firm bed for entire length of trench except where supports are otherwise provided.

b. Employ partial backfilling and cradling to hold pipe in secure position during backfilling operations.

c. Backfill evenly on both sides of pipe to maintain alignment.

d. Anchor piping laid on grade prior to embedment in concrete.

4. Bending pipe:

a. Bend pipe by any method and to any radius within manufacturer's recommendation.

b. Only bend surface free of cracks and buckles.

5. Solder joints:

a. Ream or file pipe to remove burrs.

b. Clean and polish contact surfaces of joint.

c. Apply flux to both male and female ends.

d. Insert end of tube into fittings full depth of socket.

e. Bring joint to soldering temperature, in as short a time as possible.

f. Form continuous solder bead around entire circum-ference of joint.

6. Brazed joints:

a. Ream or file pipe to remove burrs.

b. Clean and polish contact surfaces of joint.

c. Apply flux to both male and female ends.

d. Insert end of tube into fittings full depth of socket.

e. Bring joint to brazing temperature in as short a time as possible.

f. Form continuous bead of filler material around entire circumference of joint.

7. Flared joints:

a. Ream or file pipe to remove burrs.

b. Slip fitting over tube end to be flared.

c. Expand end of tube using flaring tool.

d. Tighten joint fitting.

3.03 HANGERS AND SUPPORTS:

A. Piping supported by connected equipment NOT PERMITTED; supports with accessories; hanger locations not generally on drawings; support systems by contractor; supplied information for typical provisions, adapt for actual system requirements; MSS SP-69 when details not provided; type number unit identification in above MSS Standard practice bulletins; maximum 10-ft. spacing for hangers and supports; secure supports with consideration for expansion, contraction, vibration and prevention of force transmission to equipment; multiple or trapeze hangers when several pipes are parallel; expansion type anchors for, building secured, hangers; adjust hangers after installation; hanger location: one hanger immediately adjacent to each change of direction and offset,

additional hangers where installation of in-line equipment produces con-centrated loads; guides or supports at offsets except where right angle bends for expansions.

3.04 WALL SLEEVE SEALS:

A. Expand rubber against pipe and sleeve by tightening bolts when assembled around pipe and inserted in wall.

3.05 TEMPORARY PLUGS:

A. Close open ends of pipe with temporary plugs or caps when pipe installation is not in progress. Use watertight plugs for exterior, buried piping and if water or debris is in trench when work is resumed, do not remove until adequate provision has been made to prevent any water or debris entering pipe even if it necessitates dewatering trench.

3.06 PROTECTIVE COATING (STEEL PIPE):

A. Clean surfaces to be tape wrapped immediately before wrapping.

B. Apply tape in two plies (half lap).

C. Repair any damage to coating by application of tape wrap for at least two complete turns around the pipe.

3.07 TESTING:

A. After installation, test all pipelines for watertightness. Furnish suitable testing plugs or caps, pressure pumps, pipe connections, gages, other equipment, all labor, and all water.

B. Disconnect all equipment and devices which may be damaged by test pressures.

C. Do not cover joints in underground piping with backfill material until piping has successfully passed pressure test.

D. Where feasible, test pressure at least 100 psi or 1-1/2 times normal operating pressure, whichever is greater, and maintained for at least 30 minutes.

E. Repair faulty joints even to extent of disassembling and remaking joint, remove defective pipe and fittings, and replace in manner satisfactory to Engineer.

3.08 PAINTING:

A. Paint exposed piping and supports as required and specified.

END OF SECTION

SECTION 16000

ELECTRICAL REQUIREMENTS

PART 1–GENERAL

1.01 DESCRIPTION:

A. Work includes general requirements for electrical work associated with this project.

1.02 RELATED WORK:

A. Division 1 – General Requirements.

B. Division 11 - Equipment.

1.03 REFERENCES:

A. ANSI/NFPA 70–National Electrical Code.

B. ANSI/IEEE C2–National Electrical Safety Code.

C. Classified locations referenced in the Specifications or on the Drawings shall be as defined in the NEC.

1.04 REGULATORY REQUIREMENTS

A. The rules and regulations of the federal, state, and local authorities and utility companies in force at the time of execution of the Contract shall become a part of this specification.

B. When requested, CONTRACTOR shall provide written calculations to demonstrate compliance with applicable codes and the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction box fill and sizing, pull box fill and sizing, conductor de-rating, and voltage drop. CONTRACTOR shall indicate calculation method used as well as compliance with applicable code, drawing, and specification.

1.05 CONTRACT DOCUMENTS:

A. The Drawings and Specifications are complementary and are to be used with each other to fully define the Work.

B. The drawings are generally diagrammatic, showing approximate desired locations and arrangements. Not all boxes, panels, etc. are shown on the drawings. CONTRACTOR shall coordinate the Work so that interferences are avoided. Provide all materials, offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to OWNER.

C. In preparing a Bid, CONTRACTOR shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the drawings and specifications. All cases of serious conflict or omission between the drawings, specifications, and codes shall be brought to ENGINEER’s attention, as

herein before specified. CONTRACTOR shall carry out work and complete construction as required by applicable codes and ordinances.

D. Any equipment roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to OWNER.

E. Discuss equipment locations with ENGINEER as to desired location in the various areas. In no case should equipment locations be determined by scaling drawings. Relocate equipment and bear cost of redoing work of other trades' work necessitated by failure to comply with this requirement.

F. Electrical devices and equipment, etc., may be relocated in the best interest of the final product. Where relocation is within 10 feet of location shown on the drawings, and when CONTRACTOR is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at CONTRACTOR's expense.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS:

A. Included in this Contract are electrical connections to equipment provided under other Divisions. CONTRACTOR shall refer to final shop drawings for equipment being furnished under other Divisions, for exact location of electrical equipment, and the various connections required.

1.07 SYSTEM DESCRIPTION:

A. Provide a complete electrical system for each pump as indicated on the drawings or specified herein including, but not limited to:
   1. Feeders, branch wiring, and electrical distribution equipment.
   2. All control wiring.
   3. Access panels and access doors for access to equipment.
   4. Wiring between system components if equipment is not pre-wired.
   5. Support system design and supports for electrical raceways.
   6. Code-required disconnects.

B. CONTRACTOR shall connect the following equipment and Divisions 11 and 15 consisting of components indicated on the drawings or specified herein, including, but not limited to:
   1. Pumps and control panels.

C. Provide miscellaneous items for a complete and functioning system as indicated on the drawings and specified herein.

D. CONTRACTOR shall provide and install control wiring and components as indicated and specified; all wires shall be labeled at each end. The OWNER will complete terminations in the plant control system cabinets only, with the CONTRACTOR completing terminations to equipment and CONTRACTOR supplied panels.

1.08 QUALITY ASSURANCE:

A. All electrical components shall bear the UL label, FM label, or other agency labels as appropriate for the materials.

1.09 SUBMITTALS

A. CONTRACTOR shall submit to ENGINEER for approval prior to beginning work, shop drawings on the equipment and all electrical materials proposed to be furnished and installed in the Work. See Section 01300–Submittals for requirements.

B. CONTRACTOR shall submit record drawings detailing the completed Work.

C. CONTRACTOR shall submit Operations & Maintenance manuals for the completed work.

D. CONTRACTOR shall submit test reports for all electrical testing specified herein.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment and products shall be of new manufacture, free of defects, and standard products in accordance with the applicable specifications.

B. All equipment shall be UL labeled and NEMA approved.

C. Unless specified otherwise, major distribution equipment such as motor starters, VFDs, etc., shall each be by the same manufacturer.

D. All equipment and wiring shall be selected and installed for conditions in which it will perform with appropriate NEMA rated enclosures (NEMA 4X).

E. All current carrying elements including, but not limited to, wire, bus bars, switches, fuse holders, windings, etc. shall be solid copper, tin-plated solid copper, or silver-plated copper, without exception. Wire shall be stranded copper.

F. All conduit and fittings associated with this project shall be PVC coated rigid steel. All ends shall be protected from the elements.

G. All panels and hardware used on this project shall be manufactured of Type 316 stainless steel.

PART 3–EXECUTION

3.01 CONTINUITY OF SERVICE

A. CONTRACTOR shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period with no more than two pumps out of service at any time.

B. CONTRACTOR shall assume that start-up activities will be performed at separate times for each of the pumps.

C. All testing that can be performed in the dry shall be completed and then the off-line tank filled for return to service. The re-activated tank and pump shall be in service for at least 4 days before the next tank can be removed from service.

D. No service shall be interrupted or changed without permission from OWNER. Written permission shall be obtained before any work is started.

E. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.02 CLEANUP AND REMOVAL OF RUBBISH

A. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.03 CONCRETE WORK

A. All cast-in-place concrete for new electrical equipment bases shown on the drawings shall be provided by CONTRACTOR, except where specifically noted to be provided by others. All new equipment shall be set on 3 1/2-inch minimum leveling slabs including MCCs, free-standing enclosures, switchgear, etc. Pads shall be 3 inches larger on each side than equipment being supported.

B. Concrete shall comply with Section 03300 Cast-In-Place Concrete.

C. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.04 PAINTING

A. All painting of electrical equipment shall be done by CONTRACTOR unless equipment is specified to be furnished with factory-applied finish coats.

B. All electrical equipment shall be provided with factory-applied finish, unless PVC coated, stainless steel, or otherwise specified.

C. If the factory finish on any equipment furnished by CONTRACTOR is damaged in shipment or during construction, the equipment shall be refinished by CONTRACTOR.

D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.05 CAULKING

A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

B. Caulking sealant shall be silicone construction sealant as manufactured by General Electric or two-part polysulfide conforming to the requirements and bearing the seal of the Thiokol Chemical Corporation, or as otherwise approved by the OWNER.

C. Caulking sealant shall contain no acid or ingredients that will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

D. Caulking shall be performed by craftsman skilled at such work.

3.06 BUILDING ACCESS

A. CONTRACTOR shall arrange for the necessary openings in the building, structure, or existing panels as necessary to allow for admittance of all apparatus.

B. When the installation requires openings and access through existing construction and the openings are not provided, CONTRACTOR shall provide the necessary openings.

3.07 COORDINATION

A. Provide wiring for all motors and all electrically powered or electrically controlled equipment.

B. All starters, VFDs, disconnects, relays, wire, conduit, pushbuttons, pilot lights, and other devices for the power and control of motors or electrical equipment shall be provided by CONTRACTOR except as specifically noted elsewhere in these specifications or on the drawings.

C. Where starters, VFDs, or other devices are provided by others, they shall be connected and wired by CONTRACTOR.

D. CONTRACTOR's drawings and specifications shall show number and horsepower rating of all motors furnished, together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment after the Contract is awarded, any additional costs because of these changes shall be the responsibility of CONTRACTOR. The existing pump VFDs and power wiring are for 15 horsepower pumps.

E. All motors shall be provided for starting in accordance with local utility requirements and shall be compatible with the existing VFDs as specified herein or under the other sections of the specifications.

F. CONTRACTOR shall provide all line voltage power and control wiring (100 volts and above), for operation, control, and supervision of all motorized equipment, including wiring between motor starters, VFDs, and control devices as specified herein and as shown on the drawings.

G. CONTRACTOR shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.

3.08 EXCAVATION AND BACKFILL

A. Backfill of exterior trenches shall be compacted granular fill, unless otherwise noted. Compaction shall meet the requirements of Section 02210 Earth Excavation, Backfill, Fill, and Grading.

B. All below ground electrical shall be in concrete encased duct banks.

C. Care shall be taken to ensure no disturbance of bearing soil under foundations.

3.09 EQUIPMENT ACCESS AND LOCATION

A. CONTRACTOR shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment not just that installed under this division. Any components for the electrical systems that are installed without regard to the above shall be removed and relocated as required to provide adequate access at CONTRACTOR's expense.

B. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim to fit the various types of ceiling, wall, or floor finishes. Provide materials that will fit properly the types of finishes actually installed.

C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by CONTRACTOR at no additional cost. Conduit shall be installed overhead on stainless steel supports to provide 7 feet of clearance beneath the conduit and to avoid tripping hazards.

D. Electrical equipment, devices, instruments, hardware, etc., shall be installed with ample space allowed for removal, repair, calibration or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment that is to be installed or that is already in place.

E. Locate electrical equipment to fit the details, panels, decorating, or finish of the space. ENGINEER shall reserve the right to make minor position changes of the equipment before the Work has been installed.

3.10 WORKMANSHIP

A. Install work using procedures defined in NECA Standard of Installation.

B. Locations of process equipment, as shown on the drawings, are approximate.

C. Equipment and control devices required under these specifications shall be mounted in a code-approved manner.

D. Locations of utilization equipment and control devices as shown on the drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance will be performed at no additional cost to OWNER.

E. Unless otherwise noted, equipment shall be fastened to building structure or equipment framework and not placed on the floor.

F. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.

G. Materials and equipment of the types for which there are Underwriters Laboratories (UL) listings shall be so labeled and shall be used by CONTRACTOR.

3.11 AREA CLASSIFICATION

A. As noted on the drawings.

3.12 MODIFICATIONS TO EXISTING CONSTRUCTION

A. Alterations:
   1. Alter, extend, and reconnect conduits as necessary.
   2. Reconnect existing conduits that were reused, cut, or exposed because of construction as quickly as possible.
   3. Where wiring is involved, new wires shall be “pulled in” between the nearest available accessible reused outlets to the extent allowed by the governing code.
   4. Provide new conduits for wires if they cannot be “pulled in” to existing conduits.
   5. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit.
   6. Where existing electrical equipment, devices, fixtures, electrically operated items, etc., interfere with any remodeling work, they shall be removed and reinstalled in another location to avoid such interferences. All existing and relocated equipment shall be left in good operating condition.

B. CONTRACTOR shall remove all electrical equipment, conduit, and wiring associated with the structures, equipment, and control systems specified herein and/or shown on the Drawings to be removed.

C. Bid shall include the removal of existing electrical material and equipment as specified hereinafter, as noted on the drawings, or as needed by field conditions. This includes removal of all conduit and wiring between the existing junction box in each pump house and each pump. The wiring can be re-used from the Aeration Building to each pump house, provided adequate termination strips can be added to the existing junction boxes.

D. Provide stainless steel cover plates for all existing recessed outlet and junction boxes not being reused. Seal or cap all existing conduit penetrations not being reused.

END OF SECTION

Section III

Contract Forms

Proposal

Project:	**RAS Pump Replacement Pilot Project (RSP-5 and RSP-6)** **Capital Project No. 1859**
Location:	RRWRD Treatment Plant located at 3333 Kishwaukee Street, Rockford, Winnebago County, Illinois
Completion Date:	December 31, 2018
Liquidated Damages:	$300/calendar day per each completion date deadline

To: Board of Trustees
Rock River Water Reclamation District
3501 Kishwaukee Street
Rockford, IL 61109

From: _____
(Individual, Partnership or Corporation, as case may be)

_____
(Address of Individual, Partnership or Corporation)

Gentlemen:

I (We), the undersigned, hereby propose to furnish all materials, equipment, tools, services, labor, and whatever else may be required to construct and place in service the above subject Sanitary Sewer for the Rock River Water Reclamation District all in accordance with the plans and specifications, provided by the Rock River Water Reclamation District. The undersigned also affirms and declares:

1. That I (we), have, examined and am (are) familiar with all the related contract documents and found that they are accurate and complete and are approved by the undersigned.

2. That I (we), have carefully examined the site of the work, and that, from my (our) investigation, has satisfied myself (ourselves) as to the nature and location of the work, the character, quality, and quantity of materials and the kind and extent of equipment and other

facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, effect the work or its performance.

3. That this bid is made without any understanding, agreement or connection with any other person, firm, or corporation making a bid for the same purposes, and is in all respects fair and without collusion or fraud; and that I (we) are not barred from bidding as a result of a bid-rigging or bid-rotating conviction.

4. That accompanying the Proposal is a Bidder's Bond in the amount specified in Article 1, Notice to Bidders, payable to the Board of Trustees of the Rock River Water Reclamation District, which it is agreed, shall be retained as liquidated damages by said Rock River Water Reclamation District if the undersigned fails to execute the Contract in conformity with the contract documents incorporated in the contract documents and furnish bond as specified, within ten (10) days after notification of the award of the contract to the undersigned.

5. The Bidder is of lawful age and that no other person, firm or corporation has any interest in this Proposal or in the Contract proposed to be entered into.

6. The Bidder is not in arrears to the Rock River Water Reclamation District, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the Rock River Water Reclamation District.

7. No officer or employee or person whose salary is payable in whole or in part by the District is, shall be or become interested, directly or indirectly as a contracting party, partner, stockholder, surety of otherwise, in this Proposal, or in the performance of the Contract, or in the work to which it is relates, or in any portion of the profits thereof.

8. The Bidder which I represent complies with all applicable requirements of the Americans with Disabilities Act (ADA) and the Occupational Safety and Health Act (OSHA) and that if said bidder is awarded a contract, it will complete all OSHA-required or ADA-required employee and customer training, will make available all required information, and will hold harmless and indemnify the District and the District's representatives.

In regard to participation in an approved Apprenticeship program, upon request, Contractor will be required to provide written proof of participation.

9. The undersigned, as Bidder, declares that he has adopted and promulgated written sexual harassment policies in accordance with Public Act 99-093 and will make this information available upon request.

10. The undersigned, as Bidder, declares he will comply with prevailing wages in accordance with the Illinois Department of Labor Standards. The State of Illinois requires contractors and subcontractors on public works projects (including the Rock River Water Reclamation District) to submit certified payroll records on a monthly basis, along with a statement affirming that such records are true and accurate, that the wages paid to each worker are not less than the required prevailing rate and that the contractor is aware that filing false records is a Class B Misdemeanor. The successful Bidder shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Prevailing wage rates may be found on the Illinois Department of Labor website at http://www.illinois.gov/idol/Laws-Rules/CONMED/Pages/Rates.aspx .

The certified payroll records must include the name, address, telephone number, social security number, job classification, hourly wages paid in each pay period, the number of hours worked each day, and the starting and ending time of work each day, for every worker employed on the project. Any contractor who fails to submit a certified payroll or knowingly files a false certified payroll is guilty of a Class B Misdemeanor. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (SBE 348) or other approved equal.

11. The undersigned, as Bidder, declares he will comply with the Federal Drug Free Workplace Act.

12. The undersigned, as Bidder, declares he will comply with Public Act 83-1030 entitled "Steel Products Procurement Act".

13. The undersigned, as Bidder, declares he will comply with Public Act 96-929 (30 ILCS 570) regarding Illinois residents employment.

14. The undersigned, as Bidder, declares he will comply with non-discrimination in employment in accordance with the Illinois Fair Employment Practices Commissions Rules & Regulations.

15. The undersigned, as Bidder, declares that he currently participates in an apprenticeship or training program that is registered with the United States Department of Labor's Bureau of Apprenticeship and Training or other acceptable State of Illinois Department of Labor monitored program.

In submitting this bid, it is understood that the right is reserved by the Rock River Water Reclamation District to reject any and all bids. It is agreed that this bid may not be withdrawn for a period of sixty (60) days from the opening thereof.

The undersigned further declares that he (they) has (have) carefully examined the following items of work and that the cost of all the work to complete this project is given in this Proposal.

LUMP SUM BID AMOUNT

1. Total Amount of Lump Sum Bid, expressed in figures, for providing all materials, equipment, warranty, and labor to complete this project in conformity with all specifications in this Invitation to Bid:

   $_____

The undersigned acknowledges that they have received Addendum numbers _____, _____, _____, and realizes that all Addenda are considered part of the contract.

Date: _____

Bidder: _____ By: _____

(print name of firm) (authorized rep's signature)

_____ _____

(print street address) (print rep's name)

_____ _____

(print city, state, zip) (print rep's title)

_____ _____

(area code and phone number) (facsimile number)

Note: The Rock River Water Reclamation district, a Governmental Unit, pays neither Federal Excise Tax nor Illinois Retailers' Occupational Tax. The bidder shall exclude those taxes from their bid.

Section 00310

EQUIPMENT QUESTIONNAIRE

The Bidder shall enter in the spaces provided the names of the manufacturers of equipment which Bidder proposes to furnish, and shall submit this Equipment Questionnaire with its Proposal. Owner will review and evaluate the information before award of the Contract.

Only one manufacturer's name shall be listed for each item of equipment. Upon award of a contract, the named equipment shall be furnished. Substitutions will be permitted only if named equipment does not meet the requirements of the Contract Documents, the manufacturer is unable to meet the delivery requirements of the construction schedule, or the manufacturer is dilatory in complying with the requirements of the Contract Documents. Substitutions shall be subject to concurrence of Owner and shall be confirmed by Change Order.

Preliminary acceptance of equipment listed by manufacturer's name shall not in any way constitute a waiver of the specifications covering such equipment; final acceptance will be based on full conformity with the Contract Documents.

Failure to furnish all information requested or entering more than one manufacturer's name for any item in this Equipment Questionnaire may be cause for rejection of the Proposal.

Equipment	Manufacturer
1. Submersible Solids Handling Pumps And Appurtenances, Section 11304	_____
2. Non-Lubricated Eccentric Plug Valves, Section 15101	_____
3. Swing Check Valves, Section 15101	_____

END OF SECTION

Fair Employment Practices Affidavit of Compliance

PROJECT: RAS Pump Replacement Pilot Project (RSP-5 and RSP-6), Capital Project No. 1859

NOTE: THE BIDDER MUST EXECUTE THIS AFFIDAVIT AND SUBMIT IT WITH ITS SIGNED BID. THE ROCK RIVER WATER RECLAMATION DISTRICT CANNOT ACCEPT ANY BID WHICH DOES NOT CONTAIN THIS AFFIDAVIT

_____, being first duly sworn, deposes and says that:
(Name of person making affidavit)

They are: _____ of _____
(Officer's Title) (Company Name)

that said company is and "Equal Opportunity Employer" as defined by Section 2000(e) of Chapter 21, Title 42 of the United States Code annotated and Federal Executive Orders #11375 which are incorporated herein by reference;

and that said company will comply with any and all requirements of Title 44 Admin. Code 750. APPENDIX A – Equal Opportunity Clause, Rules and Regulations, Illinois Department of Human Rights, which read as follows:

"In the event of the contractor's non-compliance with the provisions of this Equal Employment Opportunity Clause, the Illinois Human Rights Act or the Rules and Regulations of the Illinois Department of Human Rights ("Department"), the contractor may be declared ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and the contract may be cancelled or voided in whole or in part, and such other sanctions or penalties may be imposed or remedies invoked as provided by statute or regulation. During the performance to this contract, the contractor agrees as follows:

1. That it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizen status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service; and further that it will examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization.
2. That, if he or she hires additional employees in order to perform this contract or any portion of this contract, he or she will determine the availability (in accordance with the Department's Rules and Regulations) of minorities and women in the areas from which he or she may reasonably recruit and he or she will hire for each job classification for which employees are hired in a way that minorities and women are not underutilized.
3. That, in all solicitations or advertisements for employees placed by him or her or on his or her behalf, he or she will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, sexual orientation, marital status, national origin or ancestry, citizenship status, age, physical or mental handicap unrelated to ability, sexual orientation, military status or an unfavorable discharge from military service.
4. That he or she will send to each labor organization or representative of workers with which he or she has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the contractor's obligations under the Illinois Human Rights Act and the Department's Rules and Regulations. If any labor organization or representative fails or refuses to cooperate with the contractor in his or her efforts to comply with such Act and Rules and Regulations, the contractor will promptly so notify the Department and the contracting agency and will recruit employees from other sources when necessary to fulfill its obligations under the contract.
5. That he or she will submit reports as required by the Department's Rules and Regulations, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and the Departments Rules and Regulations.
6. That he or she will permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and the Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and the Department's Rules and Regulations.
7. That he or she will include verbatim or by reference the provisions of this clause in every subcontract awarded under which any portion of the contract obligations are undertaken or assumed, so that the provisions will be binding upon the subcontractor. In the same manner as with other provisions of this contract, the contractor will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply with the provisions. In addition, the contractor will not utilize any subcontractor declared by the Illinois Human Rights Commission to be ineligible for contacts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations.

(Source: Amended at 32 I11. Reg. 16484, effective September 23, 2008)"

IL Dept of Human Rights Registration No.: _____ Expiration Date: _____

_____
Signature

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

_____
Notary Public

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we:

_____ (hereinafter called the Principal) and

_____ (hereinafter called the Surety)

a Corporation chartered and existing under the laws of the State of _____ with its principal offices in the City of _____ and authorized to do business in the State of Illinois are held and firmly bound onto the Rock River Water Reclamation District of Winnebago County, Illinois (District), in the full and just sum of: **TEN PERCENT (10%) OF THE TOTAL BID PRICE** good lawful money of the United States of America, to be paid upon demand of the District, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, and assigns, jointly and severally and firmly by these presents.

WHEREAS, the Principal is about to submit, or has submitted to the District, a proposal for constructing Sanitary Sewers and Appurtenances.

WHEREAS, the Principal desires to file this bond, in accordance with law, to accompany this Proposal.

NOW THEREFORE, The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within ten days after the date of receipt of a written notice of award of Contract, execute a Contract in accordance with the Proposal and upon the terms, conditions, and prices set forth therein, in the form and manner required by the District, and execute a sufficient and satisfactory Contract Performance Bond payable to said District in an amount of one hundred percent (100%) of the Contract price (including alternates) in form and with security satisfactory to said District, then this obligation to be void, otherwise to be and remain in full force and virtue in law; and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid District, upon demand, the amount hereof in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this ___ day of _____, 20___.

_____

Principal

(Seal) By _____

Name:_____

Title:_____

Date:_____

ATTEST:

_____
Secretary

_____

Surety

(Seal)

By_____

Name:_____

Title:_____

Date:_____

Agreement

1. General

THIS AGREEMENT, made and concluded this__ day of _____, 2018, between the Rock River Water Reclamation District, Rockford, Illinois (District), acting by and through the Board of Trustees, and _____, his/their executors, administrators, successors or assigns:

2. Scope of Work

WITNESSETH: That for and in consideration of the payments and agreements made in the Proposal attached hereto, to be made and performed by the District and according to the terms expressed in the Bond referring to these presents, the Contractor agrees with the District at his/their own proper cost and expense to do all the work, furnish all equipment, materials and all labor necessary to complete the work in accordance with the plans and specifications hereinafter described, and in full compliance with all of the terms of this agreement and the requirements of the District and its representative.

And it is also understood and agreed that the Bidding Requirements, Detailed Specifications, Contract Forms, General Conditions, General Requirements, Technical Specifications, Plans, Addenda, and provisions required by law are all essential documents of the contract, and are a part hereof, as if herein set out verbatim or as if attached, except for titles, subtitles, headings, table of contents and portions specifically excluded.

3. Contract Price

The District shall pay to the Contractor, and the Contractor shall accept, in full payment for the performance of this Contract, subject to any additions or deductions provided for hereby, in current funds, the Total Contract Price of _____ and 00/100 ($_____).

Payments are to be made to the Contractor in accordance with and subject to the provisions of Section 7 of this Agreement, which is a part of this Contract.

4. Bond

The Contractor has entered into and herewith tenders a bond of even date herewith, in the penal sum of _____ and 00/100 ($_____) to insure the faithful performance of this Contract, which said bond is hereby made a part of this Contract by reference.

5. Maintenance and Guarantee

The Contractor shall promptly repair, replace, restore or rebuild any imperfections that may arise and shall maintain satisfactory to the District all work for a period three years from the date of final acceptance of the Contract for trench settlement and for a period of two years all other work, except where periods of maintenance and guarantee are provided for. The Contractor shall, for this period, indemnify and save harmless the District, its officers and agents from any injury done to property or persons as a direct or alleged result of imperfections in the Contractors' work, and shall immediately assume and take charge of the defense of such action or suits in like manner and to all intents and purposes as if said actions and suits had been brought directly against the Contractor.

If the Contractor shall fail to repair, replace, rebuild or restore such defective or damaged work promptly after receiving notice given by the District, the District shall have the right to have the work done by others and to call on the Contractor and his bondsman to pay the costs thereof.

6. Contract Execution

IT IS EXPRESSLY UNDERSTOOD AND AGREED that the entire improvement shall be done in a thorough and workmanlike manner, under the direction and to the satisfaction of the District and in full compliance with all the requirements of its representative under them. All loss or damage arising out of the nature of the work to be done, or from any detention of unforeseen obstruction or difficulty which may be encountered in the prosecution of the work, or from the action of the elements, shall be sustained by the Contractor.

The Contractor will be held responsible for all accidents, and hereby agrees to indemnify and protect the District from all suits, claims, and actions brought against it, and all cost, and damages which the District may be put to by reason of an injury or alleged injury, to the person or property of another in the execution of this contract, or the performance of the work, or in guarding the same, or for any material used in its prosecution or in its construction.

Any person employed on the work who shall refuse or neglect to obey the directions of the District or its representative, or who shall be deemed by the District to be incompetent, or who shall be guilty of any disorderly conduct, or who shall commit any trespass on any public or private property in the vicinity of the work, shall at once be removed from the work by the Contractor when so requested by the District.

Any request to extend the contract completion date must be considered by the Board at the Board meeting prior to the then-existing contract termination date. Any deviation from this action will result in the liquidated damage clause in the contract to be exercised.

7. Payments to Contractor

The District hereby covenants and agrees, in consideration of the covenants and agreements in this Contract, specified to be kept and performed by the Contractor and subject to the conditions herein contained, and if the District receives an acceptable invoice prior to the tenth day of the month and receives approval of the work by the District Engineering Manager, the District shall issue payment before the fifth day of the succeeding month. If the District receives an acceptable invoice on or after the tenth day of the month, the District shall issue payment before the fifth day of the second succeeding month.

The District reserves the right at all times to refuse to issue payment in case the Contractor has neglected or failed to pay any subcontractors, workmen or employee on the work.

8. Subcontracts

No part of the work herein provided for shall be sublet or subcontracted without the express consent of the District, to be entered in the records, and in no case shall consent relieve the Contractor from the obligation herein entered into, or change the terms of this Agreement.

9. Contractor's Responsibility

This Contract shall extend to and be binding upon the successors and assigns, and upon the heirs, administrators, executors, and legal representatives of the Contractor.

In consideration of and to induce the award of this Contract to him, the Contractor represents and warrants: that he is not in arrears to the District upon debt of the Contract and that he is not a defaulter, as surety, contractor or otherwise; that he is financially solvent and sufficiently experienced and competent to perform the work; that the work can be performed as called for by the Contract; that the facts stated in his proposal and the information given by him is true and correct in all respects, and that he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be furnished for the completion of this Contract and that his information was secured by personal investigation and research.

The Contractor shall pay not less than the prevailing wage rate as determined by the Department of Labor, to all laborers, workmen and mechanics performing work under this Contract. Contractor shall comply with current revisions of the wage standards; as required by law. The Contractor shall be responsible for verifying the prevailing wages each month and notifying all subcontractors of the appropriate monthly rates. Certified payroll reports shall be submitted on industry standard forms such as IDOT Statement of Compliance (Form SBE 348).

In regard to nondiscrimination in employment, Contractor will be required to comply with the Illinois Fair Employment Practices Commission's Rules and Regulations as provided herein.

The Contractor shall comply with the American Disabilities Act of 1990 (ADA). The Contractor will hold harmless and indemnify the District and their representatives from all:

(a) suits, claims, or actions;
(b) costs, either for defense (including but not limited to reasonable attorney's fees and expert witness fees) or for settlement, and;
(c) damages of any kind (including but not limited to actual, punitive, and compensatory damages)

relating in any way to or arising out of the ADA, to which said firm is exposed or which it incurs in the execution of the contract.

Contractor shall also comply with Public Act 99-0933, which requires any party to a contract to adopt and enforce a written policy regarding sexual harassment that includes, as a minimum, the following information:

(a) the illegality of sexual harassment
(b) the definition of sexual harassment under Illinois State law;
(c) a description of sexual harassment, utilizing examples;
(d) my (our) organization's internal complaint process including penalties;
(e) through the Illinois Department of Human Rights and the Illinois Human Rights Commission;
(f) directions on how to contact the Department and the Commission; and
(g) protection against retaliation as provided by Section 6-101 of the Illinois Human Rights Act.

Upon request this information will be provided to the Illinois Department of Human Rights. Upon District award of a contract, the District will be provided this information described no more than ten working days after the District issues its award notification.

The Contractor shall comply with Article 2 of Public Act 83-1472 which provides that Illinois residents be employed on Illinois public works projects, provided there has been a period of excessive unemployment (5%) in the State of Illinois as defined in the Act; and further, that Illinois workers are available and capable of performing the particular type work involved.

The Contractor shall comply with all rules and regulations of OSHA during the execution of this Contract.

The Contractor shall comply with the Federal Drug Free Workplace Act.

The Steel Products Procurement Act, Illinois Public Act 83-1030, requires that steel products used or supplied in performance of this Contract or subcontract shall be manufactured or produced in the United States with three exceptions, as explained in the Instructions to Bidders.

The Contractor shall comply with Public Act 96-1416 regarding the disposal of CCDD and uncontaminated soil at CCDD fill sites as explained in the Instructions to Bidders.

10. Time

Work under this Agreement shall be commenced upon written Notice to Proceed. The completion date for this project shall be December 31, 2018.

11. Liquidated Damages

The amount of liquidated damages shall be $300.00 per calendar day.

12. Seals

IN WITNESS WHEREOF, the parties have hereunto set their hands and seals, and such of them as are corporations have caused these presents to be signed by their duly authorized officers.

Rock River Water Reclamation District
Winnebago County, Illinois

(Seal)

By _____
President, Board of Trustees

ATTEST: _____
Clerk of the Board

Contractor

By _____
Contractor's Officer

(Corporate Seal)

Name: _____

Title: _____

Date: _____

ATTEST: _____

Performance Bond

KNOW ALL MEN BY THESE PRESENTS, that WHEREAS, the Rock River Water Reclamation District has awarded to: _____ hereinafter designated as the "Principal", a contract, dated, _____, for the Rock River Water Reclamation District.

WHEREAS, said Principal is required under the terms of said Contract to furnish a bond for the faithful performance of said Contract (the "Bond");

NOW, THEREFORE, we the Principal and _____, as Surety, are firmly bound unto the Rock River Water Reclamation District in the penal sum of _____ Dollars ($_____) 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 for a performance bond. The conditions of this obligation is such that if the said Principal does well and faithfully performs all the conditions and covenants of said Contract, according to the true intent and meaning thereof, upon its part to be kept and performed, then the above obligation is to be null and void, otherwise to remain in full force and effect.

THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal, its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Contract, including the provisions for liquidated damages in the said Contract, any changes, additions or alterations thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their true intent and meaning, and shall indemnify and save harmless the Rock River Water Reclamation District, its officers and agents, as therein stipulated, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect. And 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 and no inadvertent overpayment of progress payments shall in any way affect its obligations 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 or of any inadvertent overpayment of progress payments. The Rock River Water Reclamation District shall be named as beneficiary on this Performance Bond.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their seal this _____day of _____, 20_____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

CONTRACTOR
Contractor Firm Name:

By: _____

_____
Title

ATTEST:

_____
Corporate Secretary (Corporations only)

SURETY

By: _____ Signature
Attorney-in-Fact

_____
Resident Agent

Labor & Material Payment Bond

TO: _____Contractor Name

_____Contractor City, State

KNOW ALL MEN BY THESE PRESENTS

That _____(Contractor)

as Principal, and _____

a corporation of the State of _____ as Surety, are held and firmly bound unto the Rock River Water Reclamation District, as Obligee, for the use and benefit of claimants as hereinafter defined in the amount of

_____Dollars ($_____), for the payment where of Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated _____20___ Entered into a Contract with Obligee for _____ in accordance with contract documents prepared by the Rock River Water Reclamation District which Contract is by reference made a part hereof, and is hereinafter referred to as "the Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if Principal shall promptly pay for all laborers, workers and mechanics engaged in the work under the Contract, and not less than the general prevailing rate of hourly wages of a similar character in the locality in which the work is performed, as determined by the State of Illinois Department of Labor pursuant to the Illinois Compiled Statutes 280 ILCS 130 / 1-12 et.seq. and for all material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect.

1. A claimant is deemed as any person, firm, or corporation having contracts with the Principal or with any of Principal's subcontractors for labor or materials furnished in the performance of the Contract on account of which this Bond is given.
2. Nothing in this Bond contained shall be taken to make the Obligee liable to any subcontractor, material man or laborer, or to any other person to any greater extent than it would have been liable prior to the enactment of The Public Construction Bond Act, approved June 20, 1931, as amended; provided further, that any person having a claim for labor and materials furnished in the performance of the Contract shall have no right of action unless he shall have filed a verified notice of such claim with the Obligee within 180 days after the date of the last item of work or the furnishing of the last item of materials, which claim shall have been verified and shall contain the name and address of the claimant, the business address of the claimant within the State of Illinois, if any, or if the claimant be a foreign corporation having no place of business within the State the principal place of

business of the corporation, and in all cases of partnership the names and residences of each of the partners, the name of the Contractor for the Obligee, the name of the person, firm or corporation by whom the claimant was employed or to whom such claimant furnished materials, the amount of the claim and a brief description of the public improvement for the construction or installation of which the contract is to be performed. No defect in the notice herein provided for shall deprive the claimant of its right of action under the terms and provisions of this Bond unless it shall affirmatively appear that such defect has prejudiced the rights of an interested party asserting the same.

3. No action shall be brought on this Bond until the expiration of 120 days after the date of the last item of work or of the furnishing of the last item of material except in cases where the final settlement between Obligee and the Contractor shall have been made prior to the expiration of the 120 day period, in which case action may be taken immediately following such final settlement; nor shall any action of any kind be brought later than 6 months after the acceptance by the Obligee of the work. Such suit shall be brought only in the circuit court of this State in the judicial district in which the Contract is to be performed.
4. Surety hereby waives notice of any changes in the Contract, including extensions of time for the performance thereof.
5. The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.
6. The Principal and Surety shall be liable for any attorneys fees, engineering costs, or court costs incurred by the Obligee relative to claims made against this Bond.

Signed and Sealed this _____day of _____, 2016.

CONTRACTOR SURETY
Contractor Firm Name

By: _____ By:_____
Signature Attorney-in-Fact

_____
Title Resident Agent

ATTEST:

_____
Corporate Secretary (Corporations only)

Section IV

General Provisions & Technical Specifications for Sanitary Sewer Construction

(Separate document incorporated by reference)