

SPECIFICATIONS AND CONTRACT DOCUMENTS

FOR

HYDEN – LESLIE COUNTY WATER DISTRICT

HYDEN, KENTUCKY

CONTRACT NO. 15, PHASE II – A

WATERLINE EXTENSIONS



A handwritten signature in cursive script that reads "J. F. Sisler".

FOR CONSTRUCTION

NOVEMBER 2013

SME PROJECT CODE: 07080



Sisler - Maggard Engineering, PLLC
220 East Reynolds Road, Suite A3
Lexington, KY 40517
Office (859) 271-2978 Fax: (859) 271-5670

**HYDEN-LESLIE COUNTY WATER DISTRICT
CONTRACT NO. 15 PHASE II-A - WATERLINE EXTENSIONS**

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SECTION 1
ADVERTISEMENT FOR BIDS

ADVERTISEMENT FOR BIDS

1. **INVITATION:** Separate sealed bids for the construction of the following water system improvements will be received at the Hyden-Leslie County Water District, 325 Wendover Rd, Hyden, Kentucky 41749 until April 25, 2013 at 12:00 PM for furnishing all labor and materials and performing all work as set forth by this advertisement, conditions (general, supplemental, and special), specifications, and/or the drawings prepared by Sisler-Maggard Engineering, PLLC, 220 East Reynolds Road, Suite A3, Lexington, KY 40517 (859) 271-2978. Bids will be publicly opened and read at above time.

2. **PROJECT DESCRIPTION:** The project includes but is not limited to the following:

Contract No. 15 – Waterline Extensions

- a.) 4" C – 900 DR 14 PVC waterline 83,000 L.F.
- b.) 4" CL 250 PVC waterline 97,000 L.F.
- c.) 3" CL 200/250 PVC waterline 59,500 L.F.
- d.) 1" - 3/4" service line 10,000 L.F.
- e.) 6", 4", 3" Gate valves 73 EA.
- f.) 5/8" x 3/4" Water Meter Assemblies 200 EA.
- g.) Above Ground Booster Station 3 L.S.

Contract No. 16 – Water Storage Tanks (50,000 gallons)

- a.) Water Storage Tanks Complete 2 L.S.

3. **OBTAINING PLANS, SPECIFICATIONS AND BID DOCUMENTS:**

Contract documents may be reviewed and obtained at the following location:

Lynn Imaging
328 East Vine Street
Lexington, KY 40507
(859) 255-1021

A non-refundable deposit will be required for each set of documents as follows:

- Contract No. 15 – Waterline Extensions - \$175.00
- Contract No. 16 - Water Storage Tanks - \$100.00

Deposit includes standard UPS shipping. Partial sets of plans or specifications will not be issued.

Contract Documents may also be reviewed at the following locations:

Sisler-Maggard Engineering, PLLC,
220 E. Reynolds Road, Suite A3
Lexington, KY 40517
(859) 271-2978

Builder's Exchange
1035 Strader Drive, Suite 100
Lexington, Ky. 40505
(859) 288-0011

Hyden-Leslie County Water District
Leihman Howard, Jr.
325 Wendover Rd
Hyden, KY 41749
(606) 672-2791

4. METHOD OF RECEIVING BIDS: Bids will be submitted in the manner and subject to the conditions as set forth and described in the Instructions to Bidders and Contract Documents.
5. METHOD OF AWARD: The Contracts will be awarded by the Owner to the low responsive, responsible, best and qualified Bidders.
6. BID WITHDRAWAL: No Bidder may withdraw his bid for a period of forty five (45) calendar days after receipt of bids. Errors and omissions will not be the cause for withdrawal of bid without forfeit of bid bond. Bids may be withdrawn in person prior to the closing time for receipt of bids.
7. BIDDERS OF RECORD: All bids must be made on the required Bid Form and must be fully completed and executed with original signatures and corporate seals. Bidders who submit a Bid must be a Plan Holder of record at the Plan Distributor - Lynn Imaging. Non-conforming bids will not be considered.
8. WAGE RATES: State Prevailing wage rates **will** apply.
9. FUNDING: This project is being funded with Coal Severance Grants.
10. BID SECURITY: Bidders shall furnish (with bid) bid security equal to 5% of bid. A bid bond on Kentucky Resident insurance carrier or certified check is acceptable.
11. PERFORMANCE AND PAYMENT BOND: A Performance and Payment Bond each in the amount of 100 percent of the Contract Price issued by a responsible surety will be required of the successful Bidders.
12. RIGHT TO REJECT: Owner reserves the right to reject any and all bids and to waive all informalities and/or technicalities should it be in the best interest of the Owner.

"EQUAL EMPLOYMENT OPPORTUNITY"

OWNER: Hyden-Leslie County Water District

By: _____
Fred Ratliff, Chairman

SECTION 2
INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

1. Defined Terms: Terms used in these Instructions to Bidders which are defined in General Conditions or Special Conditions of the Construction Contract and have the meanings assigned to them in the said Conditions.
2. Receipt and Openings of Bids: The Hyden-Leslie County Water District, (herein called the "Owner"), invites bids on the forms attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner Hyden-Leslie County Water District, at 325 Wendover Rd, Hyden, Kentucky 41749 until 12:00 PM on April 25, 2013 and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to Hyden-Leslie County Water District designated as bid for Contract No. 15, Phase II-A – Waterline Extensions.

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informality or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within forty five (45) days after the actual date of the opening thereof.

3. Preparation of Bid: Each bid must be submitted on the prescribed forms accompanied by the following items which will constitute the submittal documents necessary for a **complete bid package**:
 - a) Bid Form including subcontractor's list and manufacturers list.
 - b) Bid Bond with Power of Attorney.
 - c) Bidder's Qualifications Statement

All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures, and the foregoing Certifications must be fully completed and executed when submitted.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the bidder, their address, and the name of the project with contract name and number for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in the bid forms.

Before submitting their Bid, each Bidder must (a) examine the Contract Documents thoroughly, (b) visit the site to familiarize themselves with local conditions that may in any manner affect performance of the Work, and (c) carefully correlate their observations with the requirements of the CONTRACT DOCUMENTS.

Reference is made to the Special Conditions of the Specifications and Plans for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the Work which have been relied upon by the ENGINEER in preparing the Drawings and Specifications. Before submitting their Bid each Bidder will, at their own expense, make such additional surveys and investigations, as they may deem necessary to determine their Bid price for performance of the work within the terms of the Contract Documents.

The submission of a Bid will constitute an incontrovertible representation by the Bidder that they have complied with every requirement of these instructions.

4. Bid Form(s): The bid Form(s) is included in these Contract Documents; additional copies may be obtained from Owner. The items listed under Paragraph 3 herein shall be submitted.

Bids by corporations must be executed in the corporate name by the President or Vice President (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the Secretary, or an assistant Secretary. The corporate address and state of incorporation shall be shown below the signature.

Bids by partnerships must be executed in the partnership name and signed by a partner, his title must appear under his signature and the official address of the partnership must be shown below the signature.

All names must be typed or printed below the signature with phone and fax numbers.

The bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

5. Subcontracts: The bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this contract:
 - a. Must be acceptable to the Owner and have current eligibility status for federal programs.

Approval of the proposed subcontract award cannot be given by the Owner unless and until the proposed subcontractor has submitted the Certifications and/or other evidence showing that it has fully complied with any reporting requirements to which it is or was subject. Although the bidder is not required to attach such Certifications by proposed subcontractors to their bid, the bidder is hereby advised of this requirement so that appropriate action can be taken to prevent subsequent delay in subcontract awards.

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

Contract No. 15 Phase II-A - Waterline Extensions

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

Each prime bidder shall complete, in detail; the form of "Bidder's Qualifications" found in and included as part of the form of Proposal. In lieu of the filling out of the detailed financial statement, the bidder may substitute a current and certified company financial statement.

Corporate Firms: Foreign Corporations are required to be registered with the Secretary of State of the Commonwealth and must be in good standing. Domestic Corporations are required to be in good standing with the requirements and provisions of the Office of the Secretary of State, Commonwealth of Kentucky.

Good Standing with the Public Works Act: Any contractor and/or subcontractors in violation of any wage or work act provisions (KRS 337.510 and 337.550) are prohibited by Statutory Act (KRS 337.990) from bidding or working on any and all public work contracts, either in their name or in the name of any other company, firm or other entity in which he might be interested. No bid from a prime contractor, in violation of the Act can be considered, nor with any subcontractor, in violation of the Act, be approved and/or accepted. The responsibility of the qualifications of the subcontractor is solely that of the prime contractor.

9. Bid Security: Each bid must be accompanied by cash, certified check of the bidder, or a bid bond prepared on the Bid Form attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of 5% of the bid. Such cash, checks or bid bonds will be returned promptly after the Owner and the accepted bidder have executed the contract, or if no award has been made within 15 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as they have not been notified of the acceptance of their bid.
10. Liquidated Damages for Failure to Enter into Contract: The successful bidder, upon their failure or refusal to execute and deliver the contract and bonds required within 10 days after they have received the notice of the acceptance of their bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with their bid.
11. Time of Completion and Liquidated Damages: Bidder must agree to commence work on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the projects as follows:

Contract No. 15 PHASE II-A - Waterline Extensions – 300 consecutive calendar days

Bidder must agree also to pay as liquidated damages, the sum of \$500.00 for each consecutive calendar day thereafter as hereinafter provided in the General Conditions.

12. Conditions of Work: Each bidder must inform themselves fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of their obligation to furnish all material and labor necessary to carry out the provisions of their contract. Insofar as possible, the contractor, in carrying out

the work, must employ such methods or means as will not cause any interruption of or interference with the work of any other contractor.

13. Addenda and Interpretations: No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally.

Every request for such interpretation on Contract No. 15 PHASE II-A - Waterline Extensions should be in writing addressed to Sisler-Maggard Engineering, PLLC., P.O. Box 23780, Lexington, Kentucky 40523-3780 and to be given consideration must be received at least five 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 to the specifications which, if issued, will be mailed by certified mail with return receipt requested to all prospective bidders (at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under their bid as submitted. All addenda so issued shall become part of the contract documents.

14. Security for Faithful Performance: Simultaneously with their delivery of the executed contract, the contractor shall furnish a 100% surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.
15. Power of Attorney: Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney with Kentucky Resident agent.
16. Notice of Special Conditions: Attention is particularly called to those parts of the contract documents and specifications which deal with the following:
- a. Inspection and testing of materials
 - b. Insurance requirements
 - c. Wage rates
17. Laws and Regulations: The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written in full.
18. Method of Award - Lowest Qualified Bidder: If at the time this contract is to be awarded, the lowest base bid submitted by a responsible bidder does not exceed the amount of funds then estimated by the Owner as available to finance the contract, the contract will be awarded on the base bid only. If all bids exceed funds available to finance the contract the Owner may negotiate price with the bidder who is lowest at that point.
19. Award of Contract: Owner reserves the right to reject any and all Bids, and waive any and all informalities, and the right to disregard all nonconforming or conditional bids or counter proposals.

In evaluating Bids, Owner shall consider the qualifications of the Bidders, whether or not the bids comply with the prescribed requirements, and alternates and unit prices, if requested in the Bid forms. He may consider the qualifications and experience of the Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for portions of the Work as to which the identity of Subcontractors and other persons or organizations must be submitted as specified in the Special Conditions or Specifications. He may conduct such investigations as he deems necessary to establish the responsibility, qualifications or financial ability of the Bidders, proposed Subcontractors and other persons or organizations to do the work in accordance with the Contract Documents, to Owner's satisfaction within the prescribed time. Owner reserves the right to reject the Bid of any Bidder who reserves the right to reject the bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

If the contract is to be awarded, Owner will give the apparent successful Bidder(s) a Notice of Award within forty five (45) calendar days after the day of the Bid opening.

Simultaneously with delivery of the executed counterparts of the Agreement to Owner, Contractor shall deliver to Owner the required Contract Security.

20. Safety Standards and Accident Prevention: With respect to all work performed under this contract, the contractor shall:
- a. Comply with the safety standards provisions of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of Title 29 of the Code of Federal Regulations, Section 1518 as published in the "Federal Register", Volume 36, No. 75, Saturday, April 17, 1971.
 - b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.
 - c. Maintain at their office or other well known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor's care of persons (including employees), who may be injured on the job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.
21. Prevailing Wage Law: State Prevailing Wage Rates applies to Contract 15 – Phase II A Waterline Extensions of this project and are included herein as SECTION 4.

END OF SECTION

SECTION 3
GENERAL AND SUPPLEMENTAL CONDITIONS

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GENERAL CONDITIONS

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. *Agency* – The Federal or state agency named as such in the Agreement.
 3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 4. *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.
 5. *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.
 6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 7. *Bidder* – The individual or entity who submits a Bid directly to Owner.
 8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 9. *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.
 10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency 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.
 11. *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.
 12. *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.
 13. *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's submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

14. *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).
15. *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.
16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.
17. *Cost of the Work* – See Paragraph 11.01.A for definition.
18. *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.
19. *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.
20. *Engineer* – The individual or entity named as such in the Agreement.
21. *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.
22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
23. *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 in connection with the Work.
24. *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.
25. *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.
26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
27. *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.
28. *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.
29. *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.
30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
31. *PCBs* – Polychlorinated biphenyls.

32. *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.
33. *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.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *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.
36. *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.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
39. *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.
40. *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.
41. *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.
42. *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.
43. *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.
44. *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.
45. *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.
46. *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.
47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.

48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *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 any Subcontractor.
50. *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.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *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.
53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the 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 following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following 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 requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 which 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.

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;
 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*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, Agency, 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.

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 may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage

as being required to produce the intended 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, or Engineer, or any of their Related Entities, 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 may discover 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 any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, 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 knew or reasonably should have known 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, code, or instruction (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 Engineer's consultants, including electronic media editions; or
 - 2. reuse any of 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 adaption by Engineer.
- B. The prohibition 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. Copies of data furnished by Owner or Engineer to Contractor or 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 of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
- 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general 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 Related Entities 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 at or contiguous to the Site 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, Owner and Engineer, and any of their Related Entities 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.

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; 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:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general 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 Related Entities 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.
- 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 to Contractor written notice: (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, 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, 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 current 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 must be accompanied by a certified copy of the agent's authority to act.
- 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 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 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.

5.04 *Contractor's Liability Insurance*

- A. Contractor shall purchase and maintain such liability and other 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, 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, 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 completed operations insurance;
 4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 5. 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);
 6. 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
 7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
 - a. 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, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.). 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, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss 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 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 additional insured to whom a certificate of insurance has been issued.
- B. Contractor shall purchase and maintain such boiler and machinery 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, 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 an insured or additional insured.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with 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 additional insured 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.

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 to be listed as insureds or additional insureds (and the officers, directors, 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 additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, 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 to be listed as insured or additional insured (and the officers, directors, 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 Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, 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, 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 Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor 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.
- B. Contractor 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 Contractor's exercise of this power. If such objection be made, Contractor 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, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor 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. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

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.

- 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;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 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 that 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 procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in 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) will 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 or not 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 or not 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;
 - 4) and 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 either a Change Order for a substitute or 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 item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the 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 anything in the Contract Documents 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 an additional insured 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, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, 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, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 primary 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, 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. 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. 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 , 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).
- D. 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 acceptable 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 determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
 - d. shall also have 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.
 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 Related Entities 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, 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 respective consultants, agents, officers, directors, partners, or employees 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, 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 via 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, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall 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 their work and will only cut or alter their 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 actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's 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 in respect of 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 in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

- A. Owner's responsibilities, if any, in 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 in 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. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

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 and will not be changed without written consent of Owner and Engineer.

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 believe 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.

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, subject to written approval by Agency 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.B.

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 notice 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) is required by the provisions of any bond to be given to a surety, 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 Time 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 include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
 - 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 at the Site. 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, 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, expressages, 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, expeditors, 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 and 11.01.B.

- 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 Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent 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 Paragraph 12.01.C.2.a 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.B.
 - 1. delays caused by or within the control of Contractor; or
- D. Owner, Engineer and the Related Entities of each of them 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. All 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, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site 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 said 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, it must, if requested by Engineer, be uncovered 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 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 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 on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to 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. that 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. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;
 - d. there are other items entitling Owner to a set-off against the amount recommended; or
 - e. 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 corrects to Owner's satisfaction the reasons for such action.
3. If it is subsequently determined 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.

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, Agency, Contractor, and Engineer shall make a prefinal 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 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 will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion 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, Agency, 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.7;
 - 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 or Owner's property might in any way be responsible 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. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

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 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. Owner and Contractor may mutually 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. 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 their 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.

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 *Agency Not a Party*

- A. This Contract is expected to be funded in part with funds provided by Agency. Neither Agency, nor any of its departments, entities, or employees is a party to this Contract.

18.02 *Contract Approval*

- A. Owner and Contractor will furnish Owner's attorney such evidence as required so that Owner's attorney can complete and execute the following "Certificate of Owner's Attorney" (Exhibit GC-A) before Owner submits the executed Contract Documents to Agency for approval.
- B. Concurrence by Agency in the award of the Contract is required before the Contract is effective.

18.03 *Conflict of Interest*

- A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.
- B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.04 *Gratuities*

- A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner or Agency in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.04.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an

amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.05 *Audit and Access to Records*

- A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), Owner, Agency, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.06 *Small, Minority and Women's Businesses*

- A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.07 *Anti-Kickback*

- A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to Agency.

18.08 *Clean Air and Pollution Control Acts*

- A. If this Contract exceeds \$100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.09 *State Energy Policy*

- A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.10 *Equal Opportunity Requirements*

- A. If this Contract exceeds \$10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment

Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, and Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

- C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.11 *Restrictions on Lobbying*

- A. Contractor and each subcontractor shall comply with Restrictions on Lobbying (Public Law 101-121, Section 319) as supplemented by applicable Agency regulations. This Law applies to the recipients of contracts and subcontracts that exceed \$100,000 at any tier under a Federal loan that exceeds \$150,000 or a Federal grant that exceeds \$100,000. If applicable, Contractor must complete a certification form on lobbying activities related to a specific Federal loan or grant that is a funding source for this Contract. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 USC 1352. Each tier shall disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Certifications and disclosures are forwarded from tier to tier up to the Owner. Necessary certification and disclosure forms shall be provided by Owner.

18.12 *Environmental Requirements*

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
 1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
 3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
 4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

EXHIBIT GC-A

Certificate of Owner's Attorney

I, the undersigned, _____, the duly authorized and acting legal representative of _____, do hereby certify as follows:

I have examined the attached Contract(s) and performance and payment bond(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with the terms, conditions, and provisions thereof.

Date: _____

Supplementary Conditions

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract Funding Agency Edition (No. C-710, 2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions will have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

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SC-1.02.A.15. Delete in its entirety and replace with the following:

Contract Times: The number of days or date stated in the Agreement to achieve substantial completion, based on remaining work, weather and market conditions.

SC-2.03.A. Delete Paragraph 2.03.A in its entirety and insert the following in its place:

A. The Contract Times will commence on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 10 days after the Effective Date of the Agreement.

{SC-4.02. Add the following new paragraphs immediately after Paragraph 4.02.B:

C. In the preparation of Drawings and Specifications, Engineer relied upon the following reports of exploration and tests of subsurface conditions at the Site:

Contract No. 15 – PHASE II-A - Waterline Extensions – NONE

D. Copies of reports and drawings itemized in SC-4.02.C are included with Bidding Documents. These reports and drawings are part of the Contract Documents. Contractor is not entitled to rely upon other information and data utilized by Engineer in the preparation of the Drawings and Specifications.

SC-5.03. Add the following new paragraph immediately after Paragraph 5.03.B:

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

SC-5.04. Add the following new paragraph immediately after Paragraph 5.04.B:

C. The limits of liability for insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

- 1. Workers’ Compensation, and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:
 - a. State: Statutory
 - b. Applicable Federal Statutory
(e.g., Longshoremen’s)
 - c. Employer’s Liability \$500,000

- 2. Contractor’s General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody, and control of the Contractor:
 - a. General Aggregate \$2,000,000
 - b. Products – Completed Operations Aggregate \$1,000,000
 - c. Personal and Advertising Injury \$1,000,000
 - d. Each Occurrence (Bodily Injury and property damage) \$1,000,000
 - e. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.
 - f. Excess or Umbrella Liability
 - 1.) General Aggregate \$5,000,000
 - 2.) Each Occurrence \$2,000,000

3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:

a. Bodily Injury:	
Each Person	\$1,000,000
Each Accident	\$1,000,000
b. Property Damage	
Each Accident	\$1,000,000
c. Combined Single Limit of	\$1,000,000

4. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

a. Bodily Injury:	
Each Person	\$2,000,000
Each Accident	\$2,000,000
b. Property Damage:	
Each Accident	\$2,000,000
Annual Aggregate	\$2,000,000

SC-6.06 Add a new paragraph immediately after Paragraph 6.06.G:

H. The Contractor shall not award work valued at more than (50%) percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

SC-7.02.A.1 Delete paragraphs 7.02.A.1-3 in their entirety and insert the following:

1. All General Contractors shall have the authority and be responsible for coordination of the activities among the other prime contractors and subcontractors on the Site to ensure a safe, efficient working environment. This authority covers scheduling delivery of materials, storage of materials, sequencing of construction involving different crafts, resolving interface issues between crafts, scheduling testing, and all other aspects of the Work that do not impact the design or function of the work.}

SC-9.03A. Add the following language at the end of paragraph 9.03.A:

The Engineer will provide Resident Project Representative Services for this project. The Duties, Responsibilities, and Limitations of Authority of the Resident Project Representative will be as stated in Exhibit D of the Agreement Between Owner and Engineer, E-510, 2002 Edition, as amended and executed for this specific project.

SC-14.02.A.3 Add the following language at the end of paragraph 14.02.A.3:

No payments will be made that would deplete the retainage prior to substantial completion, nor place in escrow any funds that are required for retainage, or invest the retainage for benefit.

SC-14.02.C.1. Delete Paragraph 14.02.C.1 in its entirety and insert the following in its place:

1. The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of

Paragraph 14.02.D will become due thirty days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-18.08 Delete paragraph 18.08.A in its entirety and insert the following in its place:

A. If this Contract exceeds \$100,000, the Contractor shall comply with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 USC §1857(h)), Section 508 of the Clean Water Act (33 USC §1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

SECTION 4
STATE WAGE RATES



Steven L. Beshear
Governor

KENTUCKY LABOR CABINET
DEPARTMENT OF WORKPLACE STANDARDS
DIVISION OF EMPLOYMENT STANDARDS,
APPRENTICESHIP & MEDIATION
1047 US Hwy 127 S - Suite 4
Frankfort, Kentucky 40601
Phone: (502) 564-3534
Fax (502) 696-1897
www.labor.ky.gov

Mark S. Brown
Secretary

Michael Donta
Deputy Commissioner

April 12, 2013

Mike Maggard
Sisler Maggard Eng.
220 E Reynolds Rd Ste A-3
Lexington KY 40517

Re: Hyden Leslie County Water District, Waterline Ext & Water Storage Tank

Advertising Date as Shown on Notification: April 11, 2013

Dear Mike Maggard:

This office is in receipt of your written notification on the above project as required by KRS 337.510 (1).

I am enclosing a copy of the current prevailing wage determination number CR 8-031, dated November 28, 2012 for LESLIE County. This schedule of wages shall be attached to and made a part of the specifications for the work, printed on the bidding blanks, and made a part of the contract for the construction of the public works between the public authority and the successful bidder or bidders.

The determination number assigned to this project is based upon the advertising date contained in your notification. There may be modifications to this wage determination prior to the advertising date indicated. In addition, if the contract is not awarded within 90 days of this advertising date or if the advertising date is modified, a different set of prevailing rates of wages may be applicable. It will be the responsibility of the public authority to contact this office and verify the correct schedule of the prevailing rates of wages for use on the project. Your project number is as follows: 066-H-00062-12-8, Heavy/Highway

Sincerely,

Michael Donta
Deputy Commissioner



**KENTUCKY LABOR CABINET
PREVAILING WAGE DETERMINATION
CURRENT REVISION
LOCALITY NO. 031**

BELL, HARLAN, LESLIE & PERRY COUNTIES

Determination No. CR 8-031

Date of Determination: November 28, 2012

Project No. 066-H-00062-12-8

_____ Bldg xx _____ HH

This schedule of the prevailing rate of wages for Locality No. 031, which includes Bell, Harlan, Leslie and Perry Counties, has been determined in accordance with the provisions of KRS 337.505 to 337.550. This determination shall be referred to as Prevailing Wage Determination No. CR 8-031.

Apprentices shall be permitted to work as such subject to Administrative Regulations adopted by the Executive Director of the Office of Workplace Standards. Copies of these regulations will be furnished upon request to any interested person.

Overtime is to be computed at not less than one and one-half (1 1/2) times the indicated BASE RATE for all hours worked in excess of eight (8) per day, or in excess of forty (40) per week. However, KRS 337.540 permits an employee and employer to agree, in writing, that the employee will be compensated at a straight time base rate for hours worked in excess of eight (8) hours in any one workday, but not more than ten (10) hours worked in any one workday, if such written agreement is prior to the over eight (8) hours in a workday actually being worked, or where provided for in a collective bargaining agreement. The fringe benefit rate is to be paid for each hour worked at a straight time rate for all hours worked. Fringe benefit amounts are applicable for all hours worked except when otherwise noted. Welders will receive rate for craft in which welding is incidental.

No laborer, workman or mechanic shall be paid at a rate less than that of the General Laborer except those classified as bona fide apprentices registered with the Kentucky State Apprenticeship Supervisor unless otherwise specified in this schedule of wage rates.

NOTE: The type of construction shall be determined by applying the following definitions.

BUILDING CONSTRUCTION

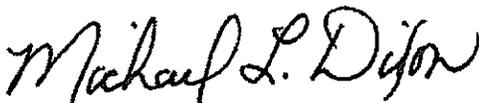
Building construction is the construction of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies. It includes all construction of such structures, the installation of utilities and the installation of equipment, both above and below grade level, as well as incidental grading, utilities and paving.

HIGHWAY CONSTRUCTION

Highway construction includes the construction, alteration or repair of roads, streets, highways, runways, taxiways, alleys, trails, paths, parking areas, and other similar projects not incidental to building or heavy construction. It includes all incidental construction in conjunction with the highway construction project.

HEAVY CONSTRUCTION

Heavy projects are those projects that are not properly classified as either "building" or "highway". For example, dredging projects, water and sewer line projects, dams, flood control projects, sewage treatment plants and facilities, and water treatment plants and facilities are considered heavy.



Michael Dixon, COMMISSIONER
DEPARTMENT OF WORKPLACE STANDARDS
KENTUCKY LABOR CABINET

ASBESTOS/INSULATION WORKERS: (Mechanical only)	BASE RATE	\$23.39
	FRINGE BENEFITS	11.01

BOILERMAKERS:	BASE RATE	\$23.95
	FRINGE BENEFITS	12.04

BRICKLAYERS:	BASE RATE	\$22.42
	FRINGE BENEFITS	4.78

CARPENTERS:		BASE RATE	\$20.38
Carpenters:	BUILDING	FRINGE BENEFITS	11.00

Piledrivermen:	BUILDING	BASE RATE	\$20.88
		FRINGE BENEFITS	11.00

Carpenters:	HEAVY & HIGHWAY	BASE RATE	\$24.84
		FRINGE BENEFITS	10.31

Piledrivermen:	HEAVY & HIGHWAY	BASE RATE	\$25.09
		FRINGE BENEFITS	10.31

Divers:	HEAVY & HIGHWAY	BASE RATE	\$31.05
		FRINGE BENEFITS	5.68

CEMENT MASONS:		BASE RATE	\$8.75
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ELECTRICIANS:	BUILDING	BASE RATE	\$29.32
		FRINGE BENEFITS	13.98

ELECTRICIANS:	HEAVY & HIGHWAY	*BASE RATE	\$23.50
		FRINGE BENEFITS	7.73

*When electricians are required to work from Bosum chairs, trusses, stacks, tanks, scaffolds, or catwalks, radio and TV towers, structural steel-open, unprotected, unfloored raw steel, bridges, or similar hazardous locations where workmen are subject to a direct fall (except for work performed using JLG's and bucket trucks up to 75 ft.): 50' to 75' – add 25% above workman's straight time rate; over 75' – add 50% above workman's straight time rate.

LINEMAN	HEAVY & HIGHWAY	BASE RATE	\$31.86
		FRINGE BENEFITS	11.63

EQUIPMENT OPERATOR	HEAVY & HIGHWAY	BASE RATE	\$28.48
		FRINGE BENEFITS	10.94

GROUND MEN	HEAVY & HIGHWAY	BASE RATE	\$18.87
		FRINGE BENEFITS	9.03

ELEVATOR CONSTRUCTORS:		BASE RATE	\$29.50
		FRINGE BENEFITS	6.56

GLAZIERS:

BELL, HARLAN & PERRY COUNTIES: BASE RATE \$7.39

GLAZIERS:

LESLIE COUNTY::: BASE RATE \$9.05

IRONWORKERS:

BUILDING BASE RATE \$8.65

Structural: HEAVY & HIGHWAY BASE RATE \$18.45
 FRINGE BENEFITS 5.80

Reinforcing: HEAVY & HIGHWAY BASE RATE \$18.25
 FRINGE BENEFITS 5.80

LABORERS / BUILDING::

BUILDING BASE RATE \$10.25
 FRINGE BENEFITS 2.61

LABORERS / HEAVY HIGHWAY:

HEAVY HIGHWAY GROUP 1: Aging and curing of concrete (any mode or method), asbestos abatement worker, asphalt plant laborers, asphalt laborers, batch truck dumpers, carpenter tenders, cement mason tenders, cleaning of machines, concrete laborers, demolition laborers, dredging laborers, drill helper, environmental laborer - nuclear, radiation, toxic and hazardous waste - Level D, flagmen, grade checkers, all hand digging and hand back filling, highway marker placers, landscaping laborers, mesh handlers and placers, puddler, railroad laborers, rip-rap and grouters, right of way laborers, sign, guard rail and fence installers (all types), signal men, sound barrier installer, storm and sanitary sewer laborers, swamper, truck spotters and dumpers, and wrecking of concrete forms, general cleanup:

HEAVY & HIGHWAY BASE RATE \$19.86
 FRINGE BENEFITS 9.55

HEAVY HIGHWAY GROUP 2: Batter board men (sanitary and storm sewer), brickmason tenders, mortar mixer operator, scaffold builders, burner and welder, bushhammers, chain saw operator, concrete saw operators, deckhand scow man, dry cement handlers, environmental laborers - nuclear, radiation, toxic and hazardous waste - Level C, forklift operators for masonry, form setters, green concrete cutting, hand operated grouter and grinder machine operator, jack hammers, lead paint abatement, pavement breakers, paving joint machine, pipe layers-laser operators (non-metallic), plastic pipe fusion, power driven Georgia buggy or wheelbarrow, power post hole diggers, precast manhole setters, walk-behind tampers, walk-behind trenchers, sand blasters, concrete chippers, surface grinders, vibrator operators, wagon drillers:

HEAVY & HIGHWAY BASE RATE \$20.11
 FRINGE BENEFITS 9.55

HEAVY HIGHWAY GROUP 3: Asphalt lutean and rakers, gunnite nozzleman, gunnite operators and mixers, grout pump operator, side rail setters, rail paved ditches, screw operators, tunnel laborers (free air), and water blasters:

HEAVY & HIGHWAY BASE RATE \$20.16
 FRINGE BENEFITS 9.55

HEAVY HIGHWAY GROUP 4: Caisson workers (free air), cement finishers, environmental laborer - nuclear, radiation, toxic and hazardous waste - Levels A and B, miners and drillers (free air), tunnel blasters, and tunnel muckers (free air), directional and horizontal boring, air track driller (all types), powder man and blaster, troxler and concrete tester if laborer is utilized:

HEAVY & HIGHWAY BASE RATE \$20.76
 FRINGE BENEFITS 9.55

MARBLE, TILE & TERRAZZO SETTERS:

BASE RATE	\$22.64
FRINGE BENEFITS	6.10

MARBLE, TILE & TERRAZZO WORKERS:

BASE RATE	\$15.42
FRINGE BENEFITS	5.42

MILLWRIGHTS:

BUILDING

BASE RATE	\$7.25
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HEAVY

BASE RATE	\$12.41
FRINGE BENEFITS	1.15

HIGHWAY

BASE RATE	\$11.51
FRINGE BENEFITS	1.15

OPERATING ENGINEERS / BUILDING:

Articulating Dump, auto patrol, batcher plant, bituminous paver, cableway, central compressor plant, clamshell, concrete mixer (21 cf or over), concrete pump, crane, crusher plant, derrick, derrick boat, directional boring machine, ditching and trenching machine, all types of loaders, forklift (regardless of lift height), GPS systems (on equipment within the classification), hoe-type machine, hoist (1-drum when used for stack or chimney construction or repair), hoisting engineer (2 or more drums), laser or remote controlled equipment (within the classification), locomotive, motor scrapper, carry-all scoop, bulldozer, heavy duty welder, mechanic, orangepeel bucket, piledriver, power blade, motor grader, roller (bituminous), scarifier, shovel, tractor shovel, truck crane, winch truck, push dozer, highlift, all types of boom cats, core drill, hopper, tow or push boat, a-frame winch truck, concrete paver, gradeall, hoist, hyster, pumpcrete, rock carrier, boom, tail boom, rotary drill, hydro hammer, mulching machine, rock spreader attached to equipment, scoopmobile, KeCal loader, tower cranes (French, German and other types, hydrocrane, backfiller, guries, subgrader, tunnel mining machines including moles, shields, or similar types of tunnel mining equipment.

BUILDING

*BASE RATE	\$14.00
FRINGE BENEFITS	2.76

***Crane operators with CCO certification shall receive fifty cents (.50) above wage rate. Operators on cranes with boom one-hundred fifty feet (150') and over including jib, shall receive seventy-five (.75) above wage rate.**

All cranes with piling leads will receive fifty cents (.50) above wage rate regardless of boom length.

Combination rate shall mean fifty cents (.50) per hour above the basic hourly rate of pay.

All air compressors over 900 cfm, bituminous mixer, joint sealing machine, concrete mixer under 21 cu ft, form grader, roller (rock), tractor (50 HP and over), bull float, finish machine, outboard motor boat, flexplane, firemen, boom type tamping machine, greaser on grease facilities servicing heavy equipment, switchman or brakeman, mechanic helper, whirley oiler, self-propelled compactor, tractor and road widening trencher and farm tractor with attachments (except backhoe, highlift and endloader), elevator (regardless of ownership when used for hoisting any building material), hoisting engineer (1-drum or buck hoist), Firebrick masonry excluded), well points, grout pump, throttle-valve man, tugger, electric vibrator compactor, and caisson drill helper.

BUILDING

BASE RATE	\$17.76
FRINGE BENEFITS	9.15

Bituminous distributor, cement gun, conveyor, mud jack, paving joint machine, roller (earth), tamping machine, tractors under 50 HP, vibrator oiler, concrete saw, burlap and curing machine, truck crane oiler, hydro-seeder, power form handling equipment, deckhand steersman, hydraulic post driver, and drill helper.

BUILDING

BASE RATE	\$16.99
FRINGE BENEFITS	9.15

OPERATING ENGINEERS / HEAVY HIGHWAY:

HEAVY HIGHWAY CLASS A: Auto patrol, batcher plant, bituminous paver, cable way, clamshell, concrete mixer (21 cf or over), concrete pump, crane, crusher plant, derrick, derrick boat, ditching and trenching machine, dragline, dredge engineer, elevator (regardless of ownership when used for hosting any build material), elevating grader and all types of loaders, hoe-type machine, hoisting engine, locomotive, LeTourneau or carry all scoop, bulldozer, mechanic, orangepeel bucket, piledriver, power blade roller, (bituminous), roller (earth), roller (rock), scarifer, shovel, tractor shovel, truck crane, well points, winch truck, push dozer, grout pump, high lift, fork lift (regardless of lift height), all types of boom cats, multiple operator, core drill, tow or push boat, A-frame winch truck, concrete paver, gradeall, hoist, hyster, material pump, pumpcrete, ross carrier, sheep foot, sideboom, throttle valve man, rotary drill, power generator, mucking machine, rock spreader attached to equipment, scoomobile, KeCal loader, tower cranes (French, German and other types), hydrocrane, tugger, backfiller gurries, self propelled compactor, self contained hydraulic percussion drill.

HEAVY & HIGHWAY	BASE RATE	\$23.30
	FRINGE BENEFITS	8.30

HEAVY HIGHWAY CLASS B: All air compressors 200 cfm or greater, bituminous mixer, concrete mixer under 21 cf, welding machine, form grader, tractor 50 HP & over, bull float, finish machine, outboard motor boat, brakeman, mechanic helper, whirly oiler, tractor and road widening wrencher, articulating trucks.

HEAVY & HIGHWAY	BASE RATE	\$20.40
	FRINGE BENEFITS	8.30

HEAVY HIGHWAY CLASS B2: Greaser on grease facilities service heavy equipment:

HEAVY & HIGHWAY	BASE RATE	\$20.60
	FRINGE BENEFITS	8.30

HEAVY HIGHWAY CLASS C: Bituminous distributor, cement gun, conveyor, mud jack, paving joint machine, pump, tamping machine, tractors (under 50 HP), vibrator, oiler, air compressors (under 200 cfm capacity), concrete saw, burlap and curing machine, hydro seeder, power form handling equipment, deckhand oiler, hydraulic post driver:

HEAVY & HIGHWAY	BASE RATE	\$19.99
	FRINGE BENEFITS	8.30

PAINTERS:	BUILDING	BASE RATE	\$11.00
	HEAVY & HIGHWAY	BASE RATE	\$17.30
		FRINGE BENEFITS	3.80

PLASTERERS:		BASE RATE	\$13.30
BELL, HARLAN & PERRY COUNTIES:			

PLASTERERS:		BASE RATE	\$8.25
LESLIE COUNTY::			

PLUMBERS & STEAMFITTERS:		BASE RATE	\$28.00
		FRINGE BENEFITS	20.37

ROOFERS: (Excluding metal roofs)		BASE RATE	\$13.00
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SHEETMETAL WORKERS: (Including metal roofs)		BASE RATE	\$10.88
		FRINGE BENEFITS	.46

SPRINKLER FITTERS:

BASE RATE	\$27.05
FRINGE BENEFITS	12.90

TRUCK DRIVERS / BUILDING:

Truck Drivers: BUILDING	BASE RATE	\$7.33
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TRUCK DRIVERS / HEAVY/HIGHWAY:

Truck helper and warehouseman: HEAVY & HIGHWAY	BASE RATE	\$18.90
	FRINGE BENEFITS	8.30

Driver, winch truck & A-frame truck when used in transporting material: HEAVY & HIGHWAY	BASE RATE	\$19.00
	FRINGE BENEFITS	8.30

Driver, semi-trailer or pole trailer, dump truck, tandem axle, and driver of distributors: HEAVY & HIGHWAY	BASE RATE	\$19.10
	FRINGE BENEFITS	8.30

Driver on mixer trucks - all types: HEAVY & HIGHWAY	BASE RATE	\$19.15
	FRINGE BENEFITS	8.30

Truck mechanic: HEAVY & HIGHWAY	BASE RATE	\$19.20
	FRINGE BENEFITS	8.30

Driver, 3 tons & under, tire changer & truck mechanic helper: HEAVY & HIGHWAY	BASE RATE	\$19.23
	FRINGE BENEFITS	8.30

Driver of pavement breakers: HEAVY & HIGHWAY	BASE RATE	\$19.25
	FRINGE BENEFITS	8.30

Driver, over 3 tons & truck mounted rotary drill: HEAVY & HIGHWAY	BASE RATE	\$19.44
	FRINGE BENEFITS	8.30

Driver, Euclid & other heavy earth moving equipment & low boy: HEAVY & HIGHWAY	BASE RATE	\$20.01
	FRINGE BENEFITS	8.30

Greaser on greasing facilities: HEAVY & HIGHWAY	BASE RATE	\$20.10
	FRINGE BENEFITS	8.30

END OF DOCUMENT
CR 8-031
November 28, 2012

SECTION 5
SPECIAL CONDITIONS

SECTION 5 - SPECIAL CONDITIONS
CONTRACT NO. 15 – PHASE II-A - Waterline Extensions

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SPECIAL CONDITIONS

1. Contract Change Order - All changes which affect the cost of the construction of the project must be authorized by means of a CONTRACT CHANGE ORDER. The CONTRACT CHANGE ORDER will include extra work, work for which quantities have been altered from those shown in the bidding schedule, as well as decreases or increases in the quantities of installed units which are different than those shown in the bidding schedule because of final measurements. All changes should be recorded on a CONTRACT CHANGE ORDER as they occur so that they may be included in the partial payment estimate. All CONTRACT CHANGE ORDERS must be approved by the Hyden – Leslie County Water District.
2. Pre-Construction Conference - Following award of the CONTRACT, the CONTRACTOR will be required to attend a Pre-Construction Conference with OWNER, ENGINEER, and CDBG representatives during which items pertinent to performance and management of the project, will be thoroughly discussed and documented.
3. Equal Opportunity - If this contract exceeds \$10,000 the CONTRACTOR is subject to provisions of the equal opportunity requirements set forth in the Supplemental General Conditions, included herein with forms.
4. Labor Regulations - The CONTRACTOR and each of his subcontractors shall comply with the following statutes (and with regulations issued pursuant thereto which are incorporated herein by reference):

Title 18 U.S.C., Section 876: Kickback from public works employees. Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans (made, insured, or guaranteed) or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined not more than \$5,000 or imprisoned not more than five years, or both.

Title 40 U.S.C., Section 276c: Regulations Governing Contractors and Subcontractors. The Secretary of Labor shall make reasonable regulations for Contractors and Subcontractors engaged in the construction, prosecution, completion or repair of public buildings, public works, or buildings or work financed in whole or in part by loans (made, insured, or guaranteed) or grant from the United States, including a provision that each Contractor and Subcontractor shall furnish weekly a statement with respect to the wages paid each employee during the preceding week.

The CONTRACTOR shall also comply with all Labor regulations set out in General Conditions.

The OWNER shall report all suspected or reported violations to the funding agencies.

5. Protection of Lives and Property - In order to protect the lives and health of his employees under the CONTRACT, the CONTRACTOR shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Inc., and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from

work, arising out of and in the course of employment or work under the CONTRACT.

The CONTRACTOR alone shall be responsible for the safety, efficiency, and adequacy of his plant, appliances, and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

6. Conflict of Interest - No member of or delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this CONTRACT or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this CONTRACT if made with a corporation for its general benefit.

No official of the OWNER who is authorized in such capacity and on behalf of the OWNER to negotiate, make, accept or approve, or to take part in negotiating, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in the CONTRACT or in any part thereof. No officer, employee, architect, attorney, engineer, or inspector of or for the OWNER who is authorized in such capacity and on behalf of the OWNER who is in any legislative, executive, supervisory, or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this CONTRACT or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

7. Partial Payments - Partial Payment estimate forms prepared by the ENGINEER shall be used when estimating periodic payments due the CONTRACTOR.

Computation of quantities that will be the basis for payment estimates, both monthly and final, will be made by the ENGINEER. All payment estimates may be checked and approved by the funding agencies before payment.

Where the computation of areas or volumes by exact geometric methods is unduly laborious or refined, the plan meter shall be held an instrument of precision and may be used in the determination of quantities upon which payments are based.

The measurements of the ENGINEER as to the amount of work done shall be final and conclusive.

Payments shall be made upon the work done within the lines prescribed by the drawings or specifications and in accordance with the unit prices for the items under which the work is done.

To insure the proper performance of the Contract, the OWNER shall retain an amount of each estimate as specified in the General Conditions and/or Supplemental General Conditions.

Additionally, on waterline contracts, clean up and seeding shall be calculated as ten percent (10%) of the unit price for pipe in place. Testing and sterilization as 5% of the unit price for pipe in place.

8. Withholding Payments - The OWNER may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any approved partial payment estimate to such extent as may be necessary to protect the OWNER from loss on account of:

- (a) Defective work not remedied.
- (b) Claims filed or reasonable evidence indicating probable filing of claims.
- (c) Failure of CONTRACTOR to make payments properly to Subcontractors or for material or labor.
- (d) A reasonable doubt that the work can be completed for the balance then unpaid.
- (e) Damage to another CONTRACTOR or the OWNER'S facilities.
- (f) Performance of work in violation of the terms of the CONTRACT DOCUMENTS.
- (g) Where work on unit price items are substantially complete but lack cleanup and/or corrections ordered by the ENGINEER, amounts shall be deducted from unit prices in partial payment estimates to amply cover such clean-up and/or corrections.

When the above grounds are removed, payment shall be made for amounts withheld because of them.

9. Sanitary Facilities - All necessary temporary sanitary facilities shall be provided for by the Prime Contractor(s) and shall meet with current requirements of the State Environmental Protection Agency. After the completion of the work, all temporary sanitary facilities shall be properly disposed of by the Prime Contractor(s).
10. Final Inspection - Final inspection of the work shall be made for the OWNER by the ENGINEER in collaboration with the Representatives for the funding agencies. Such inspection shall be made as soon as practicable after the CONTRACTOR has notified the OWNER in writing that the work is ready for such inspection.
11. Project Signs – **Contract No. 15 – PHASE II-A - Waterline Extensions** shall furnish signs as set out in Section 01580 of each Contract Technical Specifications. Location is to be determined by the Engineer at Pre-Construction Conference.
12. Conflicting Requirements - Should conflicting conditions exist within the Specifications, Contract Documents, or Construction Drawings, priorities shall be established as follows:
 - a) Written Contract
 - b) Written Proposal
 - c) Advertisement for Bids
 - d) Instruction to Bidders
 - e) Special Conditions
 - f) Written Technical Specifications
 - g) Standard Details
 - h) Large Scale Details on Drawings
 - i) General Arrangement Details on Drawings
13. Owner's Right to Award - The OWNER shall retain the right to award or not award any or all of the Contracts covered by these Contract Documents and Specifications.
14. Owner's Right to Increase or Decrease Units - The OWNER shall retain the right to increase or decrease or eliminate up to 20% of any of the units listed in the BID submitted by the CONTRACTOR as may be required to complete the work at any time concurrent with or following the award of the Contract.

Unit prices previously approved in original bid are acceptable for pricing changes of original bid items. However, when changes in quantities exceed 20 percent of the original bid quantity and the total dollar change of that bid item is significant, the unit price may be reviewed by the OWNER to determine if a new unit price should be negotiated for added work performed after the original contract completion date.

15. Workmen's Compensation and Insurance - Workmen's Compensation: As required by State Statutes
- a) Public Liability and Property Damage Including Vehicular Liability: As listed in General Conditions
 - b) Builder's Risk or Installation Floater: Full amount of Contract Price.
16. Wage Rates - All Contractors for this project shall comply with State codes as they apply to wages and hours - public works projects.

The State Prevailing Wage Determinations are located in Section 4 of these Specifications.

17. Access to Records - Representatives of the funding agencies and the State D.O.W. shall have access to work whenever it is in preparation or progress. The Comptroller General of the United States, or any authorized representative, shall have access to any books, documents, papers, and records which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.
18. Time of Completion and Liquidated Damages –

Contract No. 15 – PHASE II-A - Waterline Extensions shall be completed within 300 calendar days from date of Notice to Proceed.

Liquidated Damages shall be \$500.00 for each calendar day any Contract remains incomplete after the Time of Contract Completion.

19. Contractor's Obligations - The Contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this Contract and said Specifications and in accordance with the plans and drawings covered by this Contract and any and all supplemental plans and drawings, and in accordance with the directions of the ENGINEER as given from time to time during the progress of the work. He shall furnish, erect, maintain, and remove such construction plants and such temporary works as may be required. The CONTRACTOR shall observe, comply with, and be subject to all the terms, conditions, requirements, and limitations of the Contract and Specifications, and shall do, carry on, and complete the entire work to the satisfaction of the ENGINEER and the OWNER.
20. Quantities of Estimate - Whenever the estimated quantities of work to be done and materials to be furnished under this Contract are shown in any of the documents including the BID, they are given for use in comparing bids and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be

deemed reasonably necessary or desirable by the OWNER to complete the work contemplated by this Contract, and such increase or diminution shall not give cause for claims or liability for damages.

21. Liens - Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the OWNER, a complete release of all liens arising out of this Contract or receipt in full in lieu thereof, and if required in either case, an affidavit that insofar as he has knowledge or information, the releases and receipts include all the labor and materials for which a lien could be filed; but the Contractor may, if any subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner to indemnify him against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the OWNER all monies that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.
22. Work Reasonably Inferred But Not Particularly Delineated or Specified - The Contractor shall make a thorough examination of the site and study all drawings and specifications and all conditions relating to the erection of the work, and if any materials or labor are evidently necessary for the proper and complete execution of the work which are not specifically mentioned and included in the drawings and specifications, although reasonably inferred therefrom, unless eliminated by special mention, or if any error or inconsistency appears therein, or in the event of any doubts arising as to the true intent and meaning of the drawings or specifications, he shall report it to the ENGINEER at least five (5) days in advance of receiving the proposals. The ENGINEER will then issue an addendum containing the proper information to all Contractors not later than three (3) days prior to the time for opening of bids, to assure fair competition.
- In case the Contractor fails to make such report and the ENGINEER is not otherwise advised of such doubtful matters, the Contractor is hereby made responsible for the furnishing of the necessary labor and material reasonably inferred for any additional work involved in the correction of apparent errors or inconsistencies and in executing the true intent and meaning of the drawings and specifications as interpreted by the ENGINEER, and all such labor and material shall be provided at the Contractor's expense and under no condition will any such labor and material be allowed as an extra.
23. Limit of Liability of Owner to Contractor for Delays, Extra Cost and Damage - If, through no wrongful act or neglect of the OWNER, the Contractor is delayed, stopped, or caused extra cost or damage by injunction, court orders, judgment, or requirements of some other authority or acts beyond the control of the OWNER, he shall not be liable to the Contractor except for extension of time and payments only as reflected in application of quantities, prices, and extra work set forth in these specifications and contract. If sufficient work is otherwise available for application of Contractor's forces, the Owner will not be required to grant extension of time.
24. Requirements for Highway and Railroad Crossings and Rights-of-Way - The specifications herein concerning trenching, pipe laying, jacket pipe crossings, backfilling, maintenance during construction, protection of public, maintaining traffic, tunneling, and re-paving are subject to revision to conform to such requirements as set forth by highway and railroad specifications and such crossings and rights-of-way.
25. Delays and Cost Due to Errors and/or Changes in Lines and Grades - When the

OWNER'S engineering forces make errors or changes in lines and grades that cause items of construction to be removed and replaced, the extra cost of such removal and replacement over that of correct construction shall be chargeable as an extra per terms of Article 12 of the General Conditions.

Where the Contractor's forces are delayed only due to ENGINEER'S errors or changes in not more than five in fifty cases of location of points on the whole project, errors and changes will not be above normal to be expected in the execution of the work, and no claims for extra cost due to such delay will be granted. Layout work is considered a normal portion of a construction operation in which it is considered impractical to prevent delays of some of the required labor and equipment while others are performing their portion of the operation. Excessive delay due to such causes shall be chargeable as extra work per terms of Article 12 of the General Conditions. However, to be allowable, time, labor, and equipment delayed must be reported to and approved by the ENGINEER within 24 hours. Labor and equipment must have been applied at the time of stoppage and could not have been applied to other incomplete work during the stoppage.

26. Licenses and Permits - The Owner will secure and pay for permits required for permanent structures and State Highway Encroachment Bonds. The Contractor shall obtain and pay for all other necessary licenses and permits and shall faithfully comply with all laws, ordinances and regulations, Federal, State, or local, which may be applicable to the operations to be conducted hereunder.
27. Conflict With or Damage to Existing Utilities - Insofar as location data is available to the ENGINEER, existing underground utilities (such as water lines, sewer lines, natural gas lines, and underground telephone and electrical conduits) are located on the drawings. However, due to the approximate nature of such data and information, the locations of any particular utility cannot be certified as being correct. In general, locations and elevations are approximate only. The Contractor shall obtain the services of representatives of each of the utilities involved during construction to assist in the location of existing utilities. Lines and grades of lines have been established to minimize interference with utilities as far as possible. However, it shall be the responsibility of the Contractor to determine any relocations necessary for his performance of the contract, and to pay any fees associated therewith, with no additional cost or liabilities to the OWNER.
28. Shop or Setting Drawings - See Section 01300 of Technical Specifications for further detail. Submittals **must** meet all submittal requirements set out therein or they will be returned to Contractor.
29. Work Hours Beyond Regular Hours - The Contractor shall notify the ENGINEER in writing of any scheduled work beyond regular and normal working hours at least 48 hours in advance of the work. Work performed after regular working hours and without notice to the ENGINEER, shall be considered not in conformance with the Plans and Specifications and may be removed or not paid for.
30. Excavation - All excavation shall be considered unclassified. **Rock excavation is not a separate pay item**, and shall not be cause for claim of additional compensation due to the Contractor.
31. Air and Water Acts - If the contract exceeds \$100,000 the Contractor agrees to comply

with all the requirements of Section 114 of the Air Act (41 U.S.C., Section 1857 C-9) and Section 308 of the Water Act (33 U.S.C., Section 1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 of the Air Act and Section 308 of the Water Act and all regulations (40CFR 15.4) and guidelines issued thereunder after the award of the contract. In so doing, the Contractor further agrees to:

- a) As a condition for the Award of Contract, to notify the OWNER of the receipt of any communication from the Environmental Protection Agency (EPA) indicating that a facility to be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities. Prompt notification is required prior to contract award.
- b) The Contractor will include, or cause to be included, the above criteria and requirements in every nonexempt subcontract and that he will take such action as the Government may direct as a means of enforcing such provisions.
- c) To certify that any facility to be utilized in the performance of any nonexempt contractor is not listed on the EPA List of Violating Facilities pursuant to 40 CFR 15.20 as of the date of contract award.

32. Subcontracting - The following is in addition to and in conjunction with Article 6 of the General Conditions.

Prior to the execution and delivery of the Agreement, the successful Bidder will submit to the OWNER and the ENGINEER for acceptance a list of the names of Subcontractors and such other persons and organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for those portions of the Work as to which the identity of the Subcontractors and other persons and organizations must be submitted as specified in the Contract Documents. Prior to the execution and delivery of the Agreement, the ENGINEER will notify the successful Bidder in writing if either the OWNER or the ENGINEER, after due investigation, has reasonable objection to any Subcontractor, person or organization on such list. The failure of the OWNER or the ENGINEER to make objection to any Subcontractor, person or organization on the list prior to the execution and delivery of the Agreement shall constitute an acceptance of such Subcontractor, person or organization. Acceptance of any such Subcontractor, person or organization shall not constitute a waiver of any right of the OWNER or the ENGINEER to reject defective Work, material or equipment, not in conformance with the requirements of the Contract Documents.

If, prior to the execution and delivery of the Agreement, the OWNER or the ENGINEER has reasonable objection to and refuses to accept any Subcontractor, person or organization on such list, the successful Bidder may, prior to such execution and delivery, either (a) submit an acceptable substitute without an increase in his Bid Price or (b) withdraw his Bid and forfeit his Bid security. If, after the execution and delivery of the Agreement, the OWNER or the ENGINEER refuses to accept any Subcontractor, person or organization on such list, the CONTRACTOR will submit an acceptable substitute and the Contract Price shall be increased or decreased by the difference in cost occasioned by such substitution and appropriate Change Order shall be issued; however, no such increase in the Contract Price shall be allowed in respect of any substitutions unless the CONTRACTOR has acted promptly and reasonably in submitting a name with respect thereto prior to the execution and delivery of the Agreement.

The CONTRACTOR will not employ any Subcontractor (whether initially or as a substitute) against whom the OWNER or the ENGINEER may have reasonable objection, nor will the CONTRACTOR be required to employ any Subcontractor against whom he has reasonable objection. The CONTRACTOR will not make any substitution for any Subcontractor who has been accepted by the OWNER and the ENGINEER, unless the ENGINEER determines that there is good cause for doing so.

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

The CONTRACTOR agrees to specifically bind every Subcontractor to all of the applicable terms and conditions of the Contract Documents. Every Subcontractor, by undertaking to perform any of the Work, will thereby automatically be deemed to be bound by such terms and conditions.

All Work performed for the CONTRACTOR by a Subcontractor shall be pursuant to an appropriate agreement between the CONTRACTOR and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance provided in accordance with the General Conditions; except such rights as they may have to the proceeds of such insurance held by the OWNER as trustee under the General Conditions. The CONTRACTOR will pay each Subcontractor a just share of any insurance moneys received by the CONTRACTOR under the General Conditions.

33. Materials, Equipment and Labor; Substitute Material or Equipment - The following is in addition to and in conjunction with Article 6 of the General Conditions.

All materials and equipment will be new. If required by the ENGINEER, the CONTRACTOR will furnish satisfactory evidence as to the kind and quality of materials and equipment.

If it is indicated in the Specifications that the CONTRACTOR may furnish or use a substitute that is equal to any material or equipment specified, and if the CONTRACTOR wishes to furnish or use a proposed substitute, he will, promptly after the award of the contract, make written application to the ENGINEER for approval of such a substitute certifying in writing that the proposed substitute will perform adequately the duties imposed by the general design, be similar and of equal substance to that specified by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified. No substitute shall be ordered or installed without the written approval of the ENGINEER who shall be the judge of equality.

34. Availability of Lands, Physical and Subsurface Conditions; Reference Points - The following is in addition to and in conjunction with Article 4 of the General Conditions.

The OWNER will provide, as indicated in the Contract Documents and not later than the date when needed by the CONTRACTOR, the lands upon which the Work is to be done, rights-of-way for access thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be secured and paid for by the OWNER, unless otherwise

specified in the Contract Documents. If the CONTRACTOR believes that any delay in the OWNER'S furnishing these lands or providing such easements entitles him to an extension of the Contract Time, he may make a claim therefore as provided in the General Conditions. The CONTRACTOR will provide all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

The OWNER will, upon request, furnish to the CONTRACTOR copies of all available boundary surveys and subsurface tests.

The CONTRACTOR will promptly notify the OWNER and ENGINEER in writing of any subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents. The ENGINEER will promptly investigate those conditions and advise the OWNER in writing if further surveys or subsurface tests are necessary. Promptly thereafter, the OWNER will obtain the necessary additional surveys and tests and furnish copies to the ENGINEER and the CONTRACTOR. If the ENGINEER finds that the results of such surveys or tests indicate subsurface or latent physical conditions differing significantly from those indicated in the Contract Documents, a Change Order shall be issued incorporating the necessary revisions.

The OWNER will establish such general reference points as in his judgment will enable the CONTRACTOR to proceed with the Work. The CONTRACTOR will be responsible for the layout of the Work and will protect and preserve the established reference points and will make no changes or relocations without the prior written approval of the OWNER. He will report to the ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. The CONTRACTOR will replace and accurately relocate all reference points so lost, destroyed or moved.

35. Substantial Completion - Prior to final payment, the CONTRACTOR shall, in writing to the OWNER and the ENGINEER, certify that the entire Project is substantially complete and request that the ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, the OWNER, CONTRACTOR AND ENGINEER will make an inspection of the Project to determine the status of completion. If the ENGINEER considers the Project substantially complete, he will prepare and deliver to the OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion and the responsibilities between the OWNER and the CONTRACTOR for maintenance, heat and utilities. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment, and the certificate shall fix the time within which such items shall be completed or corrected, said time to be within the Contract Time. The OWNER shall have seven days after receipt of the tentative certificate during which he shall make written objection to the ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, the ENGINEER concludes that the Project is not substantially complete, he shall notify the CONTRACTOR in writing, stating his reasons therefore. If, after said seven days and after consideration of the OWNER'S objections, the ENGINEER considers the Project substantially complete, he will execute and deliver to the OWNER and the 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 he believes justified after consideration of any objections from the OWNER.

The OWNER shall have the right to exclude the CONTRACTOR from the Project after the date of Substantial Completion, but the OWNER may allow the CONTRACTOR reasonable access to complete or correct items on the tentative list.

36. Cleaning Up - The CONTRACTOR will keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work, and at the completion of the Work he will remove all waste materials, rubbish and debris from and about the premises as well as tools, construction equipment and machinery, and surplus materials, and will leave the site clean and ready for occupancy by the OWNER. The CONTRACTOR will restore to their original condition those portions of the site not designated for alteration by the Contract Documents. Also see paragraph 7 of these Special Conditions pertaining to clean-up.

37. Miscellaneous - Whenever any provisions of the Contract Documents requires the giving of written notice it shall be deemed to have been validly given if 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 if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to him who gives the notice.

The duties and obligations imposed by the General Conditions and the rights and remedies available hereunder, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon the CONTRACTOR and the rights and remedies available to the OWNER and ENGINEER thereunder, shall be in addition to and not a limitation of any otherwise imposed or available by law, by special guarantee or other provisions of the Contract Documents.

Should the OWNER or the CONTRACTOR suffer injury or damage to its person or property because of any error, omission or act of the other or of any of his employees or agents or others for whose acts he is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage.

The Contract Documents shall be governed by the law of the place of the Project.

38. Safety and Health Regulations - The Contractor shall comply with the Department of Labor Safety and Health Act of 1970 (P.L. 91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (P.L. 91-54).

39. Siltation and Soil Erosion - The Contractor shall make every effort possible to assure a minimum amount of siltation and erosion will occur on the job site during construction.

40. Permanent Reference Points, Bench Marks, and Property Markers - The CONTRACTOR alone will be responsible for the protection and preservation of all permanent reference points, permanent bench marks, property corners, and property line points. The CONTRACTOR will make no changes or relocations without the written approval from the OWNER. The CONTRACTOR will report to the ENGINEER whenever any reference point, etc., is lost, damaged or destroyed or requires relocation and/or establishment of temporary points for relocation of said permanent point. The CONTRACTOR will have a registered land surveyor replace and accurately relocate all permanent points so lost, damaged, destroyed, or moved. The re-establishment of any said point shall be considered incidental to the cost of construction and therefore at no additional cost to

the OWNER.

41. Existing Utilities - Also see Technical Specifications, Section 02220.

Special precautions shall be taken by the Contractor to avoid damage to existing overhead and underground utilities owned and operated by the Owner or by public or private utility companies.

The available information concerning the location of existing underground utilities is shown on the Drawings. While it is believed that the locations shown are reasonably correct, neither the Engineer nor the Owner can guarantee the accuracy or adequacy of this information.

Before proceeding with the Work, the Contractor shall confer with all public or private companies, agencies, or departments that own and operate utilities in the vicinity of the Construction Work. The purpose of the conference, or conferences, shall be to notify said companies, agencies, or departments of the proposed construction schedule, verify the location of and possible interference with the existing utilities that are shown on the Drawings, arrange for necessary suspension of service, and make arrangements to locate and avoid interference with all utilities (including house connections) that are not shown on the Drawings. The Engineer and Owner have no objection to the Contractor arranging for the said utility companies, agencies, or departments to locate and uncover their own utilities; however, the Contractor shall bear the entire responsibility and cost for locating and avoiding, or repairing damage to said existing utilities.

Where existing utilities or appurtenant structures, either underground or above-ground, are encountered, they shall not be displaced or disturbed unless necessary, and in such case shall be replaced in as good or better condition than found as quickly as possible. Relocation and/or replacement of all utilities and appurtenant structures to accommodate the construction work shall be at the Contractor's expense, unless such relocation and/or replacement is by statute or agreement the responsibility of the owner of the utility.

Where a sewer line is to be installed within 18 inches vertically or 10 feet horizontally of a water line, that section of the sewer line shall be encased in concrete, according to the requirements of Paragraph 3.10 B, Section 02700.

A list of the utility companies which service the project area are on the cover sheet of the drawings. The utilities are not limited to those on said list.

42. Coordination - All Contractors are advised that various Contracts will be awarded simultaneously with their Contracts. It is imperative that the various Contractors coordinate its activities and cooperate with the other Contractors to assure expedient completion of the Project. Any conflicts should be brought to the attention of the Engineer.

43. Care of Shrubbery - Reasonable care shall be taken during construction to avoid damage to vegetation. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Trees which receive damage to branches shall be trimmed of those branches to improve the appearance of the tree. Tree trunks

receiving damage from equipment shall be treated with a tree dressing.

44. Mitigation Measures for Endangered Species – For the potential protection of the habitat for the endangered Indiana bat, No trees larger than 6 inches in diameter shall be disturbed during construction. In the event a tree larger than 6" must be disturbed, the Contractor shall notify the Engineer. Under no circumstances shall any tree be disturbed between the period of April 1 through October 15.
45. Water for Testing and Disinfecting Purposes - Where water is required for testing and disinfecting water lines and storage tanks or testing and flushing sewer lines, the Contractor shall be responsible for all costs of said water. In the case where test water is to be purchased, the Contractor shall arrange for the purchase and shall pay all costs associated with the purchase including tap fee if applicable.

Note: The Owner will furnish water to Contractors for testing and sterilization at a cost not to exceed \$3.00/1,000 gallons. Contractors are responsible for all charges for water losses caused by leaks which occur during the one year warranty period.

Water volume used for testing and sterilization shall be computed as the difference in the master readings and the average of the readings recorded during the six months prior to construction.

SECTION 6
TECHNICAL SPECIFICATIONS

HYDEN - LESLIE COUNTY WATER DISTRICT

Contract No. 15 – PHASE II-A – Waterline Extensions

TECHNICAL SPECIFICATIONS

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SECTION 01010

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Division 1 - General Requirements shall apply to all Divisions of the Specifications. Any conflict shall be called to the attention of the Engineer for clarification and ruling.
- B. These specifications and drawings accompanying them describe the work to be done and the materials to be furnished for installation of all specified work.
- C. By submission of his bid, the Contractor acknowledges that he has acquainted himself with all conditions which may affect the work as would be evident from a thorough investigation of the job site, and these specifications covering the work, for the purpose of coordinating his work and cost, and agrees that the Owner will not be held liable for any additional costs incurred by the Contractor for causes or conditions which could or should have been determined by such an investigation.

1.2 MANAGER'S NAME AND PHONE NUMBER

Mr. Leihman Howard Jr.
Hyden-Leslie County Water District
P.O. Box 906
Hyden, Kentucky 41749
Phone: (606) 672-2791
Fax: (606) 672-7510

1.3 DRAWINGS AND SPECIFICATIONS

- A. The Drawings and Specifications are intended to be fully explanatory, however, should anything be shown, indicated or specified on one and not the other, it shall be done the same as if shown, indicated or specified in both.
- B. It shall be the responsibility of all Contractors and subcontractors to carefully examine all Drawings, Specifications and Contract Documents pertaining to all phases of the construction in order that Contractor and Subcontractors may foresee all requirements for coordination of their work. Submission of a bid shall be construed as evidence that such an examination has been made. Claims based on unforeseen requirements will not be considered.

- C. Should any error or inconsistency appear in Drawings or Specifications, the Contractor, before proceeding with the work, must make mention of the same to the Engineer for proper adjustment, and in no case proceed with the work in uncertainty or with insufficient drawings.
- D. Contractors shall follow sizes in specifications or figures on drawings, in preference to scale measurements and follow detail drawings in preference to general drawings.
- E. Where it is obvious that a drawing illustrates only a part of a given work or of a number of items, the remainder shall be deemed repetitious and so constructed.

1.4 SCOPE OF WORK

- A. General
 - 1. The work to be performed consists of furnishing all materials, labor, equipment and the execution of all operations necessary for the completion of this **Contract No. 15 PHASE II-A - Waterline Extensions.**
 - 2.. All the miscellaneous items of work shown by the drawings and/or described in the specifications.

1.5 CONTRACTS

- A. Notice and Service Thereof:

Any notice to the Contractor from the Owner relative to any part of this Contract, shall be in writing and considered delivered and the service thereof completed, when such notice is posted, by mail, to the Contractor at his last given address, or delivered in person to the Contractor or his authorized representative on the work site.

1.6 DIVISION OF SPECIFICATIONS

- A. Division of specifications into sections is done for convenience of reference and is not intended to control Contractors in dividing work among subcontractors or to limit scope of work performed by any trade under any given section.

1.7 CONFLICTS

- A. If and when doubt exists in the mind of the Bidder as to the true meaning of any part of the Bidding Documents, the Bidder shall request interpretation thereof in accordance with the Instructions to Bidders. Alleged "answers by telephone" will not be adjudged as legitimate interpretations of conflicting information. Official interpretations shall be by Addendum only, within the time frame indicated in the Instructions to

Bidders and/or the individual sections of the Specifications. In the absence of an official Addendum, the following shall prevail:

1. If a conflict occurs in or between bidding documents regarding methods of performing the work or the material required, and the Bidder does not obtain a written decision (official Addendum) with respect thereto prior to submitting his proposal, he shall be deemed to have bid upon the more expensive way of doing the work and the better quality of material. If the Owner and/or Engineer later elects to use the less expensive method, less expensive quality or less quantity of material the Owner shall receive a suitable credit.
2. Refer to the General Conditions and Special Conditions for Contract requirements.
3. The intent of the contract documents is to include all items necessary for the proper execution and completion of the work. Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications, shall be included in the Contractor's work the same as if included in both. In case of a doubt arising as to the true intent and meaning of the drawings and specifications, the Contractor shall report it at once to the Engineer. The Engineer shall furnish, with reasonable promptness, additional instructions, by means of drawings or otherwise, necessary for the proper execution of the work. All such drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable therefrom. The work shall be executed in conformity therewith and the Contractor shall do no work without proper drawings and instructions. In case of conflicts between the various contract documents, the order of precedence will be as follows: (1) Written Contract (2) Written Proposal, (3) Advertisements for Bids, (4) Instructions to Bidders, (5) Special Conditions, (6) General Conditions, (7) Written Technical Specifications, (8) Standard Details, (9) Large Scale Details on Drawings, and (10) General Arrangement Details on Drawings.
4. The Contractor shall make a thorough examination of the site and study all drawings and specifications and all conditions relating to the erection of the work. Materials or labor evidently necessary for the proper and complete execution of the work, which are not specifically mentioned although reasonably inferred therefrom, shall be included in the work.

1.8 BENEFICIAL USAGE (SUBSTANTIAL COMPLETION)

- A. The date of beneficial usage of the project, or a designated portion thereof, is the date where construction is sufficiently completed on the project for the use for which it is intended.

- B. Corrective work and the replacement of defective equipment or materials and the adjustment of control apparatus shall not delay the determination of beneficial usage.
- C. When the majority of the work is complete and ready for operation, but cannot be certified as substantially complete because of incomplete items impossible to complete due to weather conditions, payments will be authorized for the amount of work completed, withholding reasonable amounts to cover the incomplete work. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims, and shall not cancel the contract.
- D. When the Owner begins to use the facilities or any portion thereof, before contract completion, the operation, maintenance, utilities and insurance become the responsibility of the Owner.

1.9 LIQUIDATED DAMAGES

Should the Contractor fail to complete the work under his Contract and make the Project available for Beneficial Usage on or before the date stipulated for Beneficial Usage (or such later date as may result from extensions in the Contract Time granted by the Owner), the Contractor agrees that the Owner is entitled to, and shall pay the Owner, as liquidated damages, the sum of **Five Hundred Dollars (\$500.00)** for each consecutive calendar day until Beneficial Usage is reached as described herein.

1.10 SUBSTITUTION - MATERIALS AND EQUIPMENT

- A. Substitution of major equipment and materials previously submitted by the Contractor and reviewed by the Engineer will be considered only for the following reasons:
 - 1. Unavailability of the material or equipment due to conditions beyond the control of the supplier.
 - 2. Inability of the supplier to meet contract schedule.
 - 3. Technical noncompliance to specifications.
- B. Substitution of other equipment and materials named in the specifications will be considered, provided the proposed substitution will perform adequately the functions called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function of that specified. The burden for proving equality is that of the Contractor.
- C. Inclusion of a certain make or type of materials or equipment in the Contractor's estimate shall not obligate the Owner to accept such material or equipment if it does not meet the requirements of the plans and specifications.

D. Also, see Section 01600.

1.11 CONTRACTOR USE OF PREMISES

A. Release of Site:

1. All access to the site shall be as defined by the Owner.
2. Contractor shall insure that no hazardous situations exist at the site during working hours or are left during non-working hours.

1.12 SCHEDULING OF WORK

- A. The work shall be scheduled so the lines can be put into service by phases and at the earliest possible date.
- B. The Contractor shall coordinate all required shutdowns of existing systems with the various utilities of the **Hyden-Leslie County Water District**; so as to cause the least inconvenience to existing users thereof.
- C. All work shall be completed within time limits established in other portions of the Contract Documents.

1.13 TRAFFIC MAINTENANCE

- A. All traffic must be maintained at all times on public streets and roadways. No road or street shall be closed without special written permission from the Owner.
- B. Traffic must be maintained on State maintained roads in accordance with the Standard Drawings, details and specifications. Contractor will be required to adhere to all provisions of the Kentucky Transportation Cabinet Permit for the project.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1. COORDINATION OF THE WORK

- A. The Contractor shall coordinate the work of all the crafts, trades, subcontractors engaged on the Work, and he shall have final responsibility as regards the schedule, workmanship, and completeness of each and all parts of the Work.
- B. All crafts, trades, and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work, which adjoins, incorporates, proceeds, or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to the execution of subcontract agreements and the assignment of the parts of the Work. Each craft, trade, and subcontractor shall be made responsible to the Owner, for furnishing embedded items, giving directions for doing all cutting and fitting, making all provisions for accommodating the Work, and for protecting, patching, repairing, and cleaning as required to satisfactorily perform the Work.
- C. The Contractor shall be responsible for all cutting, digging, and other action of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the Project, the Contractor shall make such repairs, alterations, and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.
- D. Each subcontractor is expected to be familiar with the General requirements and all sections of the Detailed Specifications for all other trades and to study all Drawings applicable to his work and to the end that complete coordination between trades will be affected. Each Contractor shall consult with the Engineer if conflicts exist on the Drawings.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01050
FIELD ENGINEERING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Contractor's Responsibility

1. It shall be the Contractors' responsibility to establish all lines, elevations, reference marks, and batter boards needed by the Contractor during the progress of the Work. The Engineer shall have final approval of location of all facilities.
2. The Engineer shall be permitted at all times to check the lines, elevations, reference marks, and batter boards, set by the Contractor, who shall correct any errors in lines, elevations, reference marks, batter boards, etc., disclosed by such check. Such a check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish in any way the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire Work.
3. The Contractor shall make, check, and be responsible for all measurements and dimensions necessary for the proper construction of and the prevention of misfittings in the Work.

B. Work to Conform

1. During the progress and on its completion, the work shall conform truly to the lines, levels, and grades indicated on the Drawings or given by the Engineer and shall be built in a thoroughly substantial and workmanlike manner, in strict accordance with the Drawings, Specifications, and other Contract Documents and the directions given by the Engineer.
2. All work done without instructions having been given by the Engineer, without proper lines or levels, or performed during the absence of the Engineer, will not be estimated or paid for except when such work is authorized by the Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's expense.

C. Pipe Location:

1. Exterior pipelines will be located substantially as indicated on the Drawings, but the right is reserved by the Owner, acting through the Engineer, to make such modifications in location as may be neces-

sary. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items where required.

D. Limits of Normal Excavation:

1. In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below, unless other limits are indicated on the Drawings or specified.
2. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider than 2'6" plus the nominal diameters of the pipe at the level of or below the top of the pipe. Trenches cut in roads and streets shall not exceed a maximum width of 2'6" plus the nominal diameters of the pipe at the level of the road or street surface. The normal depth shall be measured to a distance of 0.2 feet below the bottom of the pipe in earth and 0.5 feet in rock, unless there is a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The width of trench for the cradle shall be assumed to be that specified above for pipes in trench.
3. For concrete placed directly against the undisturbed earth, the normal width and depth of the excavation for such concrete shall be measured to the neat lines of the concrete as indicated on the Drawings or as ordered.
4. For concrete placed against rock surfaces resulting from rock excavation, the normal width and depth of the excavation shall be measured to 4 inches outside the neat lines of the concrete as indicated on the Drawings or as ordered.
5. For other structures, except manholes as noted below, the normal width shall be measured between vertical planes one foot outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.
6. No additional width or depth of trenches excavated in earth or rock shall be allowed at standard circular manholes.
7. Wherever bell holes are required for jointing pipe, they shall be provided without additional compensation over and above that resulting from measurements as above described.
8. 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, specifications or as required, anchor

bolts shall be provided with square plates at least 4 inches by 4 inches by 3/8 inch 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. Care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise drilling and caulking.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01060
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 CODES

All construction work shall be done in strict accordance with the latest edition of the Kentucky Building Code, National Electrical Code (NEC) and supplements, the requirements of the local electrical utility company, local codes, and as specified herein. Skilled workmen shall perform all work in a neat manner and all equipment shall be cleaned before final acceptance. A partial list of codes is as follows:

Kentucky Building Code
City and/or County Building Inspector
National and Local Electrical Codes
National Fire Protection Association (NFPA)
State Fire Marshal
Local Fire Marshal
Standards of Safety
O.S.H.A.
KY Division of Water

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01070
ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1. REQUIREMENTS INCLUDED

Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth as follows.

1.2. QUALITY ASSURANCE

- A. For the products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Bid date, or date of Owner-Contractor Agreement when there are no bids, except when a specific date is specified.
- C. When required by individual Specifications section, obtain a copy of standard. Maintain a copy at job site during submittals, planning and progress of the specific work, until Substantial Completion.

1.3. SCHEDULE OF REFERENCES

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association.
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
IEEE	Institute of Electrical and Electronic Engineers, Inc.
AISC	American Institute of Steel Construction
AMCA	Air Moving and Conditioning Association
ANS	American National Standards Institute

API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CS	Commercial Standard
IBR	Institute of Boiler and Radiator Manufacturers
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards
KDOH	Kentucky Department of Highways
NBS	National Bureau of Standards
NEC	National Electrical Code; latest edition
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
Fed.	Federal Specifications issued by the Federal Supply Spec. Service of the General Services Administration, Washington, D.C.
125-lb ANS	American National Standard for Cast-Iron Pipe
150-lb ANS	Flanges and Flanged Fittings, Designation B16.1-1975, for the appropriate class
AWG	American or Brown and Sharpe Wire Gage
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
Stl.Wg	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or

	Roebing Gage
UL	Underwriters' Laboratories
USS	United States Standard Gage
WOG	Water, Oil, Gas
WSP	Working Steam Pressure

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 - GENERAL

1.1. QUALITY ASSURANCE

- A. For Products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Material shall bear Underwriters' Laboratories label where such a standard has been established and listed by Underwriters' Laboratories, Inc. All materials, equipment and appliances shall conform to requirements of standards referenced here.
- C. Conform to reference standard by date of issue current on date of Contract Documents.
- D. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.2. SCHEDULE OF REFERENCES

ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AGC	Associated General Contractors of America 1957 E Street, N.W. Washington, DC 20006
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, CO 80110
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018

ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103

CDA Copper Development Association
57th Floor, Chrysler Building
405 Lexington Avenue
New York, NY 10174

CRSI Concrete Reinforcing Steel Institute
933 Plum Grove Road
Schaumburg, IL 60195

FCC Federal Communications Commission
DOT, M443.2
Utilization and Storage Section
Washington, DC 20590

FM Factory Mutual System
1151 Boston-Providence Turnpike
Norwood, MA 02062

IEEE Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, NY 10017

NEMA National Electrical Manufacturers' Association
2101 L Street, N.W.
Washington, DC 20037

NFPA National Fire Protection Association
1619 Massachusetts Avenue, N.W.
Washington, DC 20036

PCA Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

REA Rural Electrification Administration
USDA-REA-ASD
Room 0180
ATTN: Publications
14th and Independence Avenue, S.W.
Washington, DC 20250

UL Underwriters' Laboratories, Inc.
333 Pfingston Road
Northbrook, IL 60062

PART 2 - REFERENCED STANDARDS

2.1 All work performed in connection with this contract shall be in accordance with the latest version of the following standards:

Occupational Safety and Health Administration (OSHA)

Applicable Telecommunications Standards

National Fire Protection Association

National Electrical Code (NEC)

National Electrical Safety Code (NESC)

Federal Communications Commission

National Telecommunications and Information Administration

Electronics Industries Association (EIA)

American National Standards Institute

Rural Electrification Administration

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1. WORK INCLUDED

Shop drawings, descriptive literature, project data and samples (when samples are specifically requested) for all manufactured or fabricated items shall be submitted by the Contractor to the Engineer for examination and review in the form and in the manner required by the Engineer. All submittals shall be furnished as set out in paragraph 1.5 hereinafter and shall be checked and reviewed and stamped and signed as approved by the Contractor before submission to the Engineer. The review of the Drawings by the Engineer shall not be construed as a complete check, but will indicate only that the general method of construction and detailing is satisfactory. Review of such drawings will not relieve the Contractor of the responsibility for any errors which may exist, as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.

1.2. RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. General Conditions.

B. Section 01720 - Project Record Documents (As Built).

1.3. DEFINITIONS

The term "submittals" shall mean shop drawings, manufacturer's drawings, catalog sheets, brochures, descriptive literature, diagrams, schedules, calculations, material lists, performance charts, test reports, office and field samples, and items of similar nature which are normally submitted for the Engineer's review for conformance with the design concept and compliance with the Contract Documents.

1.4. GENERAL CONDITIONS

Review by the Engineer of shop drawings or submittals of material and equipment shall not relieve the Contractor from the responsibilities of furnishing same of proper dimension, size, quality, quantity, materials, and all performance characteristics to efficiently perform the requirements and intent of the Contract Documents. Review shall not relieve the Contractor from the responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents.

Review of shop drawings shall not be construed as releasing the Contractor from the responsibility of complying with the Specifications.

1.5. GENERAL REQUIREMENTS FOR SUBMITTALS

A. Shop Drawings

1. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting, and erection details.
 2. Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting, or erection details of equipment, materials, and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for contractor distribution plus three (3), which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower right-hand corner of the exposed surface.
- B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the Project, and shall be supplemented to provide additional information applicable to the Project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the Project.
- C. Where samples are required, they shall be adequate to illustrate materials, equipment, or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.
- D. All submittals shall be referenced to the applicable item, section, and division of the Specifications, and to the applicable Drawing(s) or Drawing schedule(s). All submittals shall bear the Engineer's project code as noted in the upper right corner of this sheet.

- E. The Contractor shall review and check submittals. Including those of any subcontractor(s) and shall indicate his review and approval by placing and executing the following on all shop drawings:

This shop drawing has been reviewed by [*Name of Contractor*] and approved with respect to the mean, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. [*Name of Contractor*] also warrants that this shop drawing complies with contract documents and comprises no variation thereto.

By _____

Date _____

- F. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer, in letter of transmittal of the deviation and the reasons therefore. All changes shall be clearly marked on the submittal with a bold red mark. Any additional costs for modifications shall be borne by the Contractor.
- G. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineers, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted items.
- H. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.
- I. Submittals for all electrically operated items (including instrumentation and controls) shall include complete wiring diagrams showing leads, runs, number of wires, wire size, color coding, all terminations and connections, and coordination with related equipment.
- J. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers, and fabricators; the Contractor shall be responsible for ensuring the compatibility of such coatings with the field-applied paint products and systems.
- K. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.
- L. Where manufacturers' brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions, and similar products, the Contractor

tor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.

- M. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.
- N. All bulletins, brochures, instructions, parts lists, and warranties packaged with and accompanying materials and products delivered to and installed in the Project shall be saved and transmitted to the Owner through the Engineer.

1.6. CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, field construction criteria, catalog numbers, and similar data.
- B. Coordinate each submittal with requirements of Work and of Contract Documents.
- C. Notify Engineer, in writing at time of submission, of deviation in submittals from requirement of Contract Documents.
- D. Begin no work, and have no material or products fabricated or shipped which require submittals until return of submittals with Engineer's stamp and initials or signature indicating review.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1. REQUIREMENTS

- A. The Contractor shall employ and pay for the services of a certified independent testing laboratory to perform specified services and testing.
- B. It is the Contractors responsibility to verify that the laboratory meets the required standards and qualifications.

1.2. RELATED REQUIREMENTS

- A. CONDITIONS OF THE CONTRACT
- B. Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.
- C. Testing laboratory inspection, sampling and testing is required for the following sections and as specified:

Section 03300: Concrete For Building Construction

1.3. QUALIFICATION OF LABORATORY

- A. Meet "Recommended Requirements for Independent Laboratory Qualification": published by American Council of Independent Laboratories.
- B. Meet basic requirements of ASTM E329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."
- C. Authorized to operate in the state in which the project is located.
- D. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during the most recent tour of inspection with memorandum of remedies of any deficiencies reported by the inspection.
- E. Test Equipment
 - 1. Calibrated at reasonable intervals by devices of accuracy traceable to either:
 - a. National Bureau of Standards.
 - b. Accepted values of natural physical constants.

1.4. LABORATORY DUTIES.

- A. Cooperate with Owner, Engineer and Contractor; provide qualified personnel after due notice.
- B. Perform specified inspections, sampling and testing of materials and methods of construction:
 - 1. Comply with specified standards.
 - 2. Ascertain compliance of materials with requirements of Contract Documents.
- C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.
- D. Promptly submit written report of each test and inspection; one copy each to Engineer, Owner, Contractor, and one copy to Record Documents File. Submittal schedule for each time of test shall be approved by Engineer prior to construction of any item that requires testing. Each report shall include:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Testing laboratory name, address and telephone number.
 - 4. Name and signature of laboratory inspector.
 - 5. Date and time of sampling or inspection.
 - 6. Record of temperature and weather conditions.
 - 7. Date of test.
 - 8. Identification of product and specification section.
 - 9. Location of sample or test in the project.
 - 10. Type of inspection or test.
 - 11. Results of tests and compliance with Contract Documents.
 - 12. Interpretation of test results, when requested by Engineer or owner.
- E. Perform additional tests required by Engineer or the Owner.

1.5. LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the work.
 - 3. Perform any duties of the Contractor.

1.6. CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel and provide access to work as required.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the testing laboratory.
- D. Furnish copies of products test reports as required.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at the project site or at the source of the product to be tested.
 - 3. To facilities inspections and tests.
 - 4. For storage and curing of test samples.
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
 - 1. When tests of inspections cannot be performed after such notice, reimburse laboratory personnel for expenses incurred due to negligence.
- G. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required.
 - 1. For convenience.
 - 2. When initial tests indicate work does not comply with Contract Documents.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01420
INSPECTION SERVICES

PART 1 - TEST AND INSPECTION

1.1. GENERAL

- A. The Engineer shall be notified forty-eight (48) hours in advance when equipment is to be subjected to tests before any work is concealed and before trenches are backfilled. Failing to comply with the above-mentioned notice, this Contractor shall uncover the work for the Engineer's observation, and repair any damages to other Contractor's work. This Contractor shall provide these services without charge.
- B. Periodic inspection shall be scheduled by the Contractor for rough as well as finished work. The rough-in inspections shall be divided into as many inspections as may become necessary to cover all roughing-in.
- C. Before requesting a final inspection, this Contractor shall inspect the installation to assure that the job is complete in every detail and that all requirements of the Contract Documents have been fulfilled.
- D. A punch list inspection shall be scheduled by this Contractor with the Engineer or his representative present. The punch list inspection shall be made with junction box covers removed.
- E. The Contractor shall be responsible and shall pay all costs for the preparation, job curing (if required) and transportation of materials and equipment to the laboratory or inspection agency retained by the Owner except where these documents say specifically the Owner will pay these costs.
- F. The Contractor will be responsible for the procurement, administration and payment of all specified inspection and testing procedures. Only qualified licensed/ certified firms for the designated services will be approved. The Contractor shall submit the names of the firms for approval by the Owner prior to administering of the inspection or testing services.

1.2. ELECTRICAL INSPECTION

- A. Electrical inspections will be performed throughout the course of construction by a certified electrical inspector from the State Fire Marshal's Office.
- B. All cost of the electrical inspections shall be borne by the Contractor.

- C. Acceptance by the electrical inspector, however, does not relieve the Contractor from the responsibility of the requirements set forth in these Plans and Specifications. All work under this Contract is subject to the observation of the Engineer. When it is the opinion of the Engineer that the Contractor has failed to properly coordinate his work or provide materials and installation, or to meet the intent of these specifications, the codes and standards, then the Contractor shall remove the work and replace the work to meet the intent of the Specifications, Codes, and Standards without reimbursement.

1.3 CERTIFICATES

The Contractor shall furnish the Owner with Certificates of Inspections and Approval where required.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01440

CONTRACTOR QUALITY CONTROL

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. The General Contractor shall set forth for immediate execution a detailed and well-organized quality control plan and implementation program.

1.2. CODES, STANDARDS AND INDUSTRY SPECIFICATIONS

- A. Material or operations specified by reference to published specifications of a manufacturer, testing agency, society, association or other published standards shall comply with requirements in latest revisions thereof and amendments or supplements thereto in effect on date of (Advertisement for Bids).
- B. Discrepancies between referenced codes, standards, specifications and Contract Documents shall be governed by the latter unless written interpretation is obtained from Engineer.
- C. Material or work specified by reference to conform to a standard, code, law or regulation shall be governed by Contract Documents when they exceed requirements of such references; referenced standards shall govern when they exceed Contract Documents.
- D. Proof of Compliance

Whenever Contract Documents require that a project be in accordance with Federal Specification, ASTM designation, ANSI specification, or other association standard, at Engineer request, Contractor shall present an affidavit from manufacturer certifying that product complies therewith. Where requested or specified, submit supporting test data to substantiate.

E. PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices and/or lump-sum prices contained in the Bidding Schedule.

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices and/or lump-sum prices contained in the Bidding Schedule.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1. GENERAL

The General Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both on-site and off-site, and shall be keyed to the proposed construction sequence.

3.2. QUALITY CONTROL PLAN

A. General

The General Contractor shall furnish for review by the Engineer and Owner not later than 30 days after receipt of notice to proceed, a Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract. The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Engineer will consider an interim plan for the first 30 days of operation.

B. Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Engineer/Owner reserves the right to require the Contractor to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.3. SUBMITTALS

Submittals shall be as specified in Section 01300 SUBMITTAL. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

3.4. CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the

construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication, and will be keyed to the proposed construction sequence.

3.5. TESTS

A. Testing Procedure

The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Testing includes operation and/or acceptance tests when specified. A list of tests to be performed shall be furnished as a part of the CQC plan. The list shall give the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. The Contractor shall perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.
2. Verify that facilities and testing equipment are available and comply with testing standards.
3. Check test instrument calibration data against certified standards.
4. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
5. Results of all tests taken, both passing and failing tests, will be recorded on the Quality Control report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. Actual test reports may be submitted later, if approved by the Engineer, with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the Engineer. Failure to submit timely test reports, as stated, may result in nonpayment for related work performed and disapproval of the test facility for this contract.

B. Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor.

3.6. COMPLETION INSPECTION

At the completion of all work or any increment thereof established by a completion time, the Contractor shall conduct an inspection of the work and

develop a "punch list" of items which do not conform to the approved plans and specifications. Such a list of deficiencies shall be included in the CQC documentation, and shall include the estimated date by which the deficiencies will be corrected. The Contractor shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Engineer. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.7. DOCUMENTATION

- A. The Contractor shall maintain current records of quality control operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall be on an acceptable form and shall include factual evidence that required quality control activities and/or tests have been performed, including but not limited to the following:
1. Contractor/subcontractor and their area of responsibility.
 2. Operating plant/equipment with hours worked, idle, or down for repair.
 3. Work performed today, giving location, description, and by whom.
 4. Test and/or control activities performed with results and references to specifications/plan requirements.
 5. Material received with statement as to its acceptability and storage.
 6. Identify submittals reviewed, with contract reference, by whom, and action taken.
 7. Off-site surveillance activities, including actions taken.
 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 9. List instructions given/received and conflicts in plans and/or specifications.
 10. Contractor's verification statement.
 11. These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Engineer weekly within 20 hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the Contractor. The report from the Contractor shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.8. SAMPLE FORMS

Sample forms for Daily Construction Quality Control Report and Deficiency shall be provided by the General Contractor and submitted to Engineer for acceptance.

3.9. LINES AND GRADES

- A. Be responsible for properly laying out work, and for lines and measurements for the work executed under Contract Documents. Verify figures indicated on Drawings before laying out work, and report errors or inaccuracies in writing to the Engineer before commencing work.
- B. All trades shall be responsible for layout of their work, based on reference lines and measurements established by the General Contractor.
- C. Establish and maintain permanent hubs and other control points throughout construction.

END OF SECTION

SECTION 01580

PROJECT IDENTIFICATION AND SIGNS

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. The Contractor shall provide sign required by these specifications near the site of the work. The sign shall set forth the description of the work and the names of the Owner, Engineer and Contractor as shown hereinafter in these Specifications.
- B. The Contractor for **Contract No. 15 – PHASE II-A - Waterline Extensions** shall furnish and install six (6) project signs at each location designated by Engineer.

PART 2 - PRODUCTS

2.1. SIGNS

- A. The signs shall be constructed of 3/4" thick APA A-B Exterior grade or marine plywood. Posts shall be 4" x 4" of fencing type material. Prime all wood with white primer.

PART 3 - EXECUTION

3.1. MAINTENANCE

- A. The signs shall be maintained in good condition until completion of the Project. The signs shall be removed at completion of project.

3.2. LOCATION OF SIGNS.

The signs called for in these Specifications shall be placed at the location selected by the Engineer.

WHITE BACKGROUND

CONTRACT NO. 15 - PHASE IIA
WATERLINE EXTENSIONS

HYDEN - LESLIE COUNTY WATER DISTRICT
HYDEN, KENTUCKY

SISLER - MAGGARD ENGINEERING, PLLC.
220 E. Reynolds Rd. Ste. A3 Lexington Kentucky 40517

CONTRACTOR



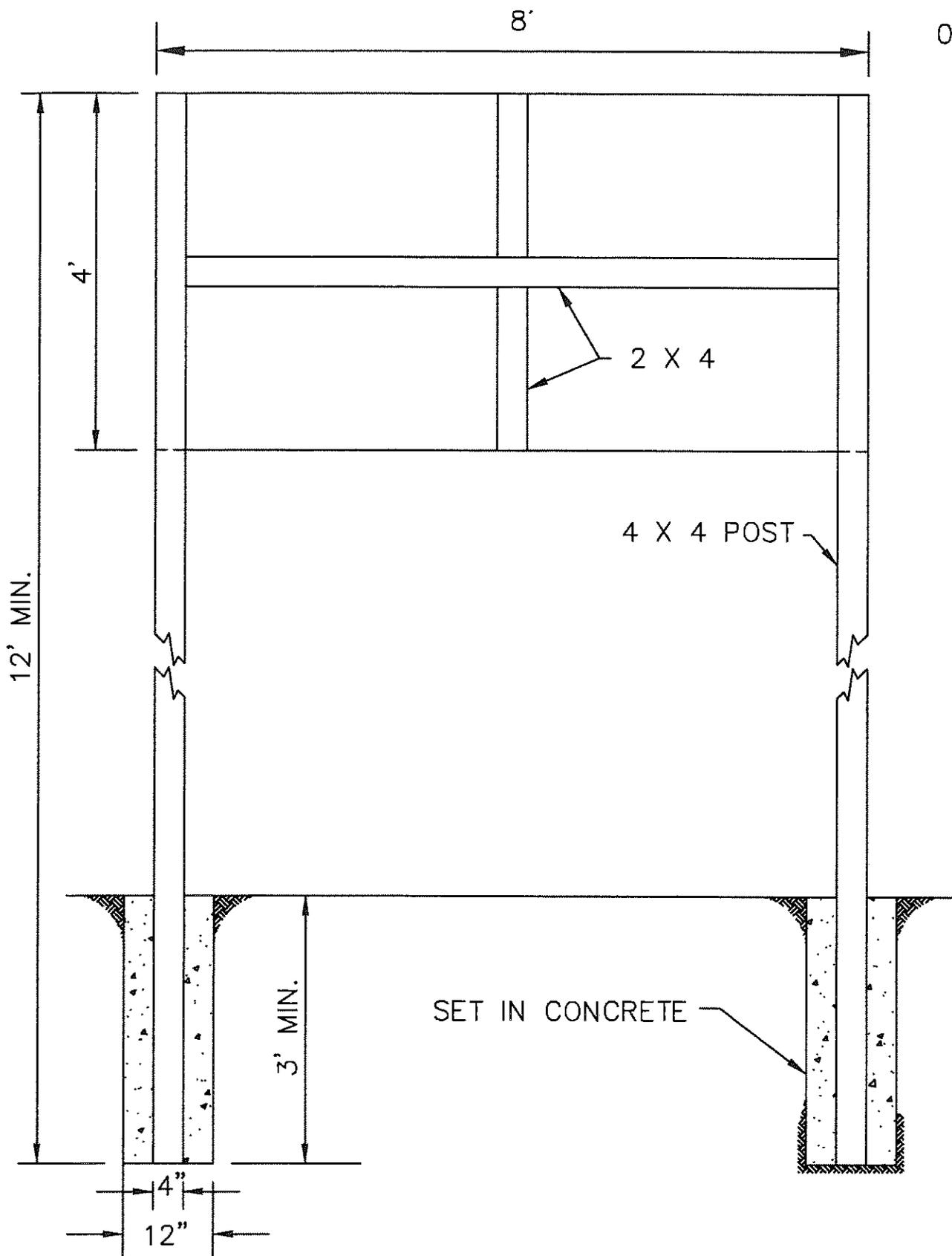
COLOR LOGO PROVIDED BY S.M.E.

Funded By KY. Coal Severance Grants

BLACK LETTERING

SIGN DIMENSIONS: 1200mm X 2400mm X 19mm (approx. 4' X 8' X 3/4")
PLYWOOD PANEL (APA RATED A-B GRADE - EXTERIOR)

07080



ASSEMBLY OF PLYWOOD SIGN

NOT TO SCALE

END OF SECTION

01580-3

SECTION 01600

SPECIAL PROVISIONS FOR MATERIALS AND EQUIPMENT

1.01 SERVICES OF MANUFACTURERS' REPRESENTATIVE AND OPERATING MANUALS

- A. Bid prices for equipment furnished under Divisions 11, 13, 15 and 16, shall include the cost of written operation and maintenance instructions and the cost of a competent representative of the manufacturers of all equipment to supervise the installation, adjustment, and testing of the equipment and to instruct the OWNER'S operating personnel and the ENGINEER'S representative on operation and maintenance. This supervision and instruction may be divided into two or more time periods as required by the installation program, and shall be scheduled at the convenience of the OWNER.
- B. Unless otherwise specified with the equipment, equipment manufacturers shall provide a minimum of 2 separate repeated training sessions for the OWNER'S staff. Each session shall be at least 2 hours in length, but not more than 4 hours. Manufacturer's agenda and schedule for the training shall be submitted to and approved by the OWNER prior to conducting the training. No training will be scheduled until the equipment has been installed, satisfactorily tested, and is ready for operation.
- C. The manufacturer's representative shall have complete knowledge of the proper installation, lubrication, operation and maintenance of the equipment provided and shall be capable of instructing the representatives of the OWNER and ENGINEER on proper start-up, shut-down, on-line operations, lubrication and preventive maintenance of the equipment. Outlines of lesson plans and proposed training schedule shall be submitted to the ENGINEER for review 30 days prior to the desired instructional period. Specific requirements for furnishing the services of manufacturer's representatives are indicated under detailed Specifications. This work may be conducted in conjunction with Inspection and Testing, whenever possible, as provided under Part 3 of EXECUTION of detailed specification. Should difficulties in operation of the equipment arise due to the manufacturer's design or fabrication, additional services shall be provided at no cost to the OWNER.
- D. A certificate from the manufacturer stating that the installation of the equipment is satisfactory, that the unit has been satisfactorily tested, is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication, and care of the unit shall be submitted to the ENGINEER.
- E. For equipment furnished under other Divisions, the CONTRACTOR, unless otherwise specified, shall furnish the services of accredited representatives of the manufacturer only when some evident malfunction or over-heating makes such services necessary.
- F. Four complete sets of operation and maintenance instructions covering all equipment furnished under Divisions 11, 13, 15 and 16, shall be delivered directly to the ENGINEER.

1. The manual for each piece of equipment shall be a separate document with the following specific requirements:
 - a. Contents:
 - Table of contents and index
 - Brief description of each system and components
 - Starting and stopping procedures
 - Special operating instructions
 - Routine maintenance procedures
 - Manufacturer's printed operating and maintenance instructions, parts list, illustrations, and diagrams. These shall be specific to the material supplied under the Contract, and not a manufacturer general brochure.
 - One copy of each wiring diagram
 - One final accepted copy of each shop drawing and each CONTRACTOR'S coordination and layout drawing
 - List of spare parts, manufacturer's price, and recommended quantity
 - Manufacturer's name, address, and telephone number
 - Name, address, and telephone number of manufacturer's local representative
 - b. Material:
 - Loose leaf on punched paper. Holes reinforced with plastic, cloth or metal. 8-1/2" x 11" paper size.
 - Diagrams and illustrations, attached foldouts as required of original quality, reproducible by dry copy method
 - Covers: oil, moisture, and wear resistant 9" x 12" size
 - c. Submittals to the ENGINEER:
 - (1) Three preliminary copies of manuals, no later than 15 days following final review of the shop drawings for each piece of equipment and 4 final copies of complete manuals prior to Field Tests.

1.02 INSTALLATION OF EQUIPMENT

- A. Special care shall be taken to ensure proper alignment of all equipment with particular reference to the pumps, blowers and electric drives. The units shall be

carefully aligned on their foundations by qualified millwrights after their sole plates have been shimmed to true alignment at the anchor bolts. The anchor bolts shall be set in place and the nuts tightened against the shims. After the foundation alignments have been reviewed by the ENGINEER, the bedplates or wing feet of the equipment shall be securely bolted in place. The alignment of equipment shall be further checked after securing to the foundations, and after conformation of all alignments, the sole plates shall be finally grouted in place. The CONTRACTOR shall be responsible for the exact alignment of equipment with associated piping, and under no circumstances, will "pipe springing" be allowed.

- B. All wedges, shims, filling pieces, keys, packing, red or white lead grout, or other materials necessary to properly align, level, and secure apparatus in place shall be furnished by the CONTRACTOR. All parts intended to be plumb or level must be proven exactly so. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the CONTRACTOR.

1.03 GREASE, OIL AND FUEL

- A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The OWNER shall be furnished with a one year's supply of required lubricants including grease and oil of the type recommended by the manufacturer with each item of equipment supplied under Divisions 11, 13, 15 and 16.
- B. All lubricants and fuels shall be properly labeled, using an indelible marker and writing on the lubricant container or drum, specifying the type and brand name of the lubricant supplied. A Master Lubrication list must be submitted to the ENGINEER for approval clearly stating which lubricants are to be used in the various pieces of plant equipment and the quantity supplied for one years' use by each unit.

1.04 TOOLS AND SPARE PARTS

- A. Any special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, and maintenance of any equipment shall be furnished with the respective equipment.
- B. All spare parts shall be properly protected for long periods of storage (contained in plastic bags or cardboard containers) and labeled for easy identification without opening.

1.05 MAINTENANCE AND LUBRICATION SCHEDULES

- A. The CONTRACTOR'S attention is directed to the General Conditions and Section 01300 for all requirements relative to the submission of shop drawings for the mechanical equipment. For all mechanical and electrical equipment furnished, the CONTRACTOR shall provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained. In

addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted along with shop drawings. Submission shall be in 4 copies.

1.06 STORAGE AND HANDLING OF EQUIPMENT

- A. Special attention shall be given to the storage and handling of equipment. As a minimum, the procedure outlined below shall be followed:
1. Equipment shall not be shipped until all pertinent shop drawings are reviewed by the ENGINEER.
 2. All equipment having moving parts such as gears, electric motors, etc., and/or instruments shall be properly stored until such time as the equipment is to be installed.
 3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
 4. Manufacturer's storage instructions shall be carefully studied by the CONTRACTOR and reviewed with the ENGINEER. These instructions shall be followed and a written record of this kept by the CONTRACTOR.
 5. Moving parts shall be rotated a minimum of once weekly to ensure 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.
 6. 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.
 7. Prior to acceptance of the equipment, the CONTRACTOR shall have the manufacturer inspect the equipment and certify in writing 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 guarantee the equipment equally in both instances. If such a written certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the CONTRACTOR'S expense.
- B. The OWNER reserves the right to withhold payment for any materials improperly stored and maintained.

1.07 PARTIAL UTILIZATION

- A. During the course of construction partial occupation and utilization of completed portions of the work may be required.
- B. When deemed necessary, the OWNER or the CONTRACTOR may request use of completed work.

1.08 EQUIPMENT WARRANTY

- A. The CONTRACTOR shall provide the OWNER a minimum 1 year warranty on all equipment, or a warranty of the length as is specified in the specific equipment section of the Specifications, in accordance with the General Conditions. The warranty period for each item of equipment shall be a minimum of 1 year, or as specified otherwise, from the date of the OWNER'S acceptance of the equipment item.

1.09 ADJUSTMENTS AND CORRECTIONS OF EQUIPMENT AND APPURTENANCES DURING OPERATION

- A. Some items of functional nature included in this Contract cannot be tested as to performance and quality at the time of completion of their installation. They must wait for necessary testing and proper performance until such functions are possible during later portions of this Contract. Such testing, specified performance and proper instructions to the OWNER's operators (as to their maintenance and operation) is deemed a portion of this Contract, and payment shall be retained by the OWNER for equipment delivered to the site and for Work completed to cover such service. Such service replacements and performance shall take precedence over expiration of the one year guarantee period.
- B. The CONTRACTOR shall expedite the completion of such service by all Suppliers and Subcontractors and shall render competent supervision of such service. The CONTRACTOR shall also expedite the replacement of defective and unaccepted parts and equipment. Unnecessary delay in delivery and installation of corrective parts and equipment may constitute damage to the OWNER for which the CONTRACTOR can be held liable.

1.10 INSTALLING NEW EQUIPMENT IN EXISTING STRUCTURES

- A. Where new equipment is planned and/or specified as being installed in existing structures, the CONTRACTOR shall verify all dimensions and locations of existing facilities prior to ordering the new equipment. Existing anchor bolts shall be used when possible, and new equipment shall be fabricated to conform to the existing dimensions, shapes, and locations as required.

END OF SECTION

SECTION 01610

TRANSPORTATION AND HANDLING

PART 1 - GENERAL

1.1. WORK INCLUDED

A. Handling and Distribution:

1. The Contractor shall handle, haul, and distribute all materials and all surplus materials on the different portions of the work, as necessary or required; shall provide suitable and adequate storage room for materials and equipment during the progress of the work, and be responsible for the protection, loss of, or damage to materials and equipment furnished by him, until the final completion and acceptance of the work.
2. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

B. Storage of Materials and Equipment

1. All excavated materials and equipment to be incorporated in the work shall be placed so as not to injure any part of the work or existing facilities and so that free access can be had at all times to all parts of the work and to all public utility installations in the vicinity of the work.
2. Materials and equipment shall be kept neatly piled and compactly stored in such locations as will cause a minimum of inconvenience to public travel and adjoining owners, tenants, and occupants.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1. RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Liquidated Damages: BID PROPOSAL, AGREEMENT AND GENERAL CONDITIONS
- B. Cleaning: Section 01710
- C. Project Record Documents: Section 01720

1.2. SUBSTANTIAL COMPLETION

- A. Contractor:
 - 1. Submit written certification to Engineer that Project is substantially complete.
 - 2. Submit list of items to be completed or corrected.
- B. Engineer will make an inspection within seven days after receipt of certification, together with Owner's and Contractor's Representatives.
- C. Should Engineer consider the project substantially complete:
 - 1. Contractor shall prepare and submit to Engineer a list of items to be completed or corrected, as determined by the inspection.
 - 2. Engineer will prepare and issue a Certificate of Substantial Completion containing:
 - a. Date of Substantial Completion.
 - b. Contractor's list of items to be completed or corrected, verified and/or amended by Engineer.
 - c. The time within which Contractor shall complete or correct work of listed items.
 - d. Time and date Owner will assume possession of project or designated portion thereof.
 - e. Responsibilities of Owner and Contractor for:
 - i. Insurance
 - ii. Utilities
 - iii. Operation of mechanical, electrical, and other systems
 - iv. Maintenance and cleaning
 - v. Security

- f. Signatures of:
 - i. Contractor
 - ii. Engineer
 - iii. Owner
 - 3. Owner occupancy of Project or Designated Portion of Project:
 - a. Contractor shall:
 - i. Obtain certificate of occupancy.
 - ii. Perform final cleaning in accordance with Section 01710.
 - b. Owner will occupy Project under provisions stated in Certificate of Substantial Completion.
 - 4. Contractor: Complete work listed for completion or correction, within designated time.
- D. Should Engineer consider that work is not substantially complete:
- 1. He shall immediately notify Contractor, in writing, stating reasons.
 - 2. Contractor: Complete work, and send second written notice to Engineer, certifying that Project, or designated portion of Project is substantially complete.
 - 3. Engineer and Owner will re-inspect work.

1.3. FINAL INSPECTION

- A. Contractor shall submit written certification that:
 - 1. Contract Documents have been reviewed.
 - 2. Project has been inspected for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in presence of Engineer and Owner's Representative and are operational.
 - 5. Project is completed and ready for final inspection.
- B. Engineer will make final inspection within seven (7) days after receipt of certification.
- C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.
- D. Should Engineer consider that work is not finally complete:
 - 1. He shall notify Contractor, in writing, stating reasons.
 - 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
 - 3. Engineer and Owner will re-inspect work.

1.4. FINAL CLEANING UP

The Work will not be considered as completed and final payment made until all final clean up has been done by the Contractor in a manner satisfactory to the Engineer and Owner. See Section 01710 for detailed requirements.

1.5. CLOSEOUT SUBMITTALS

Project Record Documents: See requirements of Section 01720.

1.6. FINAL APPLICATION FOR PAYMENT

Contractor shall submit final applications for payment in accordance with requirements of GENERAL CONDITIONS (Section 19).

1.7. FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of GENERAL CONDITIONS.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

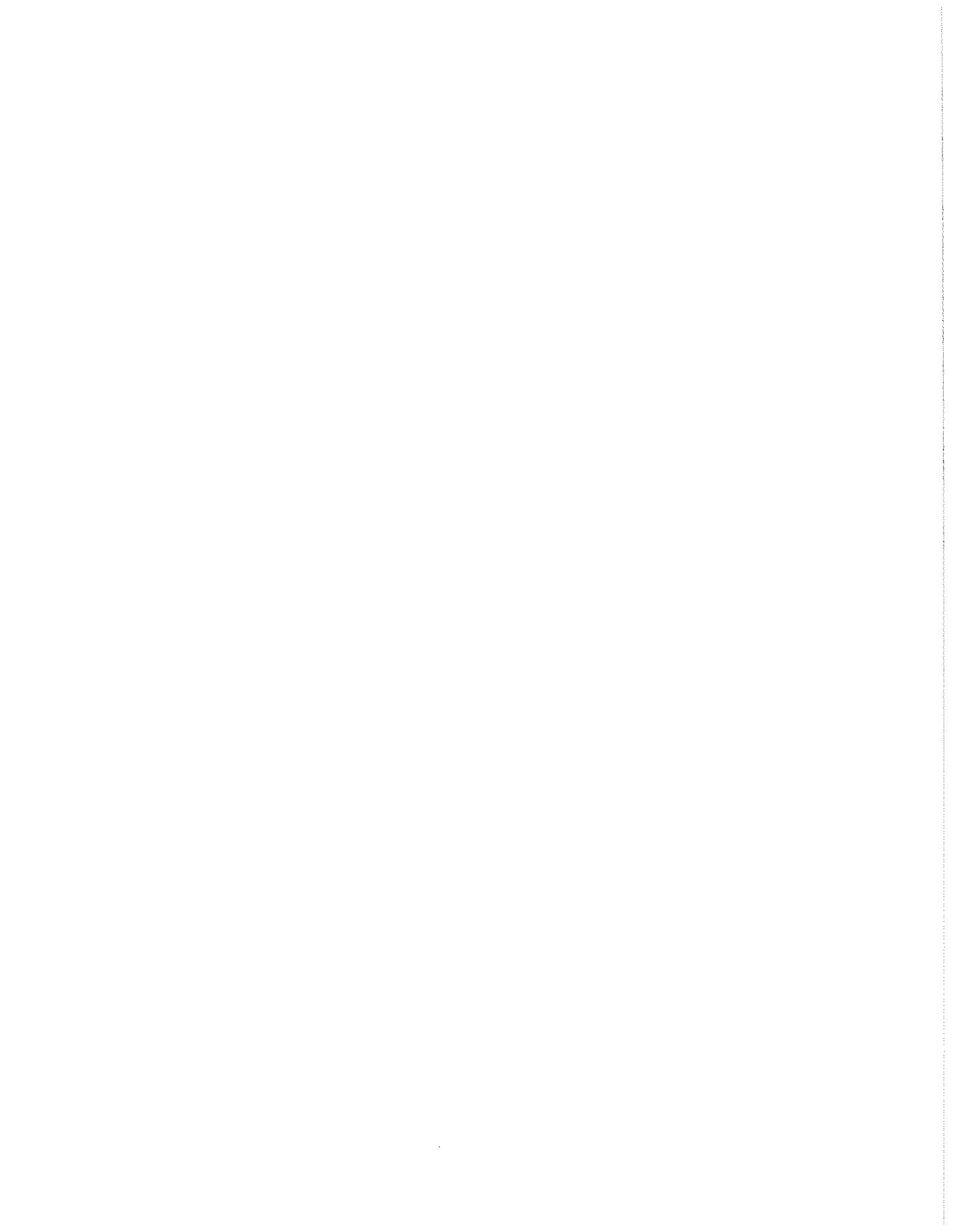
PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

NOT USED.

END OF SECTION



SECTION 01710

CLEANING

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
- B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the project. The ditches, channels, drains, pipes, structures, and any other work shall, upon completion of the work, be left in a clean and neat condition.
- C. On or before the completion of the project, the Contractor shall, unless otherwise specifically directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic in, under, and around privies, hoses and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.
- D. The Contractor shall thoroughly clean all materials and equipment installed by him and his subcontractors, and on completion of the project shall deliver it undamaged and in fresh and new appearing conditions.
- E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

1.2. DESCRIPTION

A. Related Requirements Specified Elsewhere:

Project Closeout: Section 01700.

- B. On a continuous basis, maintain premises free from accumulations of waste, debris, and rubbish caused by operations.
- C. At completion of project, remove waste materials, rubbish, tools, equipment, machinery, and surplus materials, and clean all sight-exposed surfaces; leave Project clean and ready for occupancy.

1.3. SAFETY REQUIREMENTS.

A. Hazards Control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.
2. Prevent accumulation of wastes which create hazardous conditions.
3. Provide adequate ventilation during use of volatile or noxious substances.

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on Project site without written permission from the Owner.
2. Do not dispose of volatile wastes such as mineral spirits, oil, or fuel in open drainage ditches or storm or sanitary drains.
3. Do not dispose of wastes in streams or waterways.

PART 2 - PRODUCTS

2.1. MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.1. DURING CONSTRUCTION

- A. Execute cleaning to ensure that grounds and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. At reasonable intervals during progress of Work, clean site and public properties, and properly dispose of waste materials, debris, and rubbish.
- D. Provide on-site containers for collection of waste materials, debris, and rubbish.
- E. Remove waste materials, debris, and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. The Contractor shall thoroughly clean all materials and equipment installed.

3.2. FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. The Contractor shall restore or replace existing property or structures as promptly and practicable as work progresses.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1. WORK INCLUDED

The contractor shall obtain from the Engineer one (1) set of blueline prints of the Contract Drawings. These prints shall be kept and maintained in good condition at the project site and qualified representative of the Contractor shall enter upon these prints, from day-to-day, the actual "as built" record of the construction progress. Entries and notations shall be made in a neat and legible manner and these prints shall be delivered to the Engineer upon completion of the construction. APPROVAL FOR FINAL PAYMENT WILL BE CONTINGENT UPON COMPLIANCE WITH THIS PROVISION.

1.2. RELATED REQUIREMENTS SPECIFIED ELSEWHERE:

- A. Maintain at job site, one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop Drawings
 - 5. Change Orders
 - 6. Other Modifications to Contract.
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- D. Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

1.3. MARKING DEVICES

Provide colored pencil or felt-tip pen for all marking.

1.4. RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.
- B. Keep record documents current.
- C. Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
 - 1. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 2. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by Change Order or Field Order.
 - 5. Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier or each product and item of equipment actually installed.
 - 2. Changes made by Change Order or Field Order.
 - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate Shop Drawings to record changes made after review.

1.5. SUBMITTAL

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
 - 1. Date Project Title and Number Contractor's Name and Address
 - 2. Title and Number of each Record Document
 - 3. Certification that each Document as Submitted is Complete and Accurate
 - 4. Signature of Contractor or his authorized Representative.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED.

END OF SECTION

SECTION 01740
BASIS FOR PAYMENT

CONTRACT NO. 15 – PHASE II-A - WATERLINE EXTENSIONS

PART 1 - GENERAL

All payment for work done under the provisions of this contract shall be in accordance with the basis for payment for the specific items listed herein and in the bid proposal. The item numbers in this section correspond with the item numbers in the bid proposal.

Items 1 - 8 - Waterlines - Inclusive

Payment for this item shall be based on the unit price bid per linear foot, measured in place, as shown on plans, regardless of depth. This item shall include all work and materials necessary to excavate trenches (including pavement removal and rock excavation) to required depth, install bedding as per detail and install the pipe, marking tape and ductile iron mechanical joint fittings, blocking, backfilling, trenching, seeding, testing, disinfection and cleanup, all in accordance with the Technical Specifications and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Pipe lengths shall be measured in place. Where pipelines diverge, measurement shall be from the center of the pipe main to the end of the diverging line. No deduction in pipe length shall be made for fittings.

Rock excavation is not a separate pay item.

Items 9-11 - Gate Valves - Inclusive

Payment for this item shall be made at the unit price bid each for the size of gate valve installed and shall include all work and materials necessary for complete installation, including gate valve, bedding, valve box, cover, collar, backfill, clean up and seeding in accordance with the Technical Specifications and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Item 12 - Leak Detection Assembly with Meter Assembly

Payment for this item shall be made at the unit price bid each and shall include all work and materials necessary for the complete installation, including excavation, bedding, meter box, lid, taps, meter setting equipment, backfill, clean-up and seeding in accordance with the Technical Specification and detail. **This installation does not include meter or the gate valve.** See detail.

The cost of all items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Item 13 – Blowoff Valve Assembly

Payment for this item shall be made at the unit price bid, each installed and shall include all work and materials necessary for the complete installation including excavation, bedding, fittings, valves, box, cover, tapped connection, backfill, clean up and seeding all in accordance with the Technical Specification and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Item 14 – Air Release Valves (to be field located)

Payment for this item shall be made at the unit price bid, each installed and shall include all work and materials necessary for the complete installation including excavation, bedding, fittings, valves, box, cover, tapped connection, backfill, clean up and seeding all in accordance with the Technical Specification and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Items 15 – 18 Inclusive - Asphalt Pavement, Concrete Surface Replacement, and Gravel Replacement

Payment of these items shall be based on the unit price bid per square yard of various items furnished as listed in the proposal and in accordance with the Technical Specifications and details. Payment is to be based on the measured quantity of the various items placed within limits shown in details as necessary to furnish and place same, including preparation of trenches.

The cost of all associated items not specifically listed for separate payment shall be included as an incidental expense.

Item 19 - Concrete Encasement

Payment for this item shall be based on the unit price per linear foot of encasement. Payment is to be the measured length of concrete encasement within the limits as authorized by the Engineer, and shall include all work and materials necessary to install same, in accordance with the Technical Specifications and details.

The cost of all associated items not specifically listed for separate payment shall be included as an incidental expense.

Item 20 – Large Stream Crossings

Payment for these items (when called for on the drawings) shall be based on the unit price bid per linear foot, measured in place, for the size, class and material type called for in specifications and shown on the plans and details. These items shall include all work and materials (including anchors, transition fittings and rock excavation) to excavate trenches, backfilling, testing, disinfection and cleanup, all in accordance with the Technical Specifications, Drawings and details.

The cost of all associated items not specifically listed for separate payment in the

proposal shall be included as an incidental expense.

Pipe lengths shall be measured in place. Where pipelines diverge, measurement shall be from the center of the pipemain to the end of the diverging line. No deduction in pipe length shall be made for fittings.

Rock excavation is not a separate pay item.

Items 21-23 Inclusive – Tie new W.L. to existing W.L.

Payment for these items shall be made at the unit price bid each and shall include all work and materials necessary for the complete installation, including excavation, bedding, blocking, fittings and backfill, cleanup and seeding in accordance with the Technical Specifications and details.

The cost of all items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Rock excavation is not a separate pay item.

Items 24-32 Inclusive – Tie new W.L. to existing W.L. with Wet Tap

Payment for these items shall be made at the unit price bid each and shall include all work and materials necessary for the complete installation, including excavation, bedding, blocking, fittings, **tapping** sleeve with valve, backfill, cleanup and seeding in accordance with the Technical Specifications and details.

The cost of all items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Rock excavation is not a separate pay item.

Items 30 – 31 – Meter Assemblies Installed

Payment for these items shall be made at the unit price bid each installed and shall include all work and materials necessary for the complete installation, including excavation, bedding, radio read meter, meter box, meter box cover, meter setter (standard or double),, tapped connection with service clamp and corporation stop, **PRV (where required)**, backfill, clean-up and seeding all in accordance with the Technical Specifications and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Rock excavation is not a separate pay item.

Item 32-34 - Bore and Jack

Payment for these items shall be made at the unit price bid per linear foot for the size of water line encased (as set out in specifications), length to be measured in place including all boring, casing, sealing of casing, carrier pipe, clean up and seeding in accordance with the Technical Specifications and details. Please note that the payment for this item

includes the installation of a carrier pipe on the inside and the closure of the end of the casing with boot or concrete.

The cost of all associated items not specifically listed for separate payment shall be included as an incidental expense.

Rock boring is not a separate pay item.

Item 35 – Flush Hydrant Assembly w/Gate Valve

Payment for this item shall be made at the unit price bid and shall include all work and materials necessary for the complete installation of new fire hydrants, gate valve including tee fittings in the main line, blocking, backfill, clean-up and seeding and all other materials or fittings required for the installation in accordance with the Technical Specifications and Standard Details.

The cost of all associated items not specifically listed for separate payment in the Proposal shall be included as an incidental expense.

Rock excavation is not a separate pay item.

Item 36 - 38 – Pump Stations

Payment for **these** items shall be made at the lump sum price bid for the installation of all work and materials necessary for the complete installation of new pump station, including excavation and grading, tie-in of pump station to waterline, gate valves, blow off valves, air release valves, assemblies, piping and fittings, foundations, **fencing, site and storm drainage, filter fabric and stone base** (as shown on site plan), etc., and electrical service including electrical power service from the drop pole to the pump station, heater, exhaust fan, motor controls with circuit breakers for the telemetry, pumps, lights, and all controls, including gauges and recorders, backfill, clean up, painting, seeding, start up, and testing all in accordance with the Technical Specifications and drawings.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Rock excavation is not a separate pay item.

Item 39 – Fiberglass Markers

Payment for this item shall be made at the unit price bid and shall include all work and material necessary for furnishing and installation of the fiberglass markers as shown on the plans and in the details or determined in the field during construction and in accordance with the Technical Specifications.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as in incidental expense.

Item 40 - Telemetry Monitoring with antenna at Pump Station

Payment for this item shall be made at the unit piece bid for the furnishing and installation

of RTU at pump station including connections to control panel, furnish and install necessary antenna (minimum 30' height) and connections thereto and providing and programming necessary telemetry software at the water treatment plant including start-up at pump station and water treatment plant in accordance with Technical Specifications and Drawings.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Item 41 - Horizontal Directional Drilling

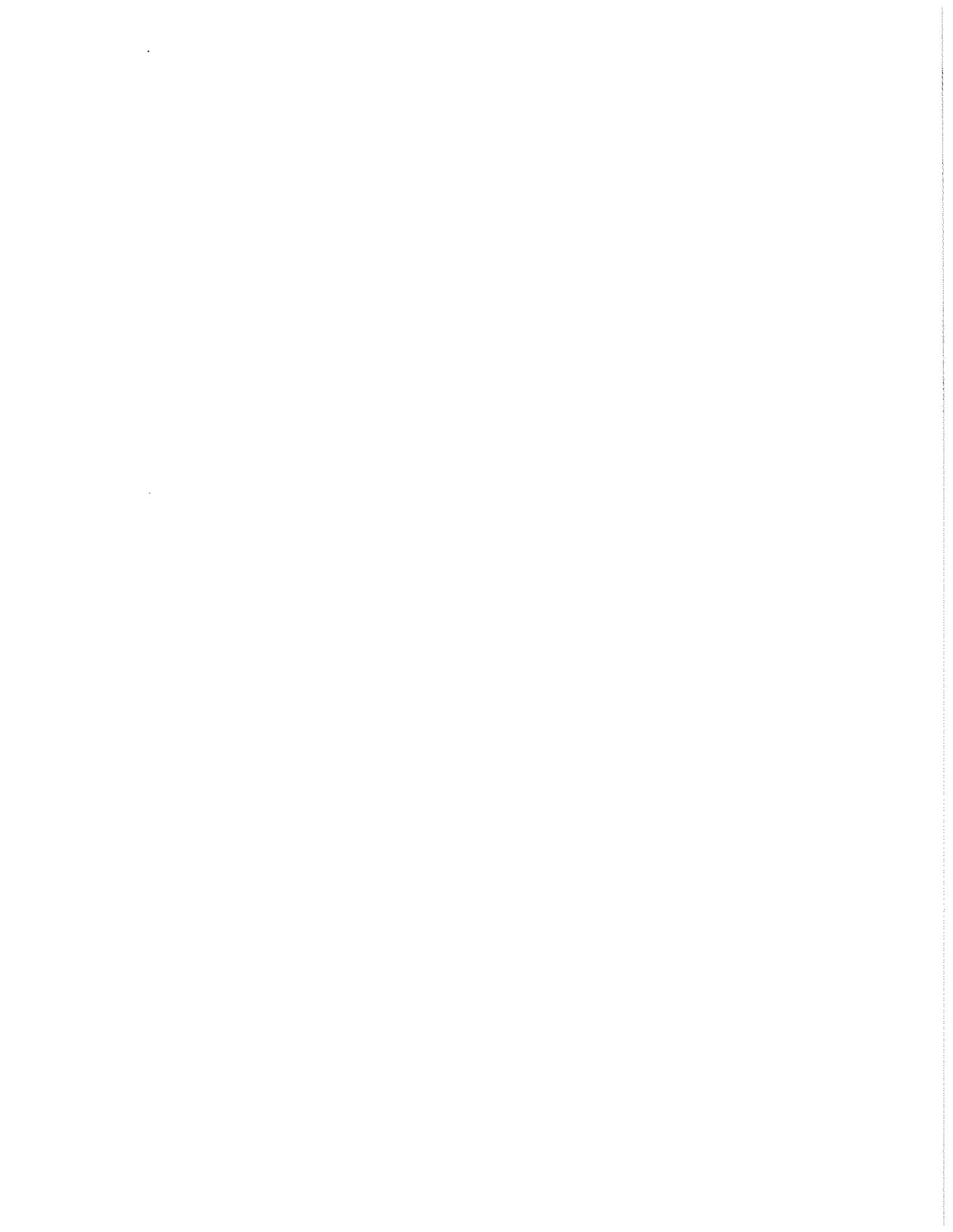
Payment for this item shall be based on the unit price bid per linear foot, measured in place, as shown on plans, regardless of depth. This item shall include all work and materials necessary to excavate bore pit (including pavement removal and rock excavation) to required depth, install the pipe by HDD method, backfilling pit, seeding, testing, disinfection and cleanup, all in accordance with the Technical Specifications and details.

The cost of all associated items not specifically listed for separate payment in the proposal shall be included as an incidental expense.

Pipe lengths shall be measured in place. Where pipelines diverge, measurement shall be from the center of the pipe main to the end of the diverging line. No deduction in pipe length shall be made for fittings.

Rock drilling is not a separate pay item.

END OF SECTION



SECTION 02110
CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY (Not Applicable)

1.02 DEFINITIONS

A. Clearing

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.

B. Grubbing

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.

1.03 PAYMENT

A. Cost associated with Clearing and Grubbing shall be incidental to facilities being placed.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 CLEARING

Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1-1/2 inches or more in diameter and shall be trimmed of all branches the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1-1/2 inches in diameter shall be painted with an approved tree-wound paint. Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work.

3.02 GRUBBING

Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.03 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of in an approved manner. All trees must be inspected by the engineer prior to cutting or removal for endangered species or cave bats that may be nesting in the tree bark.

3.04 DISPOSAL OF MATERIALS

- A. Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations shall be disposed of by the Contractor in an approved manner. The Contractor shall be responsible for compliance with all Federal and State laws and regulations and with reasonable practice relative to the disposal of the material. Disposal of refuse and debris and any accidental loss or damage attendant thereto shall be the Contractor's responsibility.

END OF SECTION

SECTION 02202
ROCK REMOVAL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. All excavation on this project is unclassified. Rock removal is not a pay item.
- B. Removal of discovered rock during excavation.
- C. Use of explosives for rock removal.

1.02 RELATED WORK

- A. Section 02221 - Excavation.

1.03 REFERENCES

- A. NFPA 495 - Code for the Manufacture, Transportation, Storage, and Use of Explosive Materials.
- B. Commonwealth of Kentucky Department of Mines and Minerals, Laws, and Regulations Governing Explosives and Blasting.

1.04 QUALITY ASSURANCE

- A. Seismic Survey Firm: Company specializing seismic surveys with five years documented experience.
- B. Explosives Firm: Company specializing in explosives for disintegration of subsurface rock with five years documented experience.
- C. Contractor shall conform to all State, Federal, and Local laws, ordinances and regulations in regard to transportation, use, and handling of explosives.
- D. Contractor shall employ the above mentioned experts if necessary during blasting, to protect workers, property and public.

1.06 SHOP DRAWINGS

- A. Submit means and methods under provisions of Section 01300.
- B. Indicate proposed method of blasting, delay pattern, explosive types, type of

blasting mat or cover, and intended rock recovery method.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Rock Definition: Solid mineral material or man made material that cannot be removed with a power shovel or as defined by KDOH specifications.
- B. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.
- C. Delay Devices: Type recommended by explosives firm and conforming to State regulations.
- D. Blasting Materials: Type recommended by explosives firm and conforming to State regulations.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section.
- B. Beginning work of this Section means acceptance of existing condition.

3.02 ROCK REMOVAL

- A. Excavate for and remove rock by a mechanical method.
- B. Cut away rock at excavation bottom to form even surface.
- C. In utility trenches, excavate to 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- D. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of this contract.

3.03 ROCK REMOVAL - EXPLOSIVES METHODS

- A. If rock is uncovered requiring the explosives method for rock disintegration, notify the Engineer.
- B. Advise owners of adjacent buildings or structures in writing prior to setting up seismographs. Describe blasting and seismic operations.

- C. Peak particle velocity will be limited to 4.0 in./sec.
- D. Provide seismographic monitoring during progress of all blasting operations, or as required by State regulations.
- E. Disintegrate rock and remove from excavation.

3.04 FIELD QUALITY CONTROL

Engineer or his representative shall approve the depth of final rock cut.

3.05 HAUL

No payment will be made separately or directly for haul on any part of the work for removed rock. All haul will be considered a necessary and incidental part of the work, and the cost thereof shall be considered by the Contractor in the contract price for items of the work involved.

END OF SECTION

SECTION 02220
EXCAVATION AND FILLING

PART 1 - GENERAL

All excavation on this project is unclassified. Rock removal is not a pay item.

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1557	(1978; R 1990) Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop
ASTM D 2216	(1990) Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
ASTM D 2487	(1990) Classification of Soils for Engineering Purposes
ASTM D 2922	(1981; R 1990) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1984) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2. DEFINITIONS

A. Degree of Compaction

1. Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, Method D, abbreviated hereinafter as Percent Laboratory maximum Density.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, Method D, abbreviated hereinafter as percent laboratory maximum density.
- B. Satisfactory materials include materials classified in ASTM D 2487 as ML, CL, MH, and CH and shall be free of trash, debris, roots or other organic matter, or stones larger than 3 inches in any dimension.
- C. Unsatisfactory materials include materials classified in ASTM D 2487 as Pt, OH, and OL, and any other materials not defined as satisfactory.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

- A. Clearing and grubbing is specified in Section 02110 CLEARING AND GRUBBING.

3.2 TOPSOIL

- A. Topsoil shall be stripped to a depth of 12 inches below existing grade within the designated excavations and grading lines and deposited in storage piles for later use. Excess topsoil shall be disposed as specified for excess excavated material.

3.3 EXCAVATION

- A. Before any work begins, the Contractor should take sufficient cross-sections to determine the amount of soil removed.
- B. Excavation shall conform to the dimensions and elevations indicated and shall include the excavation of the contained landfill and all work incidental thereto. Excavations below indicated depths will not be permitted except to remove unsatisfactory material.
- C. Unsatisfactory material encountered below the grades shown shall be removed as directed and replaced with satisfactory material.
- D. Satisfactory material removed below the depths indicated without specific direction of the Engineer shall be replaced at no additional cost to the

Owner to the indicated excavation grade with satisfactory materials excavation. Satisfactory material shall be placed and compacted as specified in paragraph FILLING AND BACKFILLING.

- E. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated shall be done under the direction of the Engineer.

3.4 DRAINAGE AND DEWATERING

A. Drainage

1. Surface water shall be directed away from excavation and construction sites to prevent erosion. Diversion ditches, dikes and grading shall be provided and maintained as necessary during construction.
2. Surface excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing.
3. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.5 SHORING

- A. Shoring, including sheet piling, shall be furnished and installed as necessary to protect workers, banks, and utilities.
- B. Shoring, bracing, and sheeting shall be removed, as excavations are backfilled, in a manner to prevent caving.

3.6 CLASSIFICATION OF EXCAVATION

- A. Excavation will be unclassified regardless of the nature of the materials encountered.
- B. Excavation is not a separate pay item.

3.7 BLASTING

- A. Blasting will not be permitted.

3.8 EXCAVATED MATERIALS.

- A. Satisfactory excavated material required for fill or backfill shall be placed in the proper section of the permanent work required under this section or shall be separately stockpiled if it cannot be readily placed.

- B. Satisfactory material in excess of that required for the permanent work and all unsatisfactory material shall be disposed of in the area designated "Borrow Area" on the drawings.

3.9 SUBGRADE PREPARATION

- A. Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials.
- B. The surface shall be scarified to a depth of 6 inches before the fill is started.
- C. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material.
- D. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density.
- E. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.
- F. Material shall not be placed on surfaces that are muddy, frozen, or contain frost.
- G. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Material shall be moistened or aerated as necessary.

3.10 CERTIFICATION

- A. The subgrade surface shall be inspected in accordance with the following requirements:
 - 1. Before placing any material over the subgrade, the project engineer shall visually inspect, the exposed surface to evaluate the suitability of the subgrade and ensure that the surface is properly compacted, smooth, uniform, and has positive surface drainage;
 - 2. Soil subgrade shall be proof-rolled using a minimum 100,000 pound loaded four (4) tire scraper (twenty (20) cubic yard size) or equivalent procedure and equipment approved by the cabinet;
 - 3. Soil subgrade shall be tested for density and moisture content at a minimum frequency of nine (9) tests per acre. The subgrade shall

- be compacted to a density of at least ninety-two (92) percent of the standard proctor; and
4. Sufficient cross sections shall be taken showing the finished elevation of the completed subgrade, referenced to existing site control.

3.11 FILLING AND BACKFILLING

- A. Satisfactory materials shall be used in bringing fills and backfills to the lines and grades indicated and for replacing unsatisfactory materials.
- B. Satisfactory materials shall be placed in horizontal layers not exceeding 8 inches in loose thickness, or 6 inches when hand-operated compactors are used.
- C. After placing, each layer shall be plowed, disked, or otherwise broken up, moistened or aerated as necessary, thoroughly mixed and compacted as specified.
- D. Backfilling shall not begin until construction below finish grade has been tested and approved, and the excavation cleaned of trash and debris.
- E. Each layer of fill and backfill shall be compacted to not less than the percentage of maximum density of 92% Standard Proctor.
- F. During construction, the moisture content of the soil component of the liner system shall be maintained within the range of optimum or above to ensure that the remolded lift attains the required permeability.
- G. Approved compacted subgrades that are disturbed by the Contractor's operations or adverse weather shall be scarified and compacted as specified herein before to the required density prior to further construction thereon.

3.12 TESTING

- A. Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner.
- B. Testing shall be performed by an approved commercial testing laboratory or may be performed by the Contractor subject to approval.
- C. Field in-place density shall be determined in accordance with ASTM D 2922. The calibration curves shall be checked and adjusted if necessary by the procedure described in ASTM D 2922, paragraph ADJUSTING CALIBRATION CURVE.

- D. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil.
- E. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017.
- F. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Engineer.
- G. The following number of tests, if performed at the appropriate time, shall be the minimum acceptable for each type of operation.

3.13 SPREADING TOPSOIL

- A. Areas outside Work Area "A" from which topsoil has been removed shall be topsoiled.
- B. The surface shall be free of materials that would hinder planting or maintenance operations.
- C. The subgrade shall be pulverized to a depth of 2 inches by disking or plowing for the bonding of topsoil with the subsoil.
- D. Topsoil shall then be uniformly spread, graded, and compacted to the thickness, elevations, slopes shown, and left free of surface irregularities.
- E. Topsoil shall be compacted by one pass of a cultipacker, roller, or other approved equipment weighing 100 to 160 pounds per linear foot of roller.
- F. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to seeding, planting, or proper grading.

3.14 PROTECTION

- A. Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work shall be repaired and grades reestablished to the required elevations and slopes.

END OF SECTION

SECTION 02221

EXCAVATION, TRENCHING, AND BACKFILLING
FOR UTILITIES SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED, EXCAVATION, TRENCHING AND BACKFILLING FOR
THE FOLLOWING SYSTEMS

A. Water Systems.

1.02 RELATED WORK

A. Section 02202 - Rock Removal

B. Section 02270 - Erosion Control

C. Section 02480 - Seeding

1.03 Applicable Publications

The publications listed below form a part of this specification. to the extent referenced. The publications are referred to in the text by basic designation only.

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND
TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180 (1986) Moisture-Density Relations of Soils Using a 10-lb.
Rammer an 18-in Drop

B. AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

ASTM D 2487 (1985) Classification of Soils for Engineering Purposes

1.04 DEFINITIONS

Degree of Compaction

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in -AASHTO T 180-, Method D.

PART 2 PRODUCTS

2.01 MATERIALS

A. Satisfactory Materials

Satisfactory materials shall consist of any material classified by -ASTM D 2487- as GW, GP, and SW.

B. Unsatisfactory Materials

Unsatisfactory materials shall be materials that do not comply with the requirements for satisfactory materials. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 3 inches, and materials classified in -ASTM D 2487-, as PT, OH, and OL. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

C. Cohesionless and Cohesive Materials

Cohesionless materials shall include materials classified in -ASTM D 2487- as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are non-plastic.

D. Rock - See Section 02202

E. Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 3 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

F. Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

G. Select Granular Material

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the 1-inch sieve. The maximum allowable aggregate size

shall be 1 inch, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

H. Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 3 inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 2 inches in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

PART 3 EXECUTION

3.01 EXCAVATION

Excavation shall be performed to the lines and grades indicated. Rock excavation shall include removal and disposition of material. Earth excavation shall include removal and disposal of material not classified as rock excavation. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 2 feet. Excavated material not required or not satisfactory for backfill shall be removed from the site. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed to maintain the stability of the bottom and sides of the excavation.

3.02 Trench Excavation

The trench shall be excavated as specified for applicable utility. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 4 feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls more than 4 feet high shall be shored. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe or cable shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be

utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Owner.

3.03 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 3 inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.04 Removal of Unyielding Material

Where over-depth is not indicated and unyielding material is encountered in the bottom of the trench, such material shall be removed 4 inches below the required grade and replaced with suitable materials as provided in paragraph "BACKFILLING AND COMPACTION."

3.05 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as provided in paragraph "BACKFILLING AND COMPACTION." When removal of unstable material is required due to the fault or neglect of the Contractor in his performance of the work, the resulting material shall be excavated and replaced by the Contractor without additional cost to the Government.

3.06 Jacking, Boring, and Tunneling

Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Engineer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

3.07 Stockpiles

Stockpiles of satisfactory and wasted materials shall be placed and graded. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled

material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government.

3.08 Placement of facilities (pipe, cable, ducts) may be on solid good clean compacted earth. See details.

3.09 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory material, select granular material, or initial backfill material as required. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density for cohesionless soils and 90 percent maximum density for cohesive soils, unless otherwise specified.

3.10 Trench Backfill

Trenches shall be backfilled to the grade shown. The trench shall be backfilled to 2 feet above the top of pipe prior to performing the required pressure tests. The joints and couplings shall be left uncovered during the pressure test.

A. Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

B. Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation shall be replaced with select granular material placed in layers not exceeding 6 inches loose thickness.

C. Bedding and Initial Backfill

Bedding of bank run sand or #9 gravel 4" thick shall be placed under water lines. Initial backfill material shall be placed and compacted with approved tampers to a height of at least one foot above the utility pipe or cable. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

D. Final Backfill

The remainder of the trench, shall be filled with satisfactory material. Backfill material shall be placed and compacted as follows:

Sidewalks, Turfed or Seeded Areas and Miscellaneous Areas: Backfill shall be deposited in layers of a maximum of 12-inch loose thickness, and compacted to 85 percent maximum density for cohesive soils and 90 percent maximum density for cohesionless soils. Compaction by water flooding or jetting will not be permitted. This requirement shall also apply to all other areas not specifically designated above.

END OF SECTION

SECTION 02270

EROSION CONTROL, SEDIMENTATION, AND CONTAINMENT
OF CONSTRUCTION MATERIALS

PART I - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall do all work and take all measures necessary to control soil erosion resulting from construction operations, shall prevent the flow of sediment from the construction site, and shall contain construction materials (including excavation and backfill) within his protected working area so as to prevent damage to the adjacent wetlands.
- B. The Contractor shall not employ any construction method that violates a rule, regulation, guideline, or procedure established by Federal, State, or local agencies having jurisdiction over the environmental effects of construction.
- C. Pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, and other harmful waste shall not be discharged into or alongside of any body of water or into natural or man-made channels leading thereto.

PART 2 - PRODUCTS

2.01 METHODS OF CONSTRUCTION

- A. The Contractor shall use any of the acceptable methods necessary to control soil erosion and prevent the flow of sediment to the maximum extent possible. These methods shall include, but not be limited to, the use of water diversion structures, diversion ditches, and settling basins.
- B. Construction operations shall be restricted to the areas of work indicated on the Drawings and to the area, which must be entered for the construction of temporary, or permanent facilities. The Engineer has the authority to limit the surface area of awardable earth material erodible by clearing and grubbing, excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of the wetlands and adjacent watercourses. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, and use of temporary mulches, mats, or other control devices or methods as necessary to control erosion.

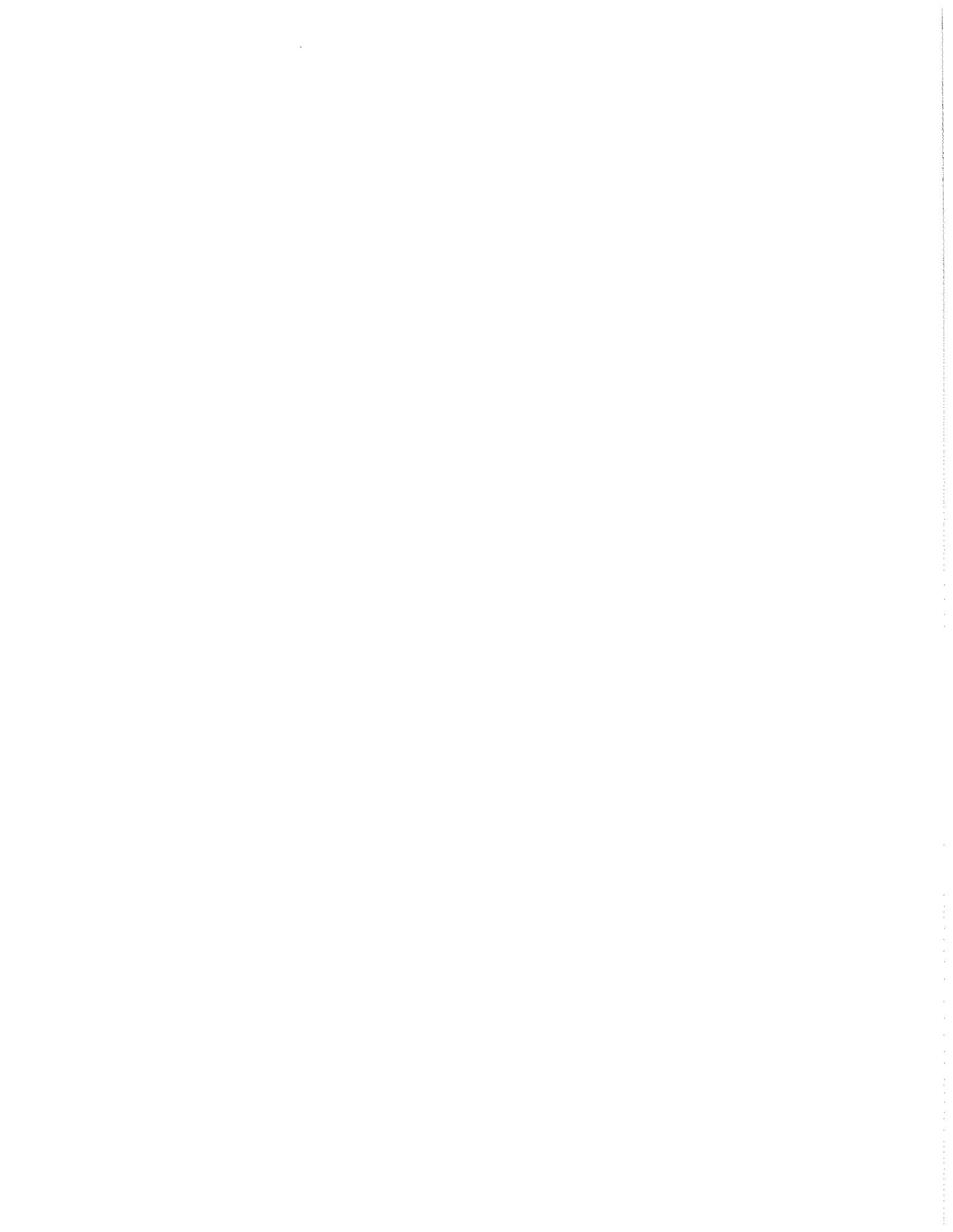
- C. Excavated soil material shall not be placed adjacent to the wetlands or watercourses in a manner that will cause it to be washed away by high water or runoff. Earth berms or diversions constructed to intercept outlets shall be stable or shall be stabilized by means acceptable to the Engineer. If for any reason construction materials are washed away during the course of construction, the Contractor shall remove those materials from the fouled areas as directed by the Engineer.
- D. For work within easements, all materials used on construction such as excavation, backfill, roadway and pipe bedding and equipment, shall be kept within the limits of the easements.
- E. The Contractor shall not pump silt-laden water from trenches or other excavations into the wetlands or adjacent watercourses. Instead, silt-laden water from his excavations shall be discharged within areas surrounded by baled hay or into sediment traps to ensure the only sediment-free water is returned to the watercourses. Damage to vegetation by excessive watering or silt accumulation in the discharge area shall be avoided.
- F. Prohibited construction procedures include, but are not limited to, the following:
 - 1. Dumping of spoil material into any streams, wetlands, surface waters, or unspecified locations.
 - 2. Indiscriminate, arbitrary, or capricious operation of equipment in wetlands or surface waters.
 - 3. Pumping of silt-laden water from trenches or excavations into surface waters or wetlands.
 - 4. Damaging vegetation adjacent to our outside of the construction area limits.
 - 5. Disposal of trees, brush, debris, paints, chemicals, asphalt products, concrete curing compounds, fuels, lubricants, insecticides, wash-water from concrete trucks or hydro-seeders, or any other pollutant in wetlands, surface waters, or unspecified locations.
 - 6. Open burning of debris from the construction work.
- G. Any temporary working roadways required shall consist of clean fill approved by the Engineer. In the event fill is used, the Contractor shall take every precaution to prevent the fill from mixing with native materials of the site. All such foreign materials shall be removed from the site following construction.

3.02 EROSION CHECKS

The Contractor shall furnish and install baled hay or straw erosion checks in all locations indicated on the Drawings, surrounding the base of all deposits of stored

excavated material outside of the disturbed area, and where indicated by the Engineer. Checks, where indicated on the Drawings, shall be installed immediately after the site is cleared and before trench excavation is begun at the location indicated. Checks located surrounding stored material shall be located approximately 6 feet from that material. Bales shall be held in place with two 2-inch by 2-inch by 4-foot wooden stakes. Each bale shall be butted tightly against the adjoining bale to preclude short-circuiting of the erosion check.

END OF SECTION



SECTION 02480

SEEDING, FERTILIZING AND MULCHING

PART 1 - GENERAL

1.01 CONDITIONS

A. General provisions of CONTRACT DOCUMENTS apply to this section.

1.02 DESCRIPTION OF WORK

A. Provide labor, material, equipment and services necessary for proper and complete seeding, fertilizing and mulching.

B. Seed all new and disturbed areas not otherwise indicated to be sodded.

1.03 QUALITY ASSURANCE

A. The intent of these Specifications is to require the Contractor to provide, in all areas to be seeded, fertilized and mulched, a smooth uniform turf of the grasses specified free from bare spots, eroded areas, weeds or other deficiencies. Acceptance by the Engineer is conditional upon compliance with this intent after initial growing season.

B. Areas outside limits of construction, damaged by work under this Contract, shall be repaired as required to match existing conditions. This includes borrow areas for excavation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mulch: Mulch shall be straw or hay mulch, tacked with asphalt,; straw or hay mulch fixed in place with disk land packers or disk harrows; or fiber mulch applied simultaneously with grass seed and fertilizer by the use of hydro-seeding machinery.

1. Straw shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold, or other objectionable material. Straw shall be in an air-dry condition suitable for placing with blower equipment.

2. Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowing, free from noxious weeds, mold or other objectionable material. Hay shall be in an air-dry condition and suitable for placing with blower equipment.

3. Wood cellulose fiber for use with hydraulic application or grass seed and fertilizer shall consist of specially prepared wood cellulose fiber or a combination of wood cellulose and recycled newsprint fibers, processed to contain no growth or germination - inhibiting factors and dyed an appropriate color to facilitate visual metering of the application of materials. On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of 12 percent moisture, plus or minus 3 percent at the time manufactured. The combination of wood cellulose and recycled newsprint fibers shall contain a maximum of 10 percent moisture plus or minus 3 percent at the time of manufacture. the pH range for either mix shall be between 4.5 and 6.5.
- B. Commercial fertilizer shall be a complete commercial fertilizer of 10-10-10 formula, uniform in composition, dry and free flowing. Fertilizer which becomes caked or otherwise damaged making it unsuitable for use will not be accepted.
 - C. Limestone shall be finely pulverized (calcium carbonate) containing equivalent of at least 45% calcium oxide, and so pulverized that the residue on #30 and #200 sieves is not more than 0.5% and 15% respectively.
 - D. Seed Mixture
 1. Lawn seed shall be guaranteed by dealer and distributed as follows:
 - 50% Fine Leaf Falcon Fescue
 - 20% Kentucky Bluegrass "Ken-Blue"
 - 30% Perennial Ryegrass

2.02 SOIL IMPROVEMENTS

A. Soil Test

A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified. Cost of soil tests is not a pay item and is an incidental cost to the Contractor.

B. Lime

Lime shall be applied at the rate recommended by the soil test. Lime shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage operation.

C. Fertilizer

Fertilizer shall be applied at the rate recommended by the soil test. Fertilizer shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage or hydro-seeding operation.

2.03 SEEDING AND MULCHING

- A. Planting Seasons and Conditions: Planting shall not be done when the ground is frozen, snow-covered, or in an unsatisfactory condition for planting. Spring seeding season shall be between February 15 and April 15. Fall seeding shall be between August 15 and October 15.

Seeding seasons may be extended only at direction of Engineer.

B. Seeding

1. Seed shall be broadcast uniformly by approved sowing equipment at the rate of 5 pounds per 1,000 square feet over a designated area. One half of the seed shall be sown in one direction, and the remainder shall be sown at right angles to the first sowing. The seed shall be covered to an average depth of (0.2-0.4) inch by means of spike tooth harrow, cultipacker, or other approved device. Seed shall not be broadcast when winds are above 10 miles per hour.
2. Drill seeding shall be accomplished using approved equipment such as cultipacker seeders and grass seed drills. The seed shall be drilled uniformly to an average depth of (0.2-0.4) inch at a rate of 5 pounds per 1,000 square feet.
3. When hydro-seeding, the (seed and fertilizer), (seed, fertilizer, and approved mulch material) shall be mixed in the required amount of water to produce a homogeneous slurry and then uniformly applied. Wood cellulose or straw mulch shall be added after the seed and fertilizer have been thoroughly mixed. Lime, when applied hydraulically, shall be a single, separate operation.
4. Immediately after seeding, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with a cultipacker-type seeder or if seed is applied in combination with hydro-mulching, rolling will not be required.

C. Mulching (Straw and Asphalt)

1. All seeded areas indicated or directed by the Engineer shall be mulched with a straw and asphalt mat. Mulching shall follow seeding operation not later than 48 hours. The asphalt mat will not be required on areas adjacent to buildings, sidewalks or concrete curbs.
2. Straw and asphalt mat shall be applied at rate of two and one-half (2½)

tons of straw per acre, and 200 gallons of asphalt per acre. Asphalt shall either be emulsified RS-1 grade or cutback RC-1 grade. Method of application may be:

- (a) by spreading straw evenly over seeded area after which asphalt tie-down is sprayed over straw in a solid pattern, or;
- (b) by applying mat in one operation by a jet type mulch spreader in which straw and asphalt are sprayed in mixture evenly over area.

2.04 SEED PROTECTION ON SLOPES

- A. Cover seeded slopes where grade is 3:1 or greater with jute matting. Roll matting down over slopes without stretching or pulling.
- B. Lay matting smoothly on soil surface, boring top end of each section in narrow 6-inch trench. Leave 12 inches overlap from top roll over bottom roll. Leave 4 inches overlap over adjacent section.
- C. Staple outside edges and overlaps at 36-inch intervals.
- D. Lightly dress slopes with topsoil to ensure close contact between matting and soil.
- E. In ditches, unroll matting in direction of flow. Overlap ends of strips 6 inches with upstream section on top.

2.05 WATERING

Immediately following seeding, the Contractor shall water areas thoroughly, including subgrade. The prepared area is to be watered a minimum of two times per week until it has been accepted. This will not be required if sufficient rain occurs during the week.

2.06 CLEAN-UP

Soil, peat or similar material which has been brought onto paved areas within or outside construction limit by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all times. Upon completion of seeding, all excess soil, stones and debris which have not previously been cleaned up shall be removed from site or disposed of as directed by the Engineer. All attended areas shall be prepared for final inspection.

2.07 MAINTENANCE

Maintenance shall begin immediately following last operation of seeding and shall continue until turf is formally accepted. Maintenance shall include watering, weeding, cultivating, mulching, regular mowing or seeded areas, and removal of dead materials.

2.08 INSPECTION FOR ACCEPTANCE

- A. Inspection of work of this section to determine completion , exclusive of possible replacement of seed, will be made by the Engineer upon written notice requesting such inspection submitted at least ten (10) days prior to anticipated date of inspection and provided that an 80% minimum coverage per square foot for all seeded areas has been established. Contractor shall guarantee, at the time of compliance with the intent of this Specification described herein. This guarantee shall apply to all permanent seeding performed in conjunction with project, regardless of type protection used or season in which seeding performed.
- B. When seeding does not meet guarantee requirements at time of inspection, the Contractor will be advised of amount and location of corrective work deemed necessary. Additional work required may include preparation of a new seedbed, refertilizing, reseeding, remulching, or any erosion control items that were originally required. Contractor shall perform all corrective work as soon as favorable working conditions occur after being advised of corrective work required. Corrective work and materials required to fulfill guarantee requirements will not be paid for, except as hereinafter provided for unavoidable damage.
- C. When unavoidable damage occurs after date project is declared complete and before inspection previously described, then payment will be made at original contract unit prices for additional seeding and protection work ordered by the Engineer. Unavoidable damage may result from slides, vehicular traffic, fires, and deluges. Failure of seed to sprout and grow will not be considered unavoidable damage.
- D. From time seeding and protection work begins until date project is declared complete, keep all seeded areas in good condition at all times. Damage to seeded areas or to mulch materials shall be promptly repaired as directed. All work and materials necessary to protect, maintain and restore seeded areas during life of contract shall be performed at no additional cost to Owner, except additional work caused by changes in project by the Engineer.
- E. When it becomes necessary to disturb previously seeded areas at direction of the Engineer, payment for a reasonable amount of additional work, as determined by the Engineer, will be made at original contract unit price. No payment will be made for additional work due to changes made for benefit of Contractor, nor will payment be made for corrective work required because Contractor has failed to properly coordinate his entire erosion control schedule thus causing previously seeded areas to be disturbed by operations that could have been performed prior to seeding.

- F. After inspection, Contractor will be notified in writing by Engineer or acceptance of all work of this Section and Contractor will be notified in writing if there are deficiencies of requirements for completion of work. Replacements, maintenance or repair work remaining to be done shall be subject to re-inspection before acceptance.

2.09 PLANT WARRANTY AND REPLACEMENT

The Contractor shall warrant 80% coverage per square foot of established grass area for duration of one (1) growing season after final acceptance of seeding by Owner. Seed shall be alive and in satisfactory growth at end of warranty period. Owner will be responsible for all maintenance necessary to keep grass alive and healthy between time lawns are accepted and end of warranty period. Basic needs of lawn during this period are for adequate water and protection from insects and other similar pests. Should contractor find lawn is not receiving proper maintenance at any time prior to end of the warranty period, he shall advise Engineer and Owner immediately in writing so corrective measures may be initiated.

END OF SECTION

SECTION 02701

POLYVINYL CHLORIDE PIPE
(WATER MAINS)

PART 1 GENERAL

1.01

- A. Polyvinyl chloride (PVC) pressure pipe two inches through twelve inch shall conform to the American Society for Testing and Materials (ASTM) Standard ASTM D-2241.
- B. Pressure class shall be 200 psi with a standard dimension ration (SDR) of 21 or 250 psi with SDR of 17 as called for on plans and of the size noted on the Plans.
- C. Molecular oriented PVC pressure pipe (PVCO) may be substituted as an "or equal" for **six inch Class 200 PVC pipe only.**

1.02 RELATED SECTIONS

- A. Section 01300 Submittals
- B. Section 01600 Material & Equipment

PART 2 PRODUCTS

2.01 MOLECULAR ORIENTED PIPE

- A. Molecular oriented PVC pressure pipe, PVCO, shall conform to latest revisions of ASTM F-1483. Pipe must be manufactured from rigid poly(vinyl chloride) compound having a cell classification of 1245-B in conformance with ASTM D-1784 having a hydrostatic design stress (HDS) of 2,000 psi. The finished PVCO pipe shall have a HDS of 3,550 psi minimum. The pipe shall have steel pipe (IPS) O.D.'s. PVCO pipe shall have an operating pressure of 200 psi and shall be as manufactured by Uponor-ETI or approved equal.

2.02 JOINTS

- A. All joints on polyvinyl chloride (PVC) pressure pipe shall be made with elastomeric-gaskets. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with an elastomeric ring which meets the requirements of ASTM F-477 standard specifications for elastomeric seal for jointing plastic pipe. The wall thickness in the bell section shall conform to the requirements of ASTM D-3139.

2.03 ANCHORING ASSEMBLIES

- A. Anchoring assemblies will be required for all fire hydrants and hydrant valves. Anchoring assemblies will be required for setting other valves and bends, as shown on the drawings and details.
- B. Special anchoring will be required at other places along the pipelines. Where the construction drawings call for special anchoring, it shall include ductile iron pipe with mechanical joint anchoring fittings, locked mechanical joints, pipe or positively restrained push-on joint type ductile iron pipe and fittings which allow for the deflection at the joint after assembly, such as "Super-Lock" manufactured by the Clow Corporation or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The installation of PVC pipelines is intended to conform with AWWA Specifications C900-75 and Appendix A as if they were totally incorporated herein, except where these specifications direct otherwise.

3.02 FITTINGS

- A. All fittings for 3" and above PVC pipe shall be ductile iron push-on joints Class 250 tar coated outside, cement lined inside in accordance with ANSI/AWWA Specifications C110/A21.10, C111/A21.11 or ductile iron fittings in accordance with AWWA C153.
- B. All fittings for PVC pipe smaller than 3" shall be PVC push-on socket type with rubber gasket, SDR 21, 200 psi based on SDR working pressure. Fittings shall meet all requirements of ASTM Specifications D3139 and shall be suitable for a working pressure of 200 psi unless the water line is designated Class 250. If the water line is designated Class 250 then fittings must be Class 250.

3.03 TIE-INS TO EXISTING LINES

- A. The tie-ins to existing lines are not to be considered as wet (hot) taps. The Contractor, in conjunction with the Owner may shut the specific line down for prearranged minimum periods, to make these connections. However, the Contractor will be required to disinfect and flush the affected lines to assure proper levels of chlorine residual.

END OF SECTION

SECTION 02703

STREAM/LAKE CROSSINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall furnish all labor, materials and equipment required to install a Stream/Lake Crossing or Crossings as shown on the plans and as specified herein. This specification shall only apply to those crossings so designated on the drawings. All other small crossings shall require concrete encasement only.
- B. The Stream Crossing pipe may either be high density polyethylene (HDPE) or ductile iron, as specified hereinafter or as called for on drawings. It is the intent of these specifications that both types of pipe shall be considered "equal" and the Contractor is advised to bid the type of pipe that would result in the lowest total bid. Stream Crossing pipe under this Section shall not require concrete encasement.
- C. The type and selection of methods and procedures used to install the Stream/Lake Crossings shall be approved by the Engineer.
- D. Crossings under this Section or concrete encased crossings shall be constructed in accordance with standard details or as directed by the Engineer. The stream/lake crossing shall conform with the specific detail drawings and these specifications.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe for Stream Crossings shall be Class 51, tar-coated outside and cement-lined inside in accordance with AWWA Specifications. The joints for the Stream Crossing pipe shall be "American" Molox ball joint, or equal as approved by the Engineer. All bolts used in making up joints shall be stainless steel. Ductile iron pipe shall be suitable for a minimum working pressure of 350 psi.
- B. Fittings other than ball joint will not be allowed in the Stream Crossing. Where steep bends are required, the Contractor shall use short lengths of pipe, and the deflection in the joints shall be utilized to make the curvature of the bend.

- C. Appropriate transition fittings shall be provided to connect the stream crossing pipe to the proposed PVC water line pipe on either side of stream/lake. Transition fittings will not be allowed in the stream crossing proper. Excavation shall be made if necessary, to assure that the pipe may be laid to the curvature of the stream bed. Concrete blocking of transition joints will be required.

2.02 POLYETHYLENE PIPE AND FITTINGS

- A. Polyethylene pipe for the Stream Crossing shall utilize thermal butt-fusion for jointing, all suitable for a 267 psi working water pressure, with an SDR of 9. Pipe shall be N.S.F. approved, and manufactured by Plexco, Nipak, or "Driscopipe" by Phillips Petroleum or equal as approved by the Engineer. The pipe must be furnished with an inside diameter equal to or greater than the size shown on the Drawings for the proposed water main.
- B. Appropriate transition fittings shall be provided to connect the Stream Crossing pipe to the proposed PVC water line pipe on either side of the stream/lake. Fittings will not be allowed in the stream crossing proper. Excavation shall be made, if necessary, to assure that the pipe may be bent to the curvature of the stream bed. As a minimum, a polyethylene molded flange adapter and ductile iron convoluted back up ring will be required with appropriate concrete blocking.

PART 3 EXECUTION

3.01 PIPE LAYING

- A. Proper equipment, instruments, tools and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. Before any length of pipe is placed, a careful inspection shall be made of the interior of the pipe to see that no foreign material is in the pipe.
- B. If any defective pipe shall be discovered after the pipeline is laid, it shall be removed and replaced with a satisfactory pipe without additional charge to the Owner.

3.02 JOINTING

- A. Joints of the pipe shall be made strictly in accordance with the manufacturer's recommendations. A copy of the manufacturer's recommendations shall be furnished to the Engineer prior to the beginning of the installation of the pipe.

3.03 DREDGING AND BACKFILLING (REGULAR STREAM CROSSING)

- A. The ditch for the pipe shall be dredged or excavated to provide a minimum of 30" cover below the stream bed in regular stream crossing. When used, payment for concrete encasement will be made separately at the unit price bid for this item. The trench shall be backfilled with trench excavated material, free from roots, wood, or other objectionable materials, and shall be approved by the Engineer. Where acceptable material from the excavation or dredging is insufficient to complete the backfill, the Contractor shall furnish additional acceptable material as required to complete the work. Such additional material shall be furnished and installed by the Contractor incidental to the various bid items and shall not be measured for separate payment.

3.04 PLACEMENT (STREAM CROSSING)

- A. The intent of these specifications and the accompanying drawings is to lay the pipe on the bottom of the stream as shown on the drawings.

END OF SECTION

SECTION 02720

PRESSURE PIPELINES INSTALLATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall complete all excavations; shall protect all existing structures, utilities, and services; shall furnish all suitable tools and appliances for the safe and convenient handling of all materials to be used on the work; shall lay the pipelines, including valves, valve boxes, fire hydrants, and all other appurtenances thereto; shall install or replace any or all service connections if specified; shall test the lines; shall disinfect water lines; shall replace all walks, driveways, grass plots, or paving; shall remove all surplus materials of every kind; and leave the entire site of the work in a presentable and satisfactory condition; all as specified herein under the various sections.
- B. The specifications for installing pressure mains are intended to conform with the latest revision of AWWA C600, "Installation of Ductile Iron Water Mains and their Appurtenances," and/or AWWA C605 "Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water". The Engineer shall require compliance with those specifications the same as if they were totally incorporated herein, except where these specifications direct otherwise.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 HANDLING AND STORAGE OF MATERIALS

- A. Pressure main pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.
- B. Pipe shall be so handled that the coating and lining will not be damaged. If however, any part of the coating or lining is damaged the repair shall be made by the Contractor at his expense in a manner satisfactory to the Engineer.
- C. The Contractor shall be responsible for the safe storage of material furnished by or to him, and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipes, fittings and other accessories shall be kept free from dirt and foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from

damage by freezing.

3.02 INSPECTION AND RESPONSIBILITY FOR MATERIAL

- A. All pipeline materials shall be carefully inspected for cracks and other defects prior to installation. All material found during the progress of the work to have cracks, flaws, or other defects, shall be rejected by the Engineer. All defective materials furnished by the Contractor shall be promptly removed by him from the site of the project.
- B. The Contractor shall be responsible for all materials furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to the final acceptance of the work.

3.03 INSTALLATION OF PRESSURE PIPELINES

- A. Pressure mains shall be laid and maintained to the required lines and grades with fittings, valves, and hydrants at the required locations; spigots centered in bells; and all valve and hydrant stems plumb.
- B. Proper implements, tools, and facilities shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment in such a manner as to prevent damage to pipe main materials and protective coatings and linings. Under no circumstances shall pipe main materials be dropped or dumped into the trench.
- C. All pipe and fittings shall be carefully examined for cracks and other defects while suspended above the trench immediately before installation in final position. Spigot ends shall be examined with particular care. Defective pipe or fittings shall be laid aside as previously specified.
- D. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, or other materials shall be placed in the pipe.
- E. As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at

the bells. Precautions shall be taken to prevent dirt from entering the joint space.

- F. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Engineer. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- G. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or lining so as to leave a smooth end at right angles to the axis of the pipe.
- H. Pipe shall be laid with bell ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade of ten (10) percent or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upgrade.

3.04 PLACING PIPELINE FITTINGS

- A. Pipeline fittings, plugs and caps shall be furnished and installed of the type indicated and at the location shown on the construction drawings or as directed by the Engineer. It will be the responsibility of the Contractor to furnish and install all proper size pipe bends for both horizontal and vertical deflections that are required to construct the pressure main to the line and grade as shown on the construction drawings or as set by the Engineer. The fittings, plugs, and caps shall be set and joined to the pipe in the manner heretofore specified for installation and the cost of same is considered incidental costs included in pipeline bid items.

3.05 ANCHORAGE

- A. The Contractor shall provide pipeline restraint at all locations shown on the construction drawings or as required by the Engineer. Anchorage shall be in the form of harnessed or restrained joints for the lengths of pipe and fittings shown.

3.06 TESTING PRESSURE MAINS

- A. The Contractor shall subject the completed pressure pipelines to a leakage test. The test shall be performed on all newly laid pipes in lengths not to exceed 2,000 feet or any valved section thereof. The length of the test section shall exceed the specified maximum limit only with the explicit approval of the Engineer. The test may be conducted after the trench has been backfilled but must be completed before replacement of pavements and final restoration. All testing shall be done in the presence of the Engineer.
- B. The Contractor shall furnish the pump, pipe connection, temporary testing plugs and caps, if required, all necessary apparatus including the pressure gauges and meters and a supply of approved water. The Contractor shall make all necessary taps into the lines. The Contractor shall be responsible for all labor and equipment

necessary to conduct the tests, including excavating and backfilling the test pit at the locations approved by the Engineer.

- C. The pipe shall first be completely flushed out. Then each valved section shall be slowly filled with water. All air shall be expelled from the pipe at high points by means of test plugs in valve bonnets, fire hydrants or through corporation stops installed by the Contractor for this purpose. After all the air has been expelled, the openings shall be closed and the test pressure applied by means of the test pump connected to the pipe in a manner satisfactory to the Engineer.
- D. The test pressure for the leakage test shall be fifty (50) percent above the normal operating pressure of the lowest point in the section of line under the test and corrected to the elevation of the test gauge. The duration of each leakage test shall be two (2) hours.
- E. The exposed piping and/or the top of the trench shall be carefully inspected during the leakage test for any signs of leakage. Any cracked or defective pipe, fittings, valves or hydrants discovered in consequence of the leakage test shall be removed and replaced by the Contractor with sound material and the test shall be redone until satisfactory results are obtained. The Contractor is responsible for locating, excavating and backfilling the defective pressure pipeline trench at no cost to the Owner, in addition to replacing the defective material if the leakage test is conducted on a backfilled pressure pipeline. The Contractor shall maintain the hydrostatic pressure at all times during the leakage test through his test pump.
- F. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air has been expelled, the pipe has been filled with water, and the pressure initially applied.
- G. No pipe installation will be accepted if the amount of leakage is greater than specified in Table 7, Allowable Leakage, AWWA C600, or calculated by the following equation:

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where

- L = allowable leakage, gallons per hour.
- S = Length of pipe to be tested, ft.
- D = Nominal diameter of pipe, in.
- P = Average test pressure, psig.

3.07 DISINFECTION OF WATER MAINS

- A. All new water mains and repaired sections or extensions to existing water mains shall be chlorinated before being placed in service so that a chlorine residual of not less than ten (25) ppm remains in the water in the test section after twenty-four (24) hours standing in the pipe. The procedures for disinfecting the water mains and the chemicals to be used shall be in accordance with the requirements of AWWA C651 latest revision.
- B. If liquid chlorine is used, a chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device; or, if approved by the Engineer, the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas or the gas itself must provide means for preventing the backflow of water into the chlorine cylinder.
- C. A mixture of water and a chlorine-bearing compound of known chlorine content may be substituted for liquid chlorine. Approved types are calcium hypochlorite or sodium hypochlorite. Commercial types of calcium hypochlorite are known as HTH, Perchloron and Pittchlor. Sodium hypochlorite is known commercially as liquid laundry bleach.
- D. High-test calcium hypochlorite or bleaching powder must be prepared as a water mixture for introduction into the water mains. The powder should first be made into a paste and then diluted to approximately a one (1) percent chlorine solution (10,000 ppm). The preparation of a one (1) percent chlorine solution requires the following proportions of powder to water:

Amount of: Product	Quantity of Water Compound	Gallon
High-test calcium hypochlorite (65-70% Cl)	1 lb.	7.50
Liquid laundry bleach (5.25%)	1 gal.	4.25

- E. The chlorinating agent shall be injected into the beginning of the new pipeline extension or any valved section through a corporation stop inserted by the Contractor. The Contractor shall supply the proper type chemical pump, piping and make up water to inject the solution into the main. The application shall be the amount necessary to apply 50 ppm of chlorine to the test section. The amount of one (1) percent chlorine water solution required to give 25 ppm chlorine in 1,000 feet of various size water mains is as follows:

<u>Diameter</u>	<u>Gallons</u>
6"	4
8"	8
10"	10
12"	15
16"	26
20"	40
24"	60
30"	90

- F. Water from the existing distribution system shall be controlled so as to flow slowly into the newly laid pipeline during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall produce at least twenty five (25) ppm, after twenty-four (24) hours standing. This may be expected with an application of fifty (50) ppm, although some conditions may require that more valves be manipulated so that the strong chlorine solution in the line being treated will not flow back into the line supplying the water. In the process of chlorinating newly laid pipe, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.
- G. Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline at its extremities until the replacement water throughout its length shall, upon test, be proved comparable in quality to the water serving the public from the existing water supply system and approved by the public health authority having jurisdiction. This satisfactory quality of water delivered by the new main should continue for a period of at least two (2) full days as demonstrated by laboratory examination of samples taken from a tap located and installed in such a way as to prevent outside contamination. Samples shall not be taken from an unsterilized hose or from a fire hydrant, because such samples will seldom meet bacteriological standards.
- H. Should the initial treatment fail to result in the conditions specified, the original chlorination procedure shall be repeated until satisfactory results are obtained.

3.08 PRESSURE PIPELINES NOT INSTALLED IN TRENCH

- A. All applicable provisions of this item of work shall also apply to the furnishing of materials and installation procedures for constructing pressure pipelines not installed in a trench condition.

3.09 SPECIAL REQUIREMENTS FOR PIPELINE CONSTRUCTION ON STATE RIGHT OF WAY (Also see Section 1580)

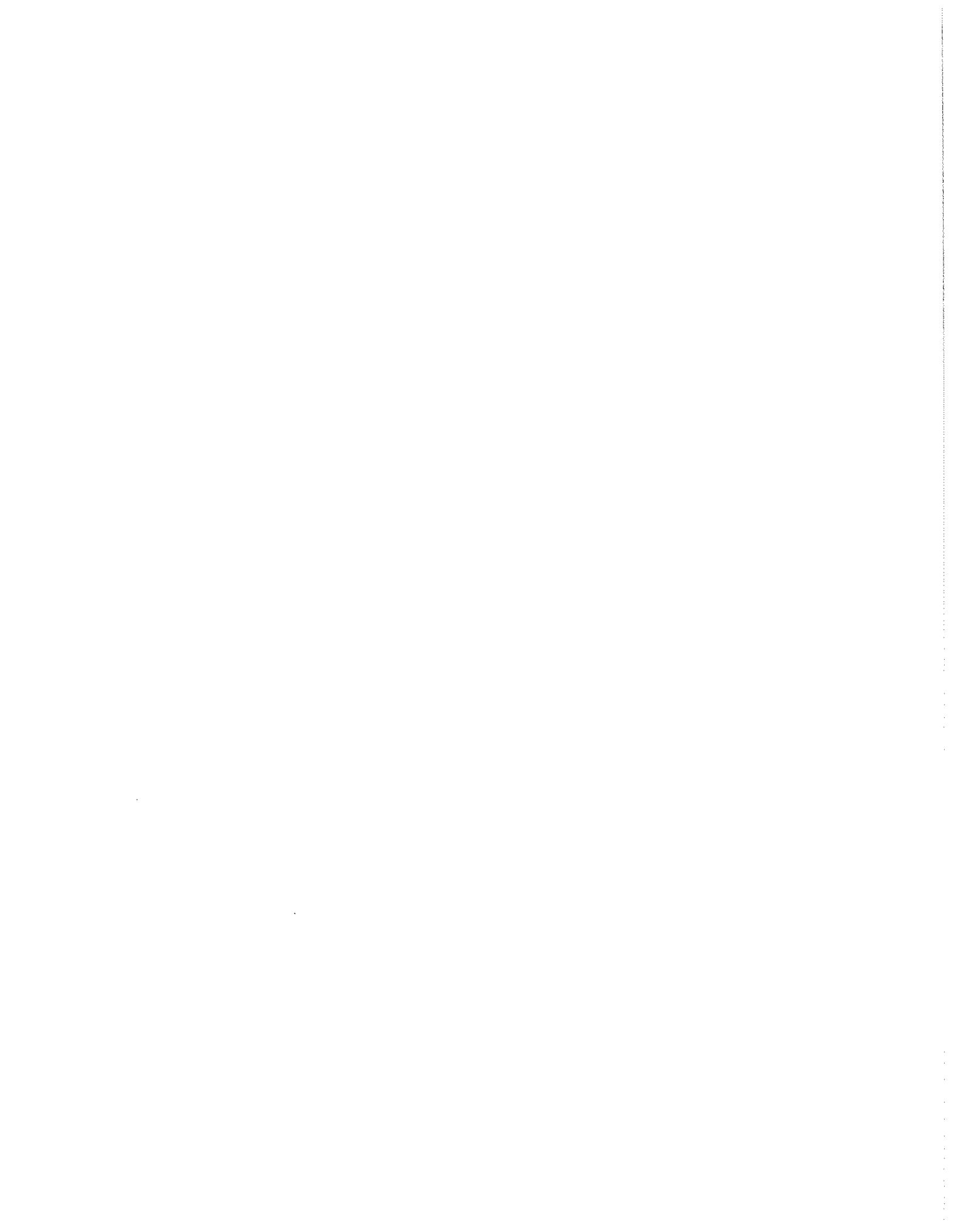
- A. Pressure pipelines to be laid on backside of all entrance culverts unless otherwise specified.
- B. All pressure pipelines to be laid on **backside of ditch line** unless otherwise specified.
- C. All slip areas to be open cut, backfilled and tamped at a maximum of 150' sections.
- D. All pressure pipeline crossing of highway culverts (RCP, CMP, Box Culverts) shall have a minimum of 1 foot clearance above or below the culvert.
- E. Efforts have been made to indicate accurate locations of some existing structures, piping and utilities. However, the contractor shall familiarize himself with the site and other existing conditions and notify the engineer of any discrepancies between information depicted by the construction drawings and actual field conditions which would significantly alter the design intent of the construction drawings prior to commencing his construction operations. Dimensions of existing structures and/or site restrictions are approximate. It is the contractor's responsibility to obtain and confirm all dimensions and elevations of existing structures and topography in the field necessary for his construction operation.
- F. The contractor shall use all possible care during excavation on this project so as not to disturb or damage any existing utility or structure not scheduled for demolition whether depicted or not in the construction drawings. Any damage to the aforementioned items caused directly or indirectly by the contractor shall be repaired or replaced by the contractor at no cost to the owner to a condition equal to or better than that which existed prior to being damaged.
- G. The contractor's attention is called to the presence of existing utilities in close proximity to the project site. The contractor is advised to carefully review the project requirements regarding utility reallocations. The contractor can call 1-800-752-6007 a minimum of two and no more than ten business days prior to excavation for information on the location of existing underground utilities which subscribe to the Before-U-Dig (BUD) Service. Additionally it is the contractor's responsibility to contact all existing utility owners and have them field locate their existing utilities prior to any construction activities.
- H. Unless otherwise noted, all buried pipes shall have **30" minimum cover** as measured from finished grade to the outside surface of the pipe. In State Highway Right-of-Way the waterlines shall have 42" cover.
- I. All bores under state highways right-of way shall be a minimum of 42" depth under bottom of ditch line to top of the proposed casing pipe on both sides of the highway.
- J. There shall be no blasting within state right-of-way without written consent from

the Kentucky Transportation Cabinet.

- K. Care shall be taken by the contractor to avoid cracking or breaking the bituminous paving. The contractor at no cost to the Dept. of Highways shall repair all damage to the existing paving caused by the contractor's operation. Paving protection shall be accomplished by the use of rubber and street padded machinery or other approved equipment well suited for this type of construction.
- L. During construction, all embankments, refills and excavations shall be kept shaped and drained by the contractor. Ditches and drains along the highways shall be maintained in such a manner as to drain effectively at all times.
- M. All roadways and driveways within the work limits of state right-of-ways shall be refilled to the natural surface of the ground with approved material and methods. The material shall be placed and compacted to smoothness suitable for traffic. The contractor shall note that all private businesses and residences along the route of the proposed water main must have access to their properties at all time during construction. Additionally, the contractor shall replace existing entrance pipes, retaining walls, catch basins, fences and other property improvements, ditches, guardrail, signs, storm drains, etc. that are damaged by construction unless said facilities are specifically shown to be removed. In particular, all drainage ditches shall be restored to a condition equal or better than existed prior to construction.
- N. Concrete thrust or "kicker" blocks shall be installed in all pressurized lines at intersections and changes of direction to resist forces acting upon the pipeline.
- O. Concrete anchors shall be provided when the pipe slope exceeds twenty percent.
- P. Sewers shall be laid at least ten feet horizontally from any existing or proposed water main. This distance shall be measured edge to edge. If field conditions do not allow this condition to be met, then the sewer shall be construction of mechanical joint ductile iron pipe (pressure tested to 150 psi) and encased in concrete. Sewers shall cross under water mains with a minimum of eighteen inches of separation between the crown of the sewer and in the invert of the water main. If field conditions are such that this separation can not be maintained, the sewer shall be constructed of mechanical joint ductile iron pipe which shall be pressure tested to 150 psi. The ductile iron pipe must be centered on the crossing so that the joints are at least ten feet on either side of the crossing.
- Q. Traffic control is to be as per MUTCD standards.
- R. Reclamation is to be accomplished as per the general notes of the approved encroachment permit provided by the Kentucky Dept. of Highways.
- S. Valve locations cannot be shown with precision of the supplied mapping. Valve locations shall be coordinated with the resident inspector prior to installation.

- T. Numerous drop box inlets are located next to some of the state and federal highways within the project limits. These inlets have concrete aprons that are 9' x 9'. Many of the inlets are set against the backside of the rock cut along the highway. The contractor may do one of two things. (1) He may either saw cut the backside of the Surface drain and without damaging the drainage box install the pipe. If the drainage box does get damaged in any way then the contractor will restore the drainage box and surface drain back to its original condition. (2) The contractor shall install the force main under the culvert pipe. If the culvert pipe is damaged in any fashion then the contractor shall replace the portion that is damaged to its original condition.
- U. Proposed utilities must go under or around existing highway culvert pipes. Utilities may not be placed over existing highway culverts. Minimum separation between culvert pipe and force main is five feet.
- V. Track vehicles must be isolated from pavement with an earth cushion or protective material. In no event shall track vehicles be operated directly on paved surfaces.

END OF SECTION



SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 WORK INCLUDED

The work covered by these specifications includes the furnishing of all plant, labor, equipment, appliances, transportation and materials required for the installation and/or erection of fences, gates and related items as drawn or herein specified.

1.2 RELATED WORK

Section 03300 – Concrete

1.3 REFERENCES

- A. AISC
- B. ANS
- C. ASTM
- D. FS - Federal Specifications

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials shall conform to the following:
 - 1. Chain Link Fence: FS RR-F-191 and detailed specifications forming the various parts thereto.
 - 2. Fabric: FS FF-F-101/1, Type I, zinc-coated steel wire with minimum coating weight of 1.2 ounces of zinc per square foot of coated surface, or Type II, aluminum-coated steel wire. Fabric shall be fabricated of 9-gauge wire woven in 2-inch mesh. Fabric height shall be 7 feet.
 - 3. Gates:
 - a. For Wire Fence: FS RR-F-191/2. Gate shall be the type and swing shown. Gate frames shall be constructed of Class 1 Grade A or B, steel pipe, size SP2, as specified in FS RR-F-191/3. Gate fabric

shall be as specified for chain-link fabric. Vertical members of gate leaves shall be spaced so that no members are more than 8 feet apart. Gates over 10 feet wide shall be additionally braced with a 5/16-inch, minimum diameter, diagonal truss rod. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that padlock will be accessible from both sides of the gate regardless of the latching arrangement.

- b. For WTR and STP: Gate shall be of the type and swing shown. Post shall be 3 inch galvanized steel set in type B concrete, 36 inches in ground with minimum of 12 inches of concrete on post diameter. Gate swing shall be 1 5/8 inch galvanized steel pipe with radii bend to obtain height of 42" above ground line and extending to center of road. Lock and key to be coordinated with Engineer. Warning sign to be as shown on detail made of weather resistance material, security fastened and non-fading material for working.
- c. Posts: FS FF-F-191/3, zinc-coated; Class 1 Grade A or B, steel pipe; Class 3, formed steel sections. Line posts shall be of the same class throughout the fence. Terminal (corner, gate, and pull) posts selected shall be of the same class throughout the fence.
- d. Braces: FS RR-F-191/3, zinc-coated; Class 1 Grade A or B, steel pipe, size SP1 Class 3, form steel sections, size FS1, conforming to FS RR-F-191/3, may be used as braces and top rails if Class 3 line posts are furnished.
- e. Accessories: FS RR-F-191/4. Ferrous accessories shall be zinc- or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment.
- f. Concrete: ASTM C 94, using 3/4-inch maximum-size aggregate, and having minimum compressive strength of 2,000 psi at 28 days (Class B) per Section 03300. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.
- g. Padlocks: FS FF-P-101, Type EPB, Size 1-3/4 inch. A padlock shall be furnished with two keys.

PART 3 - EXECUTION

3.1 GENERAL

Fence shall be installed to the lines and grades indicated. Line post shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts, however, runs between terminal posts shall not exceed 500 feet.

3.2 POSTS AND FRAMING

Posts shall be S-20 set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth of 30 inches with 10 inch diameter of concrete on the post diameter. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to a minimum depth of 30 inches unless a penetration of 18 inches in solid rock is achieved before reaching the 30-inch depth in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than 12 inches in diameter for terminal posts and 10 inches in diameter for line posts. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post so as to be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Class 3 type line posts may be mechanically driven provided soil conditions are such that the driven posts develop strengths at least equal to posts set in concrete and rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set.

3.3 TOP RAIL

Top rail shall be 1 5/8 inches and supported at each post in a manner that a continuous brace between terminal posts is formed. Where required, sections of top rail shall be joined using sleeves or couplings that will allow expansion or contraction of the rail.

3.4 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as required if shown on drawings and in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over 6 feet in height. A center brace or two diagonal truss rods shall be installed on 12-foot

fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences 6 feet high or less if a top rail is installed.

3.5 TENSION WIRES AND BARS

Tension wires shall be 3/16 inch by 3/4 inch and installed along the bottom of the fence line and attached to the terminal posts of each stretch of the fence. Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.6 CHAIN-LINK FABRIC

Chain-link fabric shall be 9 guage, 1.2 ounce galvanized and be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15-inch intervals. Fabric shall be pulled taut to provide a smooth uniform appearance free from sag. Fabric shall be fastened to line posts with hog rings at approximately 24-inch intervals and fastened to top rails and tension wires at approximately 24-inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 2 inches (plus or minus 1/2-inch) above the ground.

END OF SECTION

SECTION 02940

TEMPORARY SILT AND EROSION CONTROL

PART 1 GENERAL

1.01 SCOPE

- A. This work shall consist of furnishing all labor, material, equipment, and incidentals for the construction of silt control structures to reduce the amount of sediment delivered to waterways. Silt control structures shall be constructed as required to control any silt runoff into streams or at the locations directed by the Engineer or his designated Representative.
- B. A written silt control plan shall be prepared and submitted to the Owner for approval before start of construction.
- C. During the life of the contract, the silt control structures shall be maintained by the Contractor, and silt accumulations which threaten to damage the structures, or preclude their effective operation as determined by the Engineer, shall be removed and replaced.

1.02 RELATED SECTIONS

- A. 01600 - Materials and Equipment

PART 2 PRODUCTS

2.01 STRAW OR HAY BALE SILT CHECK

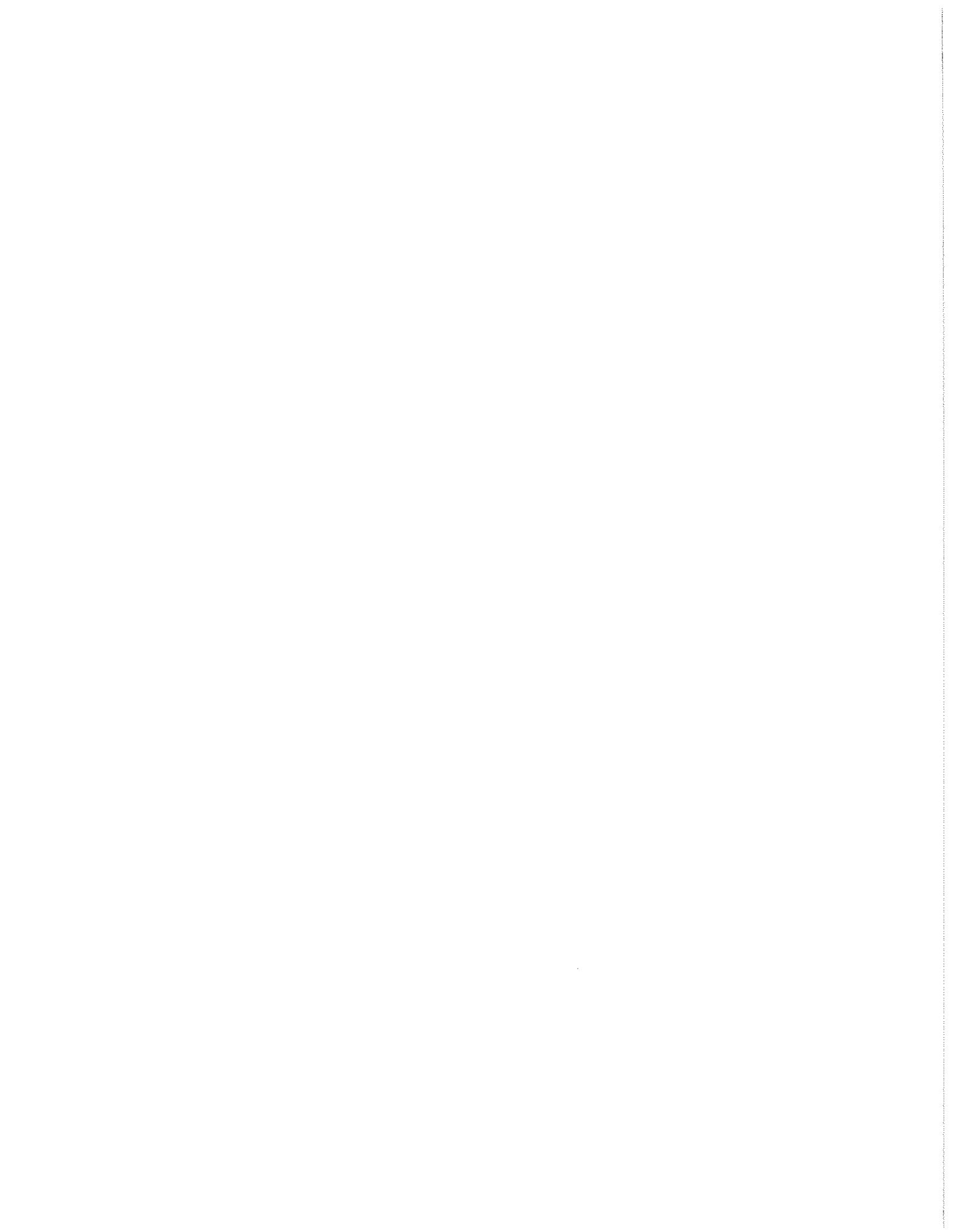
- A. This silt check shall be constructed with straw or hay bales firmly bound by twine and solidly staked to remain in place, as shown on the Standard Details.
- B. The location of straw or hay bale silt checks shall be as shown on the Plan drawings, or as directed by the Engineer at the time of construction. When the usefulness of the silt checks has ended, they shall be removed, and surplus materials shall be disposed of properly.

PART 3 EXECUTION

3.01 MEASUREMENT AND PAYMENT

- A. Payment for installation and maintenance of the temporary silt and erosion control structures shall be considered an incidental expense to the construction. All costs for same shall be included in the prices bid for the items included with the project.

END OF SECTION



SECTION 03100
CONCRETE FORMWORK

PART 1 - GENERAL

1.1. WORK INCLUDED

This Section shall cover Concrete Forms, Metal Forms, Form Ties and Form Release Agents

1.2. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 347 (1999) Concrete Formwork

AMERICAN HARDBOARD ASSN (AHA)

AHA A135.4 (1995) Basic Hardboard

THE ENGINEERED WOOD ASSOCIATION (APA)

APA F405 (1995) Product Guide Performance Rated Panel

1.3. SUBMITTALS - NOT APPLICABLE

1.4. DESIGN

- A. **METHODOLOGY:** Formwork shall be designed in accordance with methodology of ACI 347 for anticipated loads, lateral pressures, and stresses. Forms shall be capable of producing a surface which meets the requirements of the class of finish specified in Section 03300 CONCRETE FOR BUILDING CONSTRUCTION.

- B. **PRESSURES:** Forms shall be capable of withstanding the pressures resulting from placement and vibration of concrete.

PART 2 - PRODUCTS

2.1. FORM MATERIALS

- A. **FORMS FOR CLASS B FINISH:** Forms for Class B finished surfaces shall be plywood panels conforming to APA F405, Grade B-B concrete form panels, Class I or II. Other form materials or liners may be used provided the smoothness and appearance of concrete produced will be equivalent to that produced by the plywood concrete form panels.
- B. **FORMS FOR CLASS D FINISH:** Forms for Class D finished surfaces, except where concrete is placed against earth, shall be wood or steel or other approved concrete form material.
- C. **FORM TIES:** Form ties shall be factory-fabricated metal ties, shall be of the removable or internal disconnecting or snap-off type, and shall be of a design that will not permit form deflection and will not spill concrete upon removal. Solid backing shall be provided for each tie. Except where removable tie rods are used, ties shall not leave holes in the concrete surface less than 1/4 inch nor more than 1 inch deep and not more than 1 inch in diameter. Removable tie rods shall be not more than 1-1/2 inches in diameter.
- D. **FORM RELEASING AGENTS:** Form releasing agents shall be commercial formulations that will not bond with, stain or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds

PART 3 - EXECUTION

3.1. INSTALLATION

- A. Forms shall be mortar tight, properly aligned and adequately supported to produce concrete surfaces meeting the surface requirements specified in Section 03300 CONCRETE FOR BUILDING CONSTRUCTION and conforming to construction tolerance given in TABLE 1.
- B. Where concrete surfaces are to have a Class B finish, joints in form panels shall be arranged as approved.
- C. Where forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface so as to obtain accurate alignment of the surface and to prevent leakage of mortar.

- D. Forms shall not be reused if there is any evidence of surface wear and tear or defects which would impair the quality of the surface.
- E. Surfaces of forms to be reused shall be cleaned of mortar from previous concreting and of all other foreign material before reuse.
- F. Form ties that are to be completely withdrawn shall be coated with a non-staining bond breaker.

3.2. CHAMFERING

Except as otherwise shown, external corners that will be exposed shall be chamfered, beveled, or rounded by moldings placed in the forms

3.3. COATING

- A. Forms for Class B finished surfaces shall be coated with a form releasing agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's printed or written instructions.
- B. Forms for Class C and D finished surfaces may be wet with water in lieu of coating immediately before placing concrete, except that in cold weather with probable freezing temperatures coating shall be mandatory.
- C. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.4. REMOVAL OF FORMS

- A. Forms shall be removed in a manner that will prevent injury to the concrete and ensure the complete safety of the structure.
- B. Formwork for walls, side of beams and other parts not supporting the weight of concrete may be removed when the concrete has attained sufficient strength to resist damage from the removal operation but not before at least 24 hours has elapsed since concrete placement.
- C. Supporting forms and shores shall not be removed from beams, floors and walls until the structural units are strong enough to carry their own weight and any other construction or natural loads.
- D. In no case will supporting forms or shores be removed before the concrete strength has reached 70 percent of design strengths as

determined by field cured cylinders or other approved methods. This strength shall be demonstrated by job-cured test specimens, and by a structural analysis considering the proposed loads in relation to these test strengths and the strength of forming and shoring system.

- E. The job-cured test specimens for form removal purposes shall be provided in numbers as directed and shall be in addition to those required for concrete quality control. The specimens shall be removed from molds at the age of 24 hours and shall receive, insofar as possible, the same curing and protection as the structures they represent.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variations from the plumb:
 - a. In any 10 feet of length - 1/4 inch
 - b. In the lines and surfaces of piers, walls and in arises:
 - i. Maximum for entire length - 1 inch
 - c. For exposed corner piers, control-joint grooves, other conspicuous lines:
 - i. In any 20 feet of length - 1/4 inch
 - ii. Maximum for entire length - 1/2 inch
2. Variation from the level or from the grades indicated on the drawings:
 - a. In any 10 feet of length - 1/4 inch
 - b. In any bay or in any 20 feet of length - 3/8 inch
3. Variation of the linear building lines from established position in plan
 - a. In any 20 feet - 1/2 inch
 - b. Maximum - 1 inch

4. Variation of distance between walls, partitions:
 - a. 1/4 inch per 10 feet of distance, but not more than 1/2 inch in any one bay and not more than 1 inch total variation

5. Variation in the sizes and locations of sleeves, floor openings, and wall opening:
 - a. Minus - 1/4 inch
 - b. Plus - 1/2 inch

6. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:
 - a. Minus - 1/4 inch
 - b. Plus - 1/2 inch

7. Footings:
 - a. Variation of dimensions in plan when formed or plus 3 inches when placed against unformed excavation
 - i. Minus - 1/2 inch
 - ii. Plus - 2 inches
 - b. Misplacement of 2 percent of the footing width in eccentricity the direction of misplacement but not more than - 2 inches
 - c. Reduction in thickness Minus - 5 percent of specified thickness

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318 (1999) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 53 (1999) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated
Welded and Seamless

ASTM A 82 (1997) Steel Wire, Plain, for Concrete Reinforcement

ASTM A 184 (1996) Fabricated Deformed Steel Bar Mats for Concrete
Reinforcement

ASTM A 185 (1997) Steel Welded Wire Fabric, Plain, for Concrete
Reinforcement

ASTM A 497 (1999) Steel Welded Wire Fabric, Deformed, for Concrete
Reinforcement

ASTM A 499 (1997) Steel Bars and Shapes, Carbon Rolled from "T" Rails

ASTM A 615 (2000) Deformed and Plain Billet Steel Bars for Concrete
Reinforcement

ASTM A 675 (1995) Steel Bars, Carbon, Hot Wrought, Special Quality,
Mechanical Properties

ASTM A 706 (2000) Low-Alloy Steel Deformed Bars for Concrete
Reinforcement

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4 (1998) Structural Welding Code - Reinforcing Steel

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI MSP-1 (1996) Manual of Standard Practice

1.2. SUBMITTALS

Submit shop drawings and product data under provisions of Section 01300.

1.3. QUALIFICATIONS

- A. Welders shall be qualified in accordance with AWS D1.4.
- B. Qualification test shall be performed at the worksite and the Contractor shall notify the Owner 24 hours prior to conducting tests. .
- C. Welding procedures qualified by others and welders qualified by another employer may be accepted as permitted by AWS D1.4.

1.4. DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 - PRODUCTS

2.1. DOWELS

- A. Dowels shall conform to ASTM A 675, Grade 80, or ASTM A 499.
- B. Steel pipe conforming to ASTM A 53, Schedule 80, may be used as dowels provided the ends are closed with metal or plastic inserts or with mortar.

2.2. FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184.

2.3. REINFORCING STEEL

- A. Reinforcing steel shall be deformed bars conforming to ASTM A 615 or ASTM A 706, grades and sizes as indicated.

2.4. WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185 or ASTM A 497.

2.5. WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.6. SUPPORTS

- A. Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks.
- B. Precast concrete blocks shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete.
- C. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be plastic protected or of stainless steel.
- D. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface.
- E. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire fabric supports fabricated of plastic.

PART 3 - EXECUTION

3.1. REINFORCEMENT

- A. Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318.
- B. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete.
- C. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety.
- D. **PLACEMENT:** Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete.

Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

- E. **SPLICING:** Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6-inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.2. WELDED-WIRE FABRIC

- A. Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints.
- B. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction.
- C. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet.
- D. Fabric shall be positioned by the use of supports.

3.3. DOWELS

- A. Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled.

- B. Dowels shall be accurately aligned parallel to the finished concrete surface and rigidly supported during concrete placement.
- C. One end of dowels shall be coated with a bond breaker.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1. REFERENCES

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CRSI MSP-1 (1996) Manual of Standard Practice

1.2. SUBMITTALS

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1.3. QUALIFICATIONS

- A. Welders shall be qualified in accordance with AWS D1.4.
- B. Qualification test shall be performed at the worksite and the Contractor shall notify the Owner 24 hours prior to conducting tests. .
- C. Welding procedures qualified by others and welders qualified by another employer may be accepted as permitted by AWS D1.4.

1.4. DELIVERY AND STORAGE

Reinforcement and accessories shall be stored off the ground on platforms, skids, or other supports.

PART 2 - PRODUCTS

2.1. DOWELS

- A. Dowels shall conform to ASTM A 675, Grade 80, or ASTM A 499.
- B. Steel pipe conforming to ASTM A 53, Schedule 80, may be used as dowels provided the ends are closed with metal or plastic inserts or with mortar.

2.2. FABRICATED BAR MATS

Fabricated bar mats shall conform to ASTM A 184.

2.3. REINFORCING STEEL

- A. Reinforcing steel shall be deformed bars conforming to ASTM A 615 or ASTM A 706, grades and sizes as indicated.

2.4. WELDED WIRE FABRIC

Welded wire fabric shall conform to ASTM A 185 or ASTM A 497.

2.5. WIRE TIES

Wire ties shall be 16 gauge or heavier black annealed steel wire.

2.6. SUPPORTS

- A. Bar supports for formed surfaces shall be designed and fabricated in accordance with CRSI MSP-1 and shall be steel or precast concrete blocks.
- B. Precast concrete blocks shall be not less than 4 inches square when supporting reinforcement on ground. Precast concrete block shall have compressive strength equal to that of the surrounding concrete.
- C. Where concrete formed surfaces will be exposed to weather or where surfaces are to be painted, steel supports within 1/2 inch of concrete surface shall be plastic protected or of stainless steel.
- D. Concrete supports used in concrete exposed to view shall have the same color and texture as the finish surface.
- E. For slabs on grade, supports shall be precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire fabric supports fabricated of plastic.

PART 3 - EXECUTION

3.1. REINFORCEMENT

- A. Reinforcement shall be fabricated to shapes and dimensions shown and shall conform to the requirements of ACI 318.
- B. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Bars shall not be bent after embedment in concrete.
- C. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety.
- D. PLACEMENT: Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete.

Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

- E. **SPLICING:** Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection; except that lap splices shall not be used for bars larger than No. 11 unless otherwise indicated. Welding shall conform to AWS D1.4. Welded butt splices shall be full penetration butt welds. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6-inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.2. WELDED-WIRE FABRIC

- A. Welded-wire fabric shall be placed in slabs as indicated. Fabric placed in slabs on grade shall be continuous between expansion, construction, and contraction joints.
- B. Lap splices shall be made in such a way that the overlapped area equals the distance between the outermost crosswires plus 2 inches. Laps shall be staggered to avoid continuous laps in either direction.
- C. Fabric shall be wired or clipped together at laps at intervals not to exceed 4 feet.
- D. Fabric shall be positioned by the use of supports.

3.3. DOWELS

- A. Dowels shall be installed in slabs on grade at locations indicated and at right angles to joint being doweled.

- B. Dowels shall be accurately aligned parallel to the finished concrete surface and rigidly supported during concrete placement.
- C. One end of dowels shall be coated with a bond breaker.

END OF SECTION

SECTION 03250

EXPANSION JOINTS, CONTRACTION JOINTS, AND WATERSTOPS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contraction-Joint Strips.
- B. Expansion Joint Filler
- C. Joint Sealant
- D. Waterstops

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A135.4 (1995) Basic Hardboard

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1751 (1999) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

ASTM D 1752 (1996) Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM D 2628 (1998) Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

ASTM D 2835 (1998) Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

CORPS OF ENGINEERS HANDBOOK FOR CONCRETE AND CEMENT (USACE)

COE CRD-C513 (1974) Rubber Waterstops

COE CRD-C572 (1974) Polyvinylchloride Waterstops

FEDERAL SPECIFICATIONS (GSA)

FS SS-S-200	(Rev. E; Am. 2) Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement
FS SS-S-1401	(Rev. C: Am. 1; Notice 1) Sealant, Joint, Non-Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Asphalt Concrete Pavements
FS SS-S-1614	(Rev. A; Am. 1; Notice 1) Sealants, Joint, Jet-Fuel-Resistant, Hot-Applied, for Portland Cement and Tar Concrete Pavements

1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.

1.4 DELIVERY AND STORAGE

- A. Material delivered and placed in storage shall be stored off the ground and protected from moisture, dirt, and other contaminants.
- B. Sealants shall be delivered in the manufacturer's original unopened containers. Sealants whose shelf life has expired shall be removed from the site.

PART 2 - PRODUCTS

- 2.01 Products listed herein shall apply to application of contract documents/drawings. Drawings list location and type of products to be used.

2.1 CONTRACTION-JOINT STRIPS

- A. Contraction-joint strips shall be 1/8-inch thick tempered hardboard conforming to ANSI A135.4, Class 1.
- B. In lieu of hardboard strips, rigid polyvinylchloride (PVC) insert strips specifically designed to induce controlled cracking in slabs on grade may be used. Such insert strips shall have removable top section.

2.2 EXPANSION-JOINT FILLER

- A. Expansion-joint filler shall be pre-molded material conforming to ASTM D 1751 or ASTM D 1752.
- B. Unless otherwise indicated, filler material shall be 3/8-inch thick and of a width applicable for the joint formed.

2.3 JOINT SEALANT

- A. Joint sealant shall conform to the following:
- B. Preformed Polychloroprene Elastomeric Joint Seals ASTM D 2628.
- C. Lubricant for Installation of Preformed Compression Seals ASTM D 2835.
- D. Hot-Poured Type FS SS-S-1401.
- E. Cold-Applied Jet-Fuel Resistant Type FS SS-S-200, Type M.
- F. Hot-Applied Jet-Fuel Resistant Type FS SS-S-1614.

2.4 WATERSTOPS

- A. Waterstops shall conform to COE CRED-C513 or COE CRD-C572.

PART 3 - EXECUTION

3.1. JOINTS

Joints shall be installed at locations indicated and as authorized.

- A. **Contraction Joints:** Contraction joints may be constructed by inserting tempered hardboard strips or rigid PVC insert strips into the plastic concrete or by cutting the concrete with a saw after concrete has set. Joints shall be approximately 1/8-inch wide and shall extend into the slab approximately one-fourth the slab thickness but not less than 1 inch.
 - 1. **Joint Strips:** Strips shall be of the required dimensions and as long as practicable. After the first floating, the concrete shall be grooved with a tool at the joint locations. The strips shall be inserted in the groove and depressed until the top edge of the vertical surface is flush with the surface of the slab. The slab shall be floated and finished as specified. Working of the concrete adjacent to the joint shall be the minimum necessary to fill voids and consolidate the concrete. Where indicated, the top portion of the strip shall be sawed out after the curing period to form a recess for sealer. The removable section of PVC strips shall be discarded and the insert left in place. Means shall be provided to insure true alignment of the strips is maintained during insertion.
 - 2. **Sawed Joints:** Joint sawing shall be early enough to prevent uncontrolled cracking in the slab, but late enough that this can be accomplished without appreciable spalling. Concrete-sawing machines shall be adequate in number and power, and with sufficient replacement blades to complete the sawing at the required rate. Joints shall be cut to true alignment and shall

be cut in sequence of concrete placement. Sludge and cutting debris shall be removed.

- B. Expansion Joints: Pre-molded expansion joint filler shall be used in expansion and isolation joints in slabs around columns and between slabs on grade and vertical surfaces where indicated. The filler shall extend the full slab depth, unless otherwise indicated. The edges of the joint shall be neatly finished with an edging tool of 1/8-inch radius, except where a resilient floor surface will be applied. Where the joint is to receive a sealant, the filler strips shall be installed at the proper level below the finished floor with a slightly tapered, dressed-and-oiled wood strip temporarily secured to the top thereof to form a recess 3/4-inch deep to be filled with sealant. The wood strip shall be removed after the concrete has set. In lieu of the wood strip a removable expansion filler cap designed and fabricated for this purpose may be used.
- C. Joint Sealant: Sawed contraction joints and expansion joints in slabs shall be filled with joint sealant, unless otherwise shown. Types and locations of sealants shall be as indicated. Joint surfaces shall be clean, dry, and free of oil or other foreign material which would adversely affect the bond between sealant and concrete. Joint sealant shall be applied as recommended by the manufacturer of the sealant. Joints sealed with field molded sealant shall be completely filled with sealant.

3.2. WATERSTOPS

- A. Waterstops shall be of the type indicated and shall be installed at the locations shown to form a continuous watertight diaphragm.
- B. Adequate provision shall be made to support and completely protect the waterstops during the progress of the work. Any waterstop punctured or damaged shall be repaired or replaced.
- C. Splices shall be made in conformance with the recommendations of the waterstop manufacturer. Continuity of cross sectional features shall be maintained across the splice. Splices showing evidence of separation after bending shall be remade.

END OF SECTION

SECTION 03300

CONCRETE

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Admixtures
- B. Cementitious Materials
- C. Aggregates
- D. Curing Materials
- E. Embedded Items
- F. Non-shrink Grout
- G. Non-slip Surfacing Material
- H. Floor Hardener
- I. Perimeter Insulation
- J. Vapor Barrier
- K. Water

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991) Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 211.2	(1998) Selecting Proportions for Structural Lightweight Concrete
ACI 301	(1999) Structural Concrete for Buildings
ACI 305R	(1999) Hot Weather Concreting

ACI 318 (1999) Building Code Requirements for Reinforced Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31 (1991) Making and Curing Concrete Test Specimens in the Field

ASTM C 33 (1999) Concrete Aggregates

ASTM C 39 (1993) Compressive Strength of Cylindrical Concrete Specimens

ASTM C 42 (1990) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C 78 (1994) Flexural Strength of Concrete (Using Simple Beam With Third Point Loading)

ASTM C 94 (1994) Ready Mixed Concrete

ASTM C 109 (1992) Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)

ASTM C 143 (2000) Slump of Portland Cement Concrete

ASTM C 150 (1999) Portland Cement

ASTM C 171 (1997) Sheet Materials for Curing Concrete

ASTM C 172 (1999) Sampling Freshly Mixed Concrete

ASTM C 173 (1994) Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C 192 (2000) Making and Curing Concrete Test Specimens in the Laboratory

ASTM C 231 (1997) Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C 260 (2000) Air-Entraining Admixtures for Concrete

ASTM C 309 (1998) Liquid Membrane-Forming Compounds for Curing Concrete

ASTM C 330	(2000) Lightweight Aggregates for Structural Concrete
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 552	(2000) Cellular Glass Thermal Insulation
ASTM C 567	(2000) Unit Weight of Structural Lightweight Concrete
ASTM C 578	(1995) Preformed, Cellular Polystyrene Thermal Insulation
ASTM C 595	(2000) Blended Hydraulic Cements
ASTM C 597	(1997) Pulse Velocity Through Concrete
ASTM C 618	(2000) Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM C 803	(1997) Penetration Resistance of Hardened Concrete
ASTM C 805	(1997) Rebound Number of Hardened Concrete
ASTM C 989	(1999) Ground Iron Blast Furnace Slag for Use in Concrete and Mortars
ASTM C 1017	(1992) Chemical Admixture for Use in Producing Flowing Concrete
ASTM 1019	(2000) Sampling and Testing Grout
ASTM D 98	(1998) Calcium Chloride
ASTM E 96	(2000) Water Vapor Transmission of Materials

FEDERAL SPECIFICATIONS (FS)

FS HH I-530	(Rev B; Int Am 1) Insulation Board, Thermal, Unfaced, Polyurethane or Polyisocyanurate
COE CRD-C318	(1997) Cloth, Burlap, Jute (or Kenaf)

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC3	(Jan 1, 1984) Certification of Ready Mixed Concrete Production Facilities
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NRMCA CPMB 100	(1996) Concrete Plant Standards &
NRMCA TMMB-01	(1994) Truck Mixer Agitator Standards and Front Discharge Concrete Carrier Standards.

1.3 SUBMITTALS

- A. Submit shop drawings and product data under provision of Section 01300.

1.4 GENERAL REQUIREMENTS

A. Strength Requirements

Structural concrete for all work shall have a 28-day compressive strength of 4000 pounds per square inch. Concrete slabs on-grade as indicated shall have a 28-day flexural strength of 600 pounds per square inch. Concrete made with high-early strength cement shall have a 7-day strength equal to the specified 28-day strength for concrete made with Type I or II Portland cement.

B. Air Entrainment

Concrete may, at the option of the Contractor, be air entrained to produce concrete with 3 to 5 percent total air.

C. Special Properties

Concrete may contain other admixtures, such as water reducers, superplasticizers, or set retarding agents to provide special properties to the concrete only specifically when approved by the Engineer.

D. Slump

Slump shall be within the following limits:

Structural Element	Slump in inches	
	Minimum	Maximum
Walls, columns and beams	2	4
Foundation walls, substructure walls, footings, pavement, and slabs	1	3
Any structural concrete approved for placement by pumping	None	6

*Where use of superplasticizers is approved to produce flowing concrete these slump requirements do not apply.

E. Technical Service for Specialized Concrete

The service of a technical representative shall be obtained to oversee proportioning, batching, mixing, placing, consolidating and finishing of specialized structural concrete, such as lightweight or flowing concrete until field controls indicate concrete of specified quality is furnished.

1.5 PROPORTIONS OF MIX

A. Mixture Proportioning, Normal Weight Concrete

Trial batches shall contain materials proposed to be used in the project. Trial mixtures having proportions, consistencies and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios. Trial mixes shall be proportioned to produce concrete strengths specified. In the case where ground iron blast-furnace slag is used, the weight of the slag will be substituted in the equations for the term P which is used to denote the weight of pozzolan. Trial mixtures shall be designed for maximum permitted slump and air content. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192. They shall be tested at 7 and 28 days in accordance with ASTM C 39. From these test results a curve shall be plotted showing the relationship between water-cement ratio and strength.

B. Average Strength

In meeting the strength requirements specified, the selected mixture proportion shall produce an average compressive strength exceeding the specified strength by the amount indicated below. Where a concrete production facility has test records, a standard deviation shall be established. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected; shall represent concrete produced to meet a specified strength or strengths within 1000 psi of that specified for proposed work; and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at other test age designated for determination of the specified strength.

1. Test Records Exceeding 29

Required average compressive strength used as the basis for selection of concrete proportions shall be the larger of the specified strength plus the standard deviation multiplied by 1.34 or the specified strength plus the standard deviation multiplied by 2.33 minus 500.

2. Test Records Less Than 29

Where a concrete production facility does not have test records meeting the above requirements but does have a record based on 15 to 29 consecutive tests, a standard deviation may be established as the product of the calculated standard deviation and a modification factor from the following table:

No. of tests (1)	Modification factor for standard deviation
less than 15	See Note
15	1.16
20	1.08
25	1.03
30 or more	1.00

(1) Interpolate for intermediate numbers of tests.

When a concrete production facility does not have field strength test records for calculation of standard deviation or the number of tests is less than 15, the required average strength shall be:

- a. The specified strength plus 1000 specified strength of less than 3000 psi.
- b. The specified strength plus 1200 for specified strengths of 3000 to 5000 psi.
- c. The specified strength plus 1400 for specified strengths greater than 5000 psi.

1.6 STORAGE OF MATERIALS

Cement and pozzolan shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants. Aggregate stockpiles shall be

arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Reinforcing bars and accessories shall be stored above the ground on platforms, skids or other supports. Other materials shall be stored in such a manner as to avoid contamination and deterioration. Admixtures which have been in storage at the project site for longer than 6 months or which have been subjected to freezing shall not be used unless retested and proven to meet the specified requirements.

PART 2 PRODUCTS

2.1 ADMIXTURES

Admixtures shall conform to the following:

A. Accelerating Admixture

ASTM C 494, Type C or E; or calcium chloride conforming to ASTM D 98.

B. Air Entraining Admixture

ASTM C 260.

C. Flowing Concrete Admixture

ASTM C 1017, Type 1 or 2.

D. Water-Reducing or Retarding Admixture

ASTM C 494, Type A, B, D, F, or G.

2.2 CEMENTITIOUS MATERIALS

Cementitious materials shall each be of one type and from one source when used in concrete which will have surfaces exposed in the finished structure. Cementitious materials shall conform to one of the following:

A. Cement

ASTM C 150, Type I or II low alkali.

B. Portland Blast-Furnace-Slag Cement

ASTM C 595, Type IS.

- C. Portland-Pozzolan Cement
ASTM C 595, Type IP.
- D. Pozzolan
ASTM C 618, Class F.
- E. Ground Iron Blast-Furnace Slag
ASTM C 989, Grade 120.

2.3 AGGREGATES

Aggregates shall conform to the following:

- A. Lightweight Aggregate
ASTM C 330
- B. Normal Weight Aggregate
ASTM C 33.

2.4 CURING MATERIALS

- A. Burlap
COE CRD-C318.
- B. Impervious Sheets
ASTM C 171, type optional, except that polyethylene film, if used, shall be white opaque.
- C. Membrane-Forming Compounds
ASTM C 309, Type 1-D, Class A or B.

2.5 EMBEDDED ITEMS

Embedded items shall be of the size and type indicated or as needed for the application.

2.6 NONSHRINK GROUT

Non-shrink grout shall conform to ASTM C1019 and shall be a formulation suitable for the application.

2.7 FLOOR HARDENER

Floor hardener shall be a colorless aqueous solution containing zinc silicofluoride, magnesium silicofluoride, or sodium silicofluoride. These silicofluoride can be used individually or in combination.

2.8 PERIMETER INSULATION

Perimeter insulation shall be as noted on plans, polystyrene conforming to ASTM C 578, Type II; polyurethane conforming to FS HH-I-530, Type II; or cellular glass conforming to ASTM C 552, Type I or IV.

2.9 VAPOR BARRIER

Vapor barrier shall be polyethylene sheeting with a minimum thickness of 6 mils or other equivalent material having a vapor permeance rating not exceeding 0.5 perms as determined in accordance with ASTM E 96.

2.10 WATER

Water shall be potable, non-potable water shall not be used. The strength comparison shall be made on mortars, identical except for mixing water, prepared and tested in accordance with ASTM C 109. Water for curing shall not contain any substance injurious to concrete, or which causes staining.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACES

Surfaces to receive concrete shall be clean and free from frost, ice, mud, and water. Conduit and other similar items shall be in place and clean of any deleterious substance. Reference to plans for limits of specified work to be performed.

A. Foundations

Earthwork shall be as specified on Drawings. Flowing water shall be diverted without washing over freshly deposited concrete. Rock foundations shall be cleaned by high velocity air-water jets, sandblasting, or other approved methods. Debris and loose, semi-detached or unsound fragments shall be removed. Rock surfaces shall be moist but without free water when concrete is placed. Semi-porous subgrades for foundations and footings shall be damp when concrete is placed. Pervious subgrades shall be sealed by blending impervious material with

the top 6 inches of the in-place pervious material or by covering with an impervious membrane.

B. Perimeter Insulation

Perimeter insulation shall be installed at locations indicated. Adhesive shall be used where insulation is applied to the interior surface of foundation walls.

C. Vapor Barrier

Unless otherwise indicated, subgrades for slabs in buildings shall be covered with a vapor barrier. Vapor barrier edges shall be lapped at least 4 inches and ends shall be lapped not less than 6 inches. Patches and lapped joints shall be sealed with pressure-sensitive adhesive or tape not less than 2 inches wide and compatible with the membrane.

D. Preparation of Previously Placed Concrete

Concrete surfaces to which other concrete is to be bonded shall be roughened in an approved manner that will expose sound aggregate uniformly without damaging the concrete. Laitance and loose particles shall be removed. Surfaces shall be moist but without free water when concrete is placed.

3.2 INSTALLATION OF EMBEDDED ITEMS

Embedded items shall be free from oil, loose scale or rust, and paint. Embedded items shall be installed at the locations indicated and required to serve the intended purpose. Voids in sleeves, slots and inserts shall be filled with readily removable material to prevent the entry of concrete.

3.3 BATCHING, MIXING AND TRANSPORTING CONCRETE

Ready-mixed concrete shall be batched, mixed and transported in accordance with ASTM C 94, except as otherwise specified. Truck mixers, agitators, and non-agitating units shall comply with NRMCA TMMB-100. Ready-mix plant equipment and facilities shall be certified in accordance with NRMCA Q3. Site-mixed concrete shall be mixed in accordance with ACI 301. On-site plant shall conform to the NRMCA CPMB-100.

A. Admixtures

Admixtures shall be batched within an accuracy of 3 percent. Where two or more admixtures are used in the same batch, they shall be batched separately and must be compatible. Retarding admixture shall be added

within one minute after addition of water is complete or in the first quarter of the required mixing time, whichever is first. Superplasticizing admixtures shall be added as recommended by manufacturer. Concrete that shows evidence of total collapse or segregation caused by the use of admixture shall be removed from the site.

B. Control of Mixing Water

No water from the truck system or elsewhere shall be added after the initial introduction of mixing water for the batch except when on arrival at the jobsite, the slump of the concrete is less than that specified. Water added to bring the slump within the specified range shall not change the total water in the concrete to a point that the approved water-cement ratio is exceeded. The drum shall be turned an additional 30 revolutions, or more, if necessary, until the added water is uniformly mixed into the concrete. Water shall not be added to the batch at any later time.

C. Mixing of Lightweight Concrete

The mixing cycle shall be as recommended by the aggregate producer for the batching and mixing as required by the absorptivity of the aggregate. Typically, the mixer is charged with approximately 2/3 of the total mixing water and all of the aggregate. Ingredients are mixed for not less than 30 seconds in a stationary mixer nor less than 10 revolutions at mixing speed in a truck mixer. Cement, air entraining admixture, and the rest of the mixing water are added to obtain the required slump and mixing is continued for 30 revolutions at mixing speed.

3.4 SAMPLING AND TESTING

Sampling and Testing is the responsibility of the Contractor and shall be performed by an approved testing agency.

A. Aggregates

Aggregates for normal weight concrete shall be sampled and tested in accordance with ASTM C 33. Gradation tests shall be performed on the first day and every other day thereafter during concrete construction.

B. Sampling of Concrete

Samples of concrete for air, slump, unit weight, and strength tests shall be taken in accordance with ASTM C 172.

1. Air Content

Test for air content shall be performed in accordance with ASTM C 173 or ASTM C 231. A minimum of 1 test per day shall be conducted.

2. Slump

At least 2 slump tests shall be made on randomly selected batches of each mixture of concrete during each day's concrete placement. Tests shall be performed in accordance with ASTM C 143.

- C. Evaluation and Acceptance of Concrete

1. Frequency of Testing

Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. If this sampling frequency results in less than 5 strength tests for a given class of concrete, tests shall be made from at least 5 randomly selected trucks or from each truck if fewer than 5 truck loads are used. Field cured specimens for determining form removal time or when a structure may be put in service shall be made in numbers directed to check the adequacy of curing and protection of concrete in the structure. The specimens shall be removed from the molds at the age of 24 hours and shall be cured and protected, insofar as practicable, in the same manner as that given to the portion of the structure the samples represent.

2. Testing Procedures

Cylinders and beams for acceptance tests shall be molded and cured in accordance with ASTM C 31. Cylinders shall be tested in accordance with ASTM C 39 and beams shall be tested in accordance with ASTM C 78. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another specified test age.

3. Evaluation of Results

Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength and no individual strength test result falls below the

required strength by more than 500 pounds per square inch. For flexural strength concrete, the strength level of the concrete will be considered satisfactory if the averages of all sets of five consecutive strength test results equal or exceed the required flexural strength.

D. Investigation of Low-Strength Test Results

When any strength test of standard-cured test cylinder falls below the specified strength requirement by more than 500 pounds per square inch, or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that load-carrying capacity of the structure is not jeopardized. Non-destructive testing in accordance with ASTM C 597, ASTM C 803 or ASTM C 805 may be permitted by the Engineer to determine the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests, unless properly calibrated and correlated with other test data, shall not be used as a basis for acceptance or rejection. When strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores shall be determined by the Engineer to least impair the strength of the structure. If the concrete in the structure will be dry under service conditions, the cores shall be air-dried (temperature 60 to 80 degrees F, relative humidity less than 60 percent) for seven days before testing and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C 42. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to or at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement. If the core tests are inconclusive or impractical to obtain, or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Engineer in accordance with the requirements of ACI 318. Concrete work evaluated by structural analysis or by results of a load test and found deficient shall be corrected in a manner satisfactory to the Engineer. All investigations, testing, load tests, and correction of deficiencies shall be performed, and approved by the Engineer, at the expense of the Contractor.

3.5 CONVEYING CONCRETE

Concrete shall be conveyed from mixer to forms as rapidly as possible and within the time interval specified in paragraph "CONCRETE PLACEMENT" by methods which will prevent segregation or loss of ingredients. Final method of placement shall be approved by the Engineer.

A. Chutes

When concrete can be placed directly from a truck mixer or other transporting equipment, chutes attached to this equipment may be used. Separate chutes will not be permitted except when specifically approved.

B. Buckets

Bucket design shall be such that concrete of the required slump can be readily discharged. Bucket gates shall be essentially grout tight when closed. The bucket shall provide means for positive regulations of the amount and rate of deposit of concrete in each dumping position.

C. Belt Conveyors

Belt conveyors may be used when approved. Belt conveyors shall be designed for conveying concrete and shall be operated to assure a uniform flow of concrete to the final place of deposit without segregation or loss of mortar. Conveyors shall be provided with positive means for preventing segregation of the concrete at transfer points and point of placement.

D. Pumps

Concrete may be conveyed by positive displacement pumps when approved. Pump shall be the piston or squeeze pressure type. Pipeline shall be steel pipe or heavy duty flexible hose. Inside diameter of the pipe shall be at least three times the maximum size of the coarse aggregate. Distance to be pumped shall not exceed the limits recommended by the pump manufacturer. Concrete shall be supplied to the pump continuously. When pumping is completed, the concrete remaining in the pipeline shall be ejected without contaminating the concrete in place. After each use, the equipment shall be thoroughly cleaned. Flushing water shall be wasted outside the forms.

3.6 CONCRETE PLACEMENT

Mixed concrete which is transported in truck mixers or agitators or concrete which is truck mixed, shall be discharged within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates. These limitations may be waived by the Engineer if the concrete is of such slump after the 1-1/2 hour time or 300 revolution limit has been reached that it can be placed, without the addition of water to the batch. When the concrete temperature exceeds 85 degrees F, the time shall be reduced to 45

minutes. Concrete shall be placed within 15 minutes after it has been discharged from the truck.

A. Placing Operation

Concrete shall be handled from mixer to forms in a continuous manner until the approved unit of operation is completed. Adequate scaffolding, ramps and walkways shall be provided so that personnel and equipment are not supported by in-place reinforcement. Placing will not be permitted when the sun, heat, wind, or limitations of facilities furnished by the Contractor prevent proper consolidation, finishing and curing. Concrete shall be deposited as close as possible to its final position in the forms, and there shall be no vertical drop greater than 8 feet except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it will be effectively consolidated in horizontal layers not more than 12 inches thick, except that all slabs shall be placed in a single layer. Concrete to receive other construction shall be screeded to the proper level to avoid excessive shimming or grouting.

B. Consolidation

Immediately after placing, each layer of concrete shall be consolidated by internal vibrators, except for slabs 4 inches or less. The vibrators shall at all times be adequate in effectiveness and number to properly consolidate the concrete; a spare vibrator shall be kept at the jobsite during all concrete placing operations. The vibrators shall have a frequency of not less than 8000 vibrations per minute, and the head diameter and amplitude shall be appropriate for the concrete mixture being placed. Vibrators shall be inserted vertically at uniform spacing over the area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator so that the area being vibrated will overlap the adjacent just-vibrated area by a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the preceding layer if there is such. Vibrator shall be held stationary until the concrete is consolidated and then withdrawn slowly. The use of form vibrators must be specifically approved. Vibrators shall not be used to transport concrete within the forms. Slabs 4 inches and less in thickness shall be consolidated by properly designed vibrating screeds or other approved technique. Excessive vibration of lightweight concrete resulting in segregation and flotation of coarse aggregate shall be avoided.

C. Cold Weather Requirements

Special protection measures, approved by the Engineer, shall be used if freezing temperatures are anticipated before the expiration of the specified

curing period. The ambient temperature of the air where concrete is to be placed and the temperature of surfaces to receive concrete shall be not less than 40 degrees F. The temperature of the concrete when placed shall be not less than 50 degrees F nor more than 75 degrees F. Heating of the mixing water or aggregates will be required to regulate the concrete placing temperature. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt, chemicals or other materials shall not be incorporated in the concrete to prevent freezing. Upon written approval, calcium chloride or chemical admixture conforming to ASTM C 494 Type C or E may be used. The amount of calcium chloride shall not exceed 2 percent by weight of the cement, and it shall be batched in solution form. Calcium chloride shall not be used where concrete will be in contact with aluminum or zinc-coated items, or where sulfate resistant or pre-stressed concrete is specified.

D. Warm Weather Requirements

The temperature of the concrete placed during warm weather shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. In no case shall the placing temperature exceed 95 degrees F.

3.7 CONSTRUCTION JOINTS

Construction joints shall be located as indicated or approved. Where concrete work is interrupted by weather, end of work shift or other similar type of delay, location and type of construction joint shall be subject to approval of the Engineer. Unless otherwise indicated and except for slabs on grade, reinforcing steel shall extend through construction joints. Construction joints in slabs on grade shall be keyed or doweled as shown. Concrete columns, walls, or piers shall be in place at least 2 hours, or until the concrete is no longer plastic, before placing concrete for beams, girders, or slabs thereon. In walls having door window openings, lifts shall terminate at the top and bottom of the opening. Other lifts shall terminate at such levels as to conform to structural requirements or architectural details. Where horizontal construction joints are required, a strip of 1-inch square-edge lumber, beveled and oiled to facilitate removal, shall be tacked to the inside of the forms at the construction joint. Concrete shall be placed to a point 1 inch above the underside of the strip. The strip shall be removed 1 hour after the concrete has been placed, and any irregularities in the joint line shall be leveled off with a wood float, and all laitance shall be removed. Prior to placing additional concrete, horizontal construction joints shall be prepared as specified in paragraph "PREPARATIONS OF SURFACES."

3.8 FINISHING CONCRETE

A. Formed Surfaces

1. Repair of Surface Defects

Surface defects shall be repaired within 24 hours after the removal of forms. Honeycombed and other defective areas shall be cut back to solid concrete or to a depth of not less than 1 inch, whichever is greater. Edges shall be cut perpendicular to the surface of the concrete. The prepared areas shall be dampened and brush-coated with neat cement grout. The repair shall be made using mortar consisting of not more than 1 part cement to 2-1/2 parts sand. The mixed mortar shall be allowed to stand to stiffen (approximately 45 minutes), during which time the mortar shall be intermittently remixed without the addition of water. After the mortar has attained the stiffest consistency that will permit placing, the patching mix shall be thoroughly tamped into place by means approved by the Engineer and finished slightly higher than the surrounding surface. For Class A and Class B finished surfaces the cement used in the patching mortar shall be a blend of job cement and white cement proportioned to produce a finished repair surface matching, after curing, the color of adjacent surfaces. Holes left after the removal of form ties shall be cleaned and filled with patching mortar. Holes left by the removal of tie rods shall be reamed and filled by dry packing. Repaired surfaces shall be cured as required for adjacent surfaces. The temperature of concrete, mortar patching material, and ambient air shall be above 50 degrees F while making repairs and during the curing period. Concrete with defects which affect the strength of the member or with excessive honeycombs will be rejected, or the defects shall be corrected as directed.

2. Class A Finish

Where a Class A finish is indicated, fins shall be removed. A mortar mix consisting of one part Portland cement and two parts well-graded sand passing a No. 30 sieve, with water added to give the consistency of thick paint, shall be prepared. White cement shall be used to replace part of the job cement. After the surface has been thoroughly wetted and allowed to approach surface dryness, the mortar shall be vigorously applied to the area by clean burlap pads or by cork or wood-floating, to completely fill all surface voids. Excess grout shall be scraped off with a trowel. As soon as it can be accomplished without pulling the mortar from the voids, the area shall be rubbed with burlap pads until all visible grout film

is removed. The rubbing pads shall have on their surfaces the same sand-cement mix specified above but without any mixing water. The finish of any area shall be completed in the same day, and the limits of a finished area shall be made at natural breaks in the surface. The surface shall be continuously moist cured for 48 hours. The temperature of the air adjacent to the surface shall be not less than 50 degrees F for 24 hours prior to, and 48 hours after, the application. In hot, dry weather the smooth finish shall be applied in shaded areas.

3. Class B Finish

Where a Class B finish is indicated, fins shall be removed. Concrete surface shall be smooth with a texture at least equal to that obtained through the use of Grade B-B plywood forms.

4. Class C Finish

Where a Class C finish is indicated, fins shall be removed. Concrete surfaces shall be relatively smooth with a texture imparted by the forms used.

5. Class D Finish

Where a Class D finish is indicated, fins exceeding 1/4 inch in height shall be chipped or rubbed off. Concrete surfaces shall be left with the texture imparted by the forms used.

B. Unformed Surfaces

In cold weather, the air temperature in areas where concrete is being finished shall not be less than 50 degrees F. In hot windy weather when the rate of evaporation of surface moisture, as determined by methodology presented in ACI 305R, may reasonably be expected to exceed 0.2 pounds per square foot per hour; coverings, windbreaks, or fog sprays shall be provided as necessary to prevent premature setting and drying of the surface. The dusting of surfaces with dry materials or the addition of water during finishing will not be permitted. Finished surfaces shall be plane, with no deviation greater than 1/4 inch when tested with a 10-foot straightedge. Surfaces shall be pitched to drains.

1. Trowel Finish

- a. Slabs shall be given a trowel finish immediately following floating. Surfaces shall be trowelled to produce smooth, dense slabs free from blemishes including trowel marks. In

lieu of hand finishing, an approved power-finishing machine may be used in accordance with the directions of the machine manufacturer. A final hard steel troweling shall be done by hand.

- b. Trowel finish will be specified for most wearing surfaces and where a smooth finish is required.

2. Broom Finish (Concrete Stoops)

After floating, slabs shall be lightly trowelled, and then broomed with a fiber-bristle brush in a direction transverse to that of the main traffic.

3.9 CURING AND PROTECTION

A. General

- 1. All concrete shall be cured by an approved method for the period of time given below:

Concrete with Type III cement	3 days
Concrete with Type I, II, IP or IS cement	7 days
Concrete with Type I or Type II cement blended with pozzolan	7 days

- 2. Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, mechanical injury and injury from rain and flowing water. Air and forms in contact with concrete shall be maintained at a temperature above 50 degrees F for the first 3 days and at a temperature above 32 degrees F for the remainder of the specified curing period. Exhaust fumes from combustion heating units shall be vented to the outside of the enclosure and heaters and ducts shall be placed and directed so as not to cause areas of overheating and drying of concrete surfaces or to create fire hazards. All materials and equipment needed for adequate curing and protection shall be available and at the site prior to placing concrete. No fire or excessive heat shall be permitted near or in direct contact with the concrete at any time. Curing shall be accomplished by any of the following methods, or combination thereof, as approved.

B. Moist Curing

Concrete to be moist-cured shall be maintained continuously wet for the

entire curing period. If water or curing materials used stains or discolors concrete surfaces which are to be permanently exposed, the concrete surfaces shall be cleaned. When wooden forms are left in place during curing, they shall be kept wet at all times. If the forms are removed before the end of the curing period, curing shall be carried out as on unformed surfaces, using suitable materials. Horizontal surfaces shall be cured by ponding, by covering with a 2-inch minimum thickness of continuously saturated sand, or by covering with waterproof paper, polyethylene sheet, polyethylene-coated burlap or saturated burlap.

C. Membrane Curing

Membrane curing shall not be used on surfaces that are to receive any subsequent treatment depending on adhesion or bonding to the concrete; except a styrene acrylate or chlorinated rubber compound meeting ASTM C 309, Class B requirements may be used for surfaces which are to be painted or are to receive bituminous roofing or waterproofing, or floors that are to receive adhesive applications of resilient flooring. The curing compound selected shall be compatible with any subsequent paint, roofing, waterproofing or flooring specified. Membrane curing compound shall not be used on surfaces that are maintained at curing temperatures with free steam. Curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. Surfaces shall be thoroughly moistened with water and the curing compound shall be applied to slab surfaces as soon as the bleeding water has disappeared, with the tops of joints being temporarily sealed to prevent entry of the compound and to prevent moisture loss during the curing period. Compound shall be applied in a one-coat continuous operation by mechanical spraying equipment, at a uniform coverage in accordance with the manufacturer's printed instructions. Concrete surfaces which have been subjected to rainfall within 3 hours after curing compound has been applied shall be re-sprayed by the method and at the coverage specified. On surfaces permanently exposed to view, the surface shall be shaded from direct rays of the sun for the duration of the curing period. Surfaces coated with curing compound shall be kept free of foot and vehicular traffic, and from other sources of abrasion and contamination during the curing period.

3.10 SETTING BASE PLATES AND BEARING PLATES

Reference to plans for locations, which apply.

After being properly positioned, column base plates, bearing plates for beams and similar structural members, and machinery and equipment base plates shall be set to the proper line and elevation with damp-pack bedding mortar, except

where non-shrink grout is indicated. The thickness of the mortar or grout shall be approximately 1/24 the width of the plate, but not less than 3/4 inch. Concrete and metal surfaces in contact with grout shall be clean and free of oil and grease, and concrete surfaces in contact with grout shall be damp and free of laitance when grout is placed.

A. Damp-Pack Bedding Mortar

Damp-pack bedding mortar shall consist of 1 part cement and 2-1/2 parts fine aggregate having water content such that a mass of mortar tightly squeezed in the hand will retain its shape but will crumble when disturbed. The space between the top of the concrete and bottom of the bearing plate or base shall be packed with the bedding mortar by tamping or ramming with a bar or rod until it is completely filled.

B. Non-shrink Grout

Non-shrink grout shall be mixed and placed in accordance with material manufacturer's written recommendations. Forms of wood or other suitable material shall be used to retain the grout. The grout shall be placed quickly and continuously, completely filling the space without segregation or bleeding of the mix.

C. Treatment of Exposed Surfaces

For metal-oxidizing non-shrink grout, exposed surfaces shall be cut back 1 inch and immediately covered with a parget coat of mortar consisting of 1 part Portland cement and 2-1/2 parts fine aggregate by weight, with sufficient water to make a plastic mixture. The parge coat shall have a smooth finish. For other mortars or grouts, exposed surfaces shall be left untreated. Curing shall comply with paragraph "CURING AND PROTECTION."

END OF SECTION

SECTION 03419

CONCRETE ENCASUREMENT AND CONCRETE CRADLE

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. 01300 - Submittals
- B. 01600 - Materials and Equipment
- C. 01410 - Testing Laboratory Services
- D. 03300 - Concrete

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.01 CONCRETE ENCASUREMENT

- A. Buried pipelines shall be encased in 2,500 psi concrete where shown on the construction drawings or to the extent and/or at other locations as determined by the Project Manager.
- B. Concrete encasement shall provide a minimum cover of six (6) inches beneath and above the pipe O.D. and shall extend laterally to the undisturbed wall of the pipeline trench. Additional thickness of concrete encasement, if required, shall be shown on the construction drawings. Each pour shall start and stop at a pipe joint.

3.02 CONCRETE CRADLE

- A. Concrete cradles shall be 2,500 psi concrete where shown on the construction drawing or as directed by the Project Director.
- B. Concrete cradles shall provide a minimum of six (6) inches beneath the pipe and extend to the spring line of the pipe unless otherwise shown on the construction drawings. Each pour shall start and stop at a pipe joint.

3.03 MEASUREMENT AND PAYMENT

- A. The payment for concrete encasement shall include furnishing and placing the concrete encasement. The Contractor shall be paid for the number of lineal feet of encasement constructed at the unit price on the Bid Sheets.
- B. The payment for concrete cradle shall include furnishing and placing the concrete encasement. The Contractor shall be paid for the number of lineal feet of cradle at the unit price on the Bid Sheets. The concrete foundation under tee-based manholes is not considered cradle.

END OF SECTION

SECTION 04200

MASONRY

1 PART 1 GENERAL

1.1 WORK INCLUDED

- A. Concrete Masonry Units
- B. Precast Concrete Items
- C. Mortar
- D. Grout
- E. Joint Reinforcement
- F. Foam Insulation
- G. Flashing

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 82	(1997) Steel Wire, Plain, for Concrete Reinforcement
ASTM A 153	(1982; R 1987) Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 615	(2000) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 90	(2000) Hollow Load-Bearing Concrete Masonry Units
ASTM C 91	(1999) Masonry Cement
ASTM C 270	(2000) Mortar for Unit Masonry
ASTM C 476	(1999) Grout for Masonry
ASTM C 494	(1992) Chemical Admixtures for Concrete
ASTM C 780	(2000) Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry

ASTM E 84	(2000a) Surface Burning Characteristics of Building Material
ASTM E96	(2000) Water Vapor transmission of material
ASTM E119	(2000) Fire Tests for Building Construction and Materials

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS:

A. *SD-50, Samples*

Samples are required for concrete masonry units. For CMU items, samples shall be in sets of two to show typical physical characteristics of the items.

B. *SD-76, Certificates of Compliance*

Certificates of compliance shall attest that concrete masonry units & cementations materials for mortar and grout, joint reinforcement, reinforcement bars for walls, expansion joint materials, and insulating materials meet the requirements specified.

1.4 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered, handled, and stored in a manner to avoid chipping, breakage, and contact with soil or contaminating material. Concrete masonry units shall conform to the moisture content as specified in ASTM C 90 when delivered to the jobsite. Units shall be stored off the ground and protected from inclement weather. Anchors, ties, and joint reinforcement shall be stored in a dry location. Reinforcing bars shall be kept free of loose scale and rust. Cementitious materials shall be delivered in unopened containers plainly marked and labeled with manufacturers' names and brands. Cementitious materials shall be stored in dry, weathertight enclosures or covers. Sand shall be stored in a manner to prevent contamination.

2 PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

Concrete masonry units shall conform to ASTM C 90, Type I, Grade N-I normal weight for hollow-load-bearing units normal weight for solid load-bearing units. Units shall be modular in size and shall include closer, jamb header, and bond-beam units, and special shapes and sizes required to complete the work indicated.

2.2 MORTAR

Mortar shall conform to ASTM C 270, Type M, except as otherwise specified. Mortar mix shall be based on laboratory-proportioned and tested mix. Laboratory testing of mortar shall be in accordance with the preconstruction evaluation of mortar section of ASTM C 780. Mortar mix shall be such that the mortar will develop a minimum laboratory compressive strength of 2500 psi at 28 days. Laboratory proportioned mortar shall be mixed to an initial flow of 100 to 115 percent and shall retain a flow after suction of at least 70 percent when tested for water retention

in accordance with ASTM C 91. Cement shall be of one brand. Aggregates shall be from one source. Accelerating admixture, if used, shall be non-corrosive and chloride free conforming to ASTM C 494, Type C.

2.3 GROUT

Grout unless otherwise specified, shall conform to the requirements of ASTM C 476. Grout shall be laboratory-proportioned for a 2000 psi mix when tested in accordance with design criteria. Test cylinders shall be made and tested accordingly. Grout shall be mixed when it is flowable with a slump of 9 to 11 inches. Fine grout as defined, shall be used to fill spaces when the smallest dimension is 2 inches or less. Course grout as defined, shall be used to fill spaces where the smallest dimension is 2 inches or greater.

2.4 ANCHORS AND TIES

Anchors and ties shall be fabricated without drips or crimps and shall be zinc-coated in accordance with ASTM A 153, Class B-1, B-2, or B-3, as applicable for the size of material coated.

A. Door Anchors

Rigid steel anchors shall be 1-1/4 inches wide by 1/8 or 3/16 inch thick, with ends turned in same directions not less than 3 inches and of length required for the application indicated; however, length between turned ends shall not be less than 24 inches.

2.5 REINFORCING BARS

Reinforcing bars shall be Grade 40 or 60 steel conforming to ASTM A 615. Size shall be as shown. Centering clips or caging devices shall be formed from not lighter than 9 gauge wire and shall be of a design that will prevent displacement of reinforcing steel during construction. Bending of bars shall be as shown.

2.6 INJECTED INSULATION

Foam-in place insulation shall be Tripolymer PRM16 or 105 as manufactured by C.P. Chemical Company. Phone (914)428-2517. Both the "A" component (resin) and "B" component (catalyst) shall bear the manufacturing lot no., date and product description.

Material shall have the following physical properties:

A.	Density	0.8 – 1.3 lb./cubic foot
B.	Compression strength	35 psi
C.	Fire Characteristics	ASTM E-84
	1. Flame spread	5
	2. Smoke	0
	3. Fuel	0
D.	Thermal Conductivity	C-177 @ 75°F K factor of 0.219 BTU in 1 hr-ft ² -°F

- E. Water vapor transmission ASTM E-96 permeability.
- F. Fire hour rating ASTM E-119 – 2 hrs.

2.7 FLASHING

Flashing shall conform to the requirements in Section 07600 SHEET METALWORK, GENERAL.

3 PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Wall sections, types of construction, and dimensions shall be as shown. Masonry shall be laid in running bond and vertical joints shall be kept plumb. Units being laid and surfaces to receive units shall be free of water film and frost. Units shall be laid in a non-furrowed full bed of mortar, beveled and sloped toward the center of the wythe on which the mortar was placed. Units shall be shoved into place so that the vertical joints are tight. Vertical joints of brick and the vertical face shells of concrete masonry units, except where indicated at control and expansion joints, shall be completely filled with mortar. Units that have been disturbed after the mortar has stiffened shall be removed, cleaned and relaid with fresh mortar. Chases and raked-out joints shall be kept free from mortar and other debris. Space around metal door frames and other built-in items shall be solidly filled with mortar as each course is laid. Faces of units in finished areas shall be free from chipped edges or other imperfections detracting from the appearance of the finish work.

A. Surface Preparation

Surfaces on which masonry is to be laid shall be cleaned of laitance and other foreign material and slightly roughened to provide a surface texture with a depth of at least 1/8 inch.

B. Hot Weather Masonry Construction

Masonry erected when the ambient air has a temperature of more than 99 degrees F in the shade and has a relative humidity of less than 50 percent shall be protected from direct exposure to wind and sun during installation and for 48 hours after installation.

C. Cold Weather Masonry Construction

Temperatures of masonry units shall not be less than 40°F when laid and the temperature of the mortar and grout used shall be between 40°F and 120°F. When the ambient temperature is 32°F or less, masonry work under construction shall be protected and maintained at a temperature greater than 32°F during installation and for a period of 24 hours after installation. The proposed method of maintaining the temperature within the specified range shall be submitted for approval prior to implementation.

D. Tolerances

Masonry units shall be laid plumb, level and true to line units within the tolerances specified in TABLE 2; and all corners shall be square unless otherwise indicated.

TABLE 2

Variation from plumb

In adjacent units	1/8 inch
In 10 feet	1/4 inch
In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

Variation from level or grades

In 10 feet	1/8 inch
In 20 feet	1/4 inch
In 40 feet or more	1/2 inch

Variation from linear building lines

In 20 feet	3/8 inch
In 40 feet or more	1/2 inch

Variation from cross sectional dimensions
of columns and walls

Plus 1/2 inch to minus	1/4 inch
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3.2 MIXING OF MORTAR

Mortar shall be mixed in a mechanically operated mortar mixer for at least 3 minutes but not more than 5 minutes. Measurement of ingredients for mortar shall be either by volume or weight. If ingredients are measured by volume, measurement of sand shall be accomplished by the use of a container of known capacity or shovel count based on a container of known capacity. If ingredients are measured by weight, measurement of sand shall be based on the dry weight of sand of 80 pounds per cubic foot. Water shall be mixed with the dry ingredients in sufficient amount to provide a workable mixture which will adhere to the vertical surfaces of masonry units. Mortar that has stiffened because of loss of water through evaporation shall be re-tempered by adding water to restore the proper consistency and workability; mortar that has reached its initial set or that has not been used within 2 hours shall be discarded.

3.3 CUTTING AND FITTING

Wherever possible, full units shall be used in lieu of cut units. Where cut units are required to accommodate the design, cutting shall be done by masonry mechanics using power masonry saws, except that cutting of units in unexposed work may be accomplished with masonry hammers and chisels. Wet-cut units shall be dried to the same surface-dry appearance as uncut units before being placed in the work. Cut edges shall be clean, true, and sharp. Openings to accommodate pipes, conduits, and other accessories shall be neatly formed so that framing or escutcheons required will completely conceal the cut edges. Cutting of webs of hollow units shall be kept to a minimum. Insofar as practicable, all cutting and fitting shall be accomplished while masonry work is being erected.

3.4 JOINTING

Joint widths shall be uniform and such that the specified widths are maintained throughout. Joints in concealed masonry surfaces and joints at top of electrical boxes in wet areas shall be cut flush with the masonry surfaces. All joints shall be tooled slightly concave. Tooling shall be accomplished when mortar is thumbprint hard and in a manner that will compress and seal the mortar joint and produce joints of straight and true lines free of tool marks.

A. Concrete Masonry Unit Joints (Plain face)

Joints in concrete masonry unit construction shall be 3/8 inch wide.

3.5 ANCHORAGE AND JOINT REINFORCEMENT

Spacing of joint reinforcement and type and spacing of anchors shall be as indicated. Joint reinforcement shall be continuous except at expansion or control joints. Splices in joint reinforcement shall be lapped at least 6 inches. Where walls or partitions intersect to form T-sections, the intersecting walls shall be anchored together with rigid steel anchors or joint reinforcement as indicated.

3.6 REINFORCING STEEL

Reinforcing steel shall be cleaned of loose or flaky rust and scale, grease, mortar, or other coating which would tend to reduce bonding of the grout to steel. Steel shall be in place at the time of grouting. The minimum clear distance between bars and masonry units shall be 1/2 inch; and between parallel bars, the minimum clear distance shall be one bar diameter. Reinforcement shall be held in place with centering clips or caging devices. Vertical bars shall be supported near each end and at intermediate intervals not exceeding 192 bar diameters. Horizontal reinforcement shall be set in a full bed of grout. Splices in adjacent bars shall be staggered. Reinforcing bars where spliced shall be lapped a minimum of 40 bar diameters. Welded or mechanical connections shall develop at least 125 percent of the strength of the reinforcement.

3.7 BOND BEAMS

Bond beams shall consist of concrete masonry bond beam units reinforced and filled with concrete as indicated. Bond beams shall be made discontinuous at control joints. Where splices are required, reinforcement shall be lapped a minimum of 40 bar diameters or 24 inches,

whichever is greater. A minimum clearance of 1/2 inch shall be maintained between reinforcement and interior faces of units.

3.8 DISCONTINUOUS WORK

When necessary to temporarily discontinue the work, masonry units shall be stepped back for joining when work resumes. Tothing may be resorted to only when specifically approved. Before resuming work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned. Top of walls exposed to rain or snow shall be covered with nonstaining waterproof covering or membrane when work is not in process. Covering shall extend a minimum of 2 feet down on each side of the wall and be held securely in place.

3.9 FOAM INJECTED INSULATION

Installation of produce shall be through top holes on inside face of building. Material shall be installed by certified craftsmen specifically instructed by proper methods as directed by product manufacturer. Installers must be specifically certified as applicators by manufacturers.

3.10 CLEANING

Mortar daubs or splashings, before setting or hardening, shall be completely removed from masonry unit surfaces that will be exposed or painted. Before completion of the work, all defects in joints of masonry to be exposed or painted shall be raked out as necessary, filled with mortar, and tooled to match existing joints. Masonry surfaces shall not be cleaned, other than removing excess surface mortar, until mortar in joints has hardened. Cleaning shall be accomplished with the use of stiff bristle fiber brushes, wooden paddles, wooden scrapers, or other suitable nonmetallic tools. Masonry surfaces shall be left clean, free of mortar daubs, dirt, stain, and discoloration, including scum from cleaning operations, and with tight mortar joints throughout.

A. Concrete-Masonry-Unit

Concrete-masonry-unit surfaces shall be dry-brushed at the end of each day's work after any required pointing has been done.

END OF SECTION

SECTION 05800
BORING & JACKING
AND COVER PIPE

PART 1 GENERAL

The construction drawings show the details of the cover pipe material.

1.01 RELATED SECTIONS

- A. 01300 - Submittals
- B. 01600 - Material and Equipment

PART 2 PRODUCTS

2.01 STEEL PIPE

- A. Where designated on the construction drawings, the steel pipe shall be fusion welded steel pipe, Grade "B" with no coating. It shall conform to the requirements of ASTM 139. The wall thickness shall be Schedule 40 for pipe up to 4-inches in diameter and 0.250 inch wall thickness for larger sizes, unless railroad specification require a greater thickness. See paragraph 3.06 for diameter of casing required.

2.02 NESTABLE CORRUGATED METAL PIPE

- A. Where corrugated metal pipe is designated in the construction drawings beneath a highway, it shall be nestable and conform to KDOT, Section 810. The gauge shall be as shown on the construction drawings.
- B. Where corrugated metal pipe is designated in the construction drawings beneath the tracks of a railroad, it shall be AREA Specification 146; with bituminous coating, in accordance with AREA Specifications 1413. The gauge shall be as shown on the construction drawings.

2.03 TUNNEL LINER PLATES

- A. Tunnel liner plates where shown on the construction drawings shall be hot dripped galvanized steel of the thickness (gauge) and section modulus shown on the construction drawings. The plates shall be formed from steel meeting the requirements of ASTM 139, Grade "B". Individual liner plates shall be made of one piece of metal, provided with flanges from both longitudinal and circumferential joints. The joints shall have sufficient bolt holes to fully develop the strength of the individual liner plate and so spaced in each liner plate that liner

plates of similar curvature will be interchangeable and readily handled in the tunnel. Liner plates shall be of a design that when bolted together no opening shall exist large enough to permit inflow of granular material. Liner plates will be accurately curved to suit the tunnel cross section and when bolted together, the finished casing pipe shall be full round with the nominal diameter to the neutral axis as specified on the proposal sheets and/or construction drawings. Grouting plugs shall consist of a 2-inch standard half-pipe couplings welded or tapped into a hole in the liner plate and furnished with a cast iron plug for closure. They will be of the same material as the liner plate and furnished with a cast iron plug for closure. The spacing of the grouting plugs will be as specified on construction drawings. Bolts, heads, and nuts shall be square and of the same size.

PART 3 EXECUTION

3.01 INSTALLING COVER PIPE

- A. Cover Pipe shall be installed by the boring method, the jacking method, by trenching or by tunneling as shown on the construction drawings. The Owner will obtain permits for any railroad, State or Federal Highway crossings. The Owner shall coordinate scheduling of construction of crossings with railroads and highway departments and shall pay any charges established by these outside agencies. Special construction requirements defined by railroads or highway departments will be shown on the construction drawings and shall be adhered to by the Contractor. Installation of cover pipe shall not commence without the express permission of the Project Engineer.
- B. The annular space between the cover pipe and the contained carrier pipe shall be filled with grout or with granular materials unless otherwise specified on the construction drawings or approved by the Engineer.

3.02 INSTALLATION BY BORING

- A. Steel pipe shall be installed by the boring method utilizing an auger type boring machine or a machine of such design meeting the individual requirements of the railroad, State or Federal Highway System being crossed. The Contractor shall provide an approach pit, completely sheeted and of sufficient size to operate the boring equipment. The operation of the boring equipment shall be subject to continuous checking by the Project Engineer to insure proper alignment of the cover pipe as installed.

3.03 INSTALLATION BY JACKING

- A. The Contractor will provide an approach pit for the jacking operation, excavated so the jacking face is a minimum of three (3) feet above the pipe. This open face should be shored securely to prevent displacement of the embankment. The pit shall include a backstop of sufficient size to take the thrust of the jack. The guide

rails that support the pipe as it enters the bore shall be accurately placed to line and grade. The entire approach pit shall be sheeted.

- B. Hydraulic or mechanical jacks may be used in this operation. The number of jacks and the capacity of the jacks shall be adequate to complete the operation. A jacking head shall be used to transfer the pressure from the jack and the jacking frame to the pipe. If an auger is used, the pipe shall be jacked simultaneously with the augering. The construction work shall be checked by the Contractor and Project Engineer at frequent intervals to insure proper line and grade of the installation.

3.04 INSTALLATION BY TUNNELING

- A. Care shall be exercised in trimming the surface of the excavated section to a true line and grade with the excavation conforming to the outside of the tunnel as nearly as possible. In the installation of tunnel or shaft liner plates, the amount of unsupported tunnel or shaft wall shall be at a minimum at all times. Excavation ahead of the liner plates will not be permitted. Liner plates shall be placed promptly as excavation permits. Upon completion of any ring of liner plates, bolts shall be retightened in the two (2) rings previously completed. The Project Engineer may direct that the top half of the tunnel excavation be supported by a cutting shield and excavation shall not advance ahead of such support.
- B. The vertical face of the excavation shall be supported, as necessary, to prevent sloughing and at any interruption of the tunneling operation, the heading shall be completely bulkheaded.
- C. Grouting shall follow the excavation and lining of the tunnel or shaft as required to fill all voids outside the tunnel liner plates. Grouting shall be performed prior to or upon completion of the installation of a maximum of four (4) rings, unless otherwise directed by the Project Engineer. Grouting shall start at the lowest hole in each grout panel and proceed upwards progressively and simultaneously, when possible, on both sides of the tunnel. The machine used for grouting shall be capable of forcing grout, under pressure, into all voids.

3.05 MEASUREMENT AND PAYMENT

- A. The payment for installation of cover pipe shall be made on the actual number of lineal feet of the various types and sizes of pipes installed. The unit price per foot for cover pipe shall include furnishing the carrier pipe material and installing the pipe by jacking, boring or tunneling, whichever is required, the construction of the approach pits with all necessary sheeting and all other incidentals required to complete the installation as shown on the construction drawings and herein specified.

3.06 CASING PIPE SCHEDULE (WATER AND SEWER LINES)

Carrier Pipe Nominal Diameter	Minimum I.D. of Casing Pipe for Water and Sewer Lines	Minimum I.D. of Casing Pipe for Vitrified Clay Sewer Lines
PVC, ABS, C.I. & D.I. (B&S)	C.I. & D.I. (M.J.)	
--- IN INCHES ---		
2	4	-
3	9	12
4	10	14
6	12	14
8	16	18
10	18	20
12	20	22
14	22	24
15	24	-
16	26	26
18	28	28
20	28	30
21	30	-
24	34	34
27	38	-
30	42	-
33	45	-
36	48	-
39	54	-
42	57	-

END OF SECTION

SECTION 05801

HORIZONTAL DIRECTIONAL DRILLING REQUIREMENTS

PART 1 - GENERAL

1.1. WORK INCLUDED

The work specified in this section consists of furnishing and installing underground utilities using the Horizontal Directional Drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.

1.2. QUALITY ASSURANCE

The requirements set forth in this document specify a wide range of procedural precautions necessary to insure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.3 SUBMITTALS

- A. **Work Plan:** Prior to beginning work, the Contractor must submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan should include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan should be comprehensive, realistic and based on actual working conditions for this particular project. Plan should document the thoughtful planning required to successfully complete the project.
- B. **Equipment:** Contractor will submit specifications on directional drilling equipment. Equipment shall include but not be limited to: drilling rig, mud system, mud motors (if applicable), down-hole tools, guidance system, rig safety systems. Calibration records for guidance equipment shall be included.

Specifications for any drilling fluid additives that Contractor intends to use or might use will be submitted.

- C. Material: Specifications on material to be used shall be submitted to Engineer. Material shall include the pipe, fittings and any other item, which is to be an installed component of the project.

PART 2 – EQUIPMENT REQUIREMENTS

2.1 GENERAL

- A. The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the core and pull-back the pipe, a drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the crossing, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused, a guidance system to accurately guide boring operations, a vacuum truck of sufficient capacity to handle the drilling fluid volume, trained and competent personnel to operate the system.
- B. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

2.2 DRILLING SYSTEM

- A. Drilling Rig: The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm, which automatically sounds when an electrical current is detected.
- B. Drill Head: The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.
- C. Mud Motors (if required): Mud motors shall be of adequate power to turn the required drilling tools.

- D. Drill Pipe: Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

2.3 GUIDANCE SYSTEM

- A. A Magnetic Guidance System (MGS) or proven gyroscopic system shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at all depths up to one hundred feet and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to $\pm 2\%$ of the vertical depth of the bore hole at sensing position at depths up to one hundred feet and accurate within 1.5 meters horizontally.
- B. The Guidance System shall be of a proven type and shall be operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies on the surface of the drill path and shall consider such influences in the operation of the guidance system if using a magnetic system.

2.4 DRILLING FLUID (MUD) SYSTEM

- A. Mixing System: A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid. Mixing system shall continually agitate the drilling fluid during drilling operations.
- B. Drilling Fluids: Drilling fluid shall be composed of clean water and appropriate clay additive. Water shall be from an authorized source with a pH of 8.5 – 10. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No potentially hazardous material may be used in drilling fluid.
- C. Delivery System: The mud pumping system shall be capable of delivering the drilling fluid at a constant minimum pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and conveyed to the drilling fluid recycling system. A berm, minimum of 12” high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and/or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and recycling facilities.

- D. **Drilling Fluid Recycling System:** The drilling fluid recycling system shall separate sand, dirt and other solids from the drilling fluid to render the drilling fluid re-usable. Spoils separated from the drilling fluid will be stockpiled for later use or disposal.

2.5 OTHER EQUIPMENT

- A. **Pipe Rollers:** Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe.
- B. **Pipe Rammers:** Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.
- C. **Restrictions:** Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

PART 3 – OPERATIONS

3.1 GENERAL

- A. The Engineer must be notified 48 hours in advance of starting work. The directional bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made.
- B. The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract. It shall be the responsibility of Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

3.2 PERSONNEL REQUIREMENTS

All personnel shall be fully trained in their respective duties as part of the direction drilling crew and in safety. A responsible representative who is thoroughly familiar with the equipment and type work to be performed, must be in direct charge and control of the operation at all times. In all cases the supervisor must be continually present at the job site during the actual directional bore operation. The Contractor shall have a sufficient

number of competent workers on the job at all times to insure the directional bore is made in a timely and satisfactory manner.

3.3 DRILLING PROCEDURE

- A. Site Preparation: Prior to any alterations to work-site, Contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to Engineer and one copy to remain with Contractor for a period of one year following the completion of the project. Work-site as indicated on drawings, within right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.
- B. Drill Path Survey: Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If Contractor is using a magnetic guidance system, drill path will be surveyed for any surface magnetic variations or anomalies.
- C. Environmental Protection: Contractor shall place silt fence between all drilling operations and any drainage, wetland, waterway or other areas designated for such protection by contract documents, state, federal and local regulation. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel may not be stored in bulk containers within 200' of any water-body or wetland.
- D. Safety: Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner. Safety meetings shall be conducted at least weekly with a written record of attendance and topic submitted to Engineer.
- E. Pipe: Pipe shall be welded/fused together in one length, if space permits, with welds x-rayed prior to being placed in bore hole. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.
- F. Pilot Hole: Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', Contractor will notify Engineer and Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, Contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a Marsh funnel and then wait another 30 minutes. If mud fracture or return loss continues, Contractor will cease operations

and notify Engineer. Engineer and Contractor will discuss additional options and work will then proceed accordingly.

- G. Reaming: Upon successful completion of pilot hole, Contractor will ream bore hole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.
- H. Pull-Back: After successfully reaming bore hole to the required diameter, Contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel and reamer to compact bore holes. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into bore hole. During pull-back operations Contractor will not apply more than the maximum safe pipe pull pressure at any time. In the event that pipe becomes stuck, Contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, Contractor will notify Engineer. Engineer and Contractor will discuss options and then work will proceed accordingly.

3.4 PIPE TESTING

Following successful pull-back of pipe, Contractor will hydro-test pipe using potable water. A calibrated pressure recorder will be used to record the pressure during the test period. This record will be presented to Engineer. After successful completion of hydro-test, pipe will be pigged dry.

3.5 SITE RESTORATION

Following drilling operations, Contractor will de-mobilize equipment and restore the work-site to original condition. All excavations will be backfilled and compacted to 95% of original density. Landscaping will be subcontracted to a local professional landscaping company.

3.6 RECORD KEEPING, AS-BUILTS

Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of project. As-built drawings shall be completed by the Contractor and certified as to accuracy by Contractor.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Lumber and Sheathing
- B. Preservative Treatment
- C. Accessories and Nails
- D. Manufactured Wood Trusses
- E. Insulation

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN INSTITUTE OF TIMBER CONSTRUCTION (AITC)

AITC-TC Manual (1994) Timber Construction Manual

AMERICAN PLYWOOD ASSN (APA)

APA AFG-01 (Jun 1984) Adhesives for Field-Gluing Plywood to Wood Framing

APA-E-30 (1996) Design/Construction Guide, Residential and Commercial

APA-E-445 (1996) Performance Standards and Policies for Structural-Use Panels

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 307 (2000) Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength

ASTM C 518 (1998) Steady-State Heat Flux Measurements and Thermal Transmission Properties By Means of the Heat Flow Meter Apparatus

- ASTM C 578 (1995) Preformed, Cellular Polystyrene Thermal Insulation
- ASTM D 226 (1997) Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
- ASTM D 2103 (1997) Polyethylene Film and Sheeting

AMERICAN WOOD PRESERVERS' ASSN (AWPA)

- AWPA M4 (1999) The Care of Preservative-Treated Wood Products

AMERICAN WOOD PRESERVERS BUREAU (AWPB)

- AWPA-C1 (2000) All timber products-preservative treatment by pressure process

FEDERAL SPECIFICATIONS (FS)

- FS FF-N-105 (Rev B; Am 3; Int Am 4) Nails, Brads, Staples and Spikes: Wire, Cut and Wrought
- FS HH-I-521 (Rev. F) Insulation Blankets, Thermal (Mineral Fiber, for Ambient Temperatures)
- FS HH-I-558 (Rev B; Am 3) Insulation, Blocks, Boards, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe Fitting Covering, Thermal (Mineral Fiber, Industrial Type)
- FS UU-B-790 (Rev A; Int Am 1) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)

NATIONAL FOREST PRODUCTS ASSN (NFOPA)

- NFOPA-01 (1986; Supple) National Design Specification for Wood Construction
- NFOPA-02 (1988) Manual for Wood Frame Construction

NATIONAL HARDWOOD LUMBER ASSN (NHHLA)

- NHLRM1HC (1994) Rules for the Measurement and Inspection of Hardwood and Cypress Lumber

TRUSS PLATE INSTITUTE (TPI)

ANSI/TPI-1 (1995) Design Specification for Metal Plate Connected Wood Trusses

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 20 (1994 Addenda Jan. 1997) American Softwood Standards

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS:

A. Design Analysis and Calculations

Design analysis and calculations of structural laminated members, fabricated wood trusses, and other fabricated structural members shall show design criteria used to accomplish the applicable analysis.

B. Fabrication/Erection/Installation Drawings

Drawings of structural, fabricated wood trusses and other fabricated structural members shall indicate materials and shop and field erection details including methods of fastening.

C. Certificates of Compliance

Manufacturer's certificates attesting that lumber and material not normally grade marked or exempt from being grade marked meets the specified requirements are required.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in undamaged condition, stored off ground in fully covered, well ventilated areas, and protected from extreme changes in temperature and humidity.

PART 2 - PRODUCTS

2.1 LUMBER AND SHEATHING

A. Grading and Marking

Materials shall bear the grademark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying

marks on material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade species used. Except for structural laminated members, plywood, and lumber; bundle marking will be permitted in lieu of marking each individual piece. Surfaces that are to be architecturally exposed to view shall not bear grademarks, stamps, or other types of identifying marks.

B. Sizes

Lumber and material sizes shall conform to requirements of rules or standards under which produced. Unless otherwise specified, lumber shall be surfaced on four sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

C. Moisture Content

At the time lumber and other materials are delivered and when installed in the work their moisture content shall be as follows:

1. Treated and Untreated Lumber Except Roof Planking: 4 inches or less, nominal thickness 19 percent maximum
2. Roof Planking: 15 percent maximum.
3. Materials Other Than Lumber: In accordance with standard under which product is produced.

D. Structural and Miscellaneous Wood Members

1. Structural Members

Joists, rafters including trussed type, decking, and headers shall have design values of psi in bending for repetitive member uses. Design of members and fastenings shall conform to AITC-TC. Other stress graded or dimensioned items such as blocking; carriages, sleepers and studs shall be standard or No. 2 grade except that studs may be Stud grade.

2. Nonstress Graded Members

Members shall include bridging, corner bracing, furring, grounds, and nailing strips. Members shall be in accordance with TABLE I for the species used. Sizes shall be as follows unless otherwise shown:

Member	Size
Bridging	1 by 3 or 1 by 4 for use between members 2 by 12 and smaller; 2 by 4 for use between members larger than 2 by 12.
Nailing strips	1 by 3 or 1 by 4 when used as shingle base or interior finish, otherwise 2-inch stock.

E. Sheathing

Sheathing shall be plywood, structural-use panels, or wood for roof sheathing.

1. Plywood

Plywood shall conform to NIST PS 1, Grade C-D with exterior glue. Sheathing for roof framing shall have a span rating of 16/0 or greater for supports 16 inches on center and a span rating of 24/0 or greater for supports 24 inches on center.

2. Structural-Use Panels

Panels shall meet the qualification requirements of APA-E445 for rated sheathing, Exposure 1 or Structural I rated sheathing, Exposure 1. Sheathing for roofs or walls without corner bracing of framing shall have a span rating of 16/0 or greater for supports 16 inches on center and shall have a span rating of 24/0 or greater for supports 24 inches on center.

3. Wood

Species and grade shall be in accordance with TABLE I at the end of this section; center-matched, ship lapped, or square edge. Roof sheathing shall be 1-inch thick for supports 16 or 24 inches on center.

2.2 PRESERVATIVE TREATMENT

The treatment of lumber, timber, and plywood shall meet the requirements of AWWA-C1. All products shall bear the appropriate AWWA Quality Mark. The wood shall then be dried to the moisture content specified and marked with the word "Dry." Surfaces of lumber that will be exposed shall not be incised. Exposed areas of treated wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWWA M4. Items of all-heart material of cedar, cypress, or redwood will not require preservative treatment, except when in direct contact with soil. Unless otherwise specified for all-heart material of the previous mentioned species, the following items will always be treated:

1. All wood members set into concrete regardless of location, including flush-with-deck wood nailers for roofs.
2. Nailing strips or nailers used in conjunction with roof systems.

2.3 ACCESSORIES AND NAILS

Accessories and nails shall conform to the following:

A. Adhesive

APA AFG-01

B. Anchor Bolts

ASTM A 307, size as indicated, complete with nuts and washers.

C. Bolts: Lag, Toggle, and Miscellaneous Bolts and Screws

Type, size, and finish best suited for intended use.

D. Clip Angles

Steel, 3/16 inch thick, size best suited for intended use; or zinc-coated steel or iron commercial clips designed for connecting wood members.

E. Expansion Shields

Type and size best suited for intended use.

F. Metal Bridging

Optional to wood bridging; zinc-coated steel, size and design to provide rigidity equivalent to specified wood bridging.

G. Nails and Staples

FS FF-N-105, size and type best suited for purpose. For sheathing and sub-flooring, length of nails shall be sufficient to extend 1 inch into supports. In general, 8-penny or larger nails shall be used for nailing through 1-inch thick lumber and for toe nailing 2-inch thick lumber; 16-penny or larger nails shall be used for nailing through 2-inch thick lumber. Nails used with treated lumber and sheathing shall be galvanized.

H. Timber Connectors

Unless otherwise specified, in accordance with NFOPA-01, TPI-01, or AITC-01.

2.4 PRE-ENGINEERED WOOD TRUSSES

A. Provide all material equipment and labor necessary for the prefabrication, delivery and permanent placement of wood trusses. Provide all the miscellaneous bracing, related items of hardware, metal hangers, anchors and special metal shapes as necessary for proper prefabrication, erection, assembly, supporting and anchoring of the wood trusses.

B. Materials:

1. All wood roof trusses shall be of configurations and spacing as shown on the Drawings and shall be designed to comply with load requirements noted within this section with no allowable increase for short term loading. Trusses shall be as designed by a company which has a minimum of five (5) years experience in truss design and shall be fabricated by a licensed fabricator. Structural wood chord members shall be of machine stress-rated lumber: $f_b' = 1700$ psi (minimum).
2. The design and fabrication criteria of all wood trusses shall meet with "National Design Specifications for Stress Grade Lumber and Fastenings" by National Forest Products Association (latest revision); "Timber Construction Manual" (latest revision), the same as if those specifications and all their references were set out in full herein. All additional loads such as plywood ceiling, light fixtures, insulation, etc. shall be included.
3. All lumber used for truss members shall conform to the published stress ratings for the species and grades as set out in the official grading rules of the appropriate lumber association or as this specification, or notes on the plans or truss engineering designs shall be applicable, and information stated or shown in one shall be applicable, the same as if, in all of them. The moisture content of all lumber shall be within the proper limits, as stated in the referenced specifications, but shall not, in any case, exceed 19 percent nor be less than seven (7) percent at the time of fabrication.
4. All truss connector plates shall be manufactured from only prime commercial quality galvanized sheet steel of not less than 20 gauge, minimum ultimate tensile strength of 48,000 psi. The corrosion resistant coating shall be 1.25 ounce per square foot commercial class hot dipped galvanized before stamping. The connectors shall have a series of nail-like projections which are design to separate the fibers of the wood into which they are pressed in accordance with accepted nailing practices.

C. Engineering and Shop Drawings:

1. All truss designs shall bear the name, seal, and registration number of a Professional Engineer licensed in Kentucky.
2. Engineering and shop drawings shall contain the following data for each truss type:
 - a. Design and fabrication data: Pitch, span, spacing of trusses.
 - b. Metal Connectors: Nominal sizes and locations of connectors at all joints.
 - c. Lumber Specifications: Species and stress grades of lumber to be used as members.
 - d. Design loading of trusses and allowable stress increase.
 - e. Force analysis or bar forces in each member.
 - f. Truss bearing supports: Sizes and location at each varying condition.
 - g. Camber.
 - h. Permanent bracing and/or bridging as required to prevent compression buckling of individual truss members only.
 - i. Handling and erection instructions.
3. Submit six (6) copies of each truss design and shop drawings to the Engineer for approval prior to the fabrication of any components.
4. Truss type configuration shown on the Drawings describe spans, slopes and general conditions only and do not relieve the fabricator of the responsibility of providing proper engineering and members of appropriate size to resist all imposed loads and stresses.

D. Fabrication

1. All trusses and other roof structural components shall be fabricated in a properly equipped manufacturing facility of a permanent nature. They shall be manufactured by experienced workmen, using precision cutting and truss fabricating equipment, under the direct supervision of a qualified foreman. All trusses shall be fabricated under strict rules of inspection and quality control as the local code may require, open to the inspection of the Engineer or his representatives at all times.
2. All truss members shall be accurately cut to length, angle and be true to line to assure tight joints for finished truss.
3. All truss members and connector plates shall be properly placed in special jigs and the members tightly clamped in place, remaining in that position until the connector plates have been pressed in the lumber simultaneously on both sides of the joints.
4. Camber shall be built into the trusses, as noted on the engineering truss designs, by properly positioning the members in the fabricating jig.

E. Handling and Erection

1. Fabricated trusses shall be handled with care so that they are not subject to damage. If the trusses are to be stockpiled or stored prior to erection, they shall be set in a vertical position, resting upon temporary bearing supports and braces so that they will be subjected to no unusual bending or tipping over. Any trusses damaged during handling or erection shall be removed from the job site and new replacement trusses shall be fabricated.
2. Contractor shall provide temporary and permanent bracing at three (3) locations on the trusses: bottom chord, web members, and top chord. Temporary bracing may remain in place as permanent bracing if these instructions are followed and if nailed so the nails are loaded laterally not in withdrawal.
 - a. Bottom Chord Plane: Install continuous lateral bracing across the entire width of the building and perpendicular to the trusses. The first brace shall be located at and parallel to the end line of the truss span. Additional bracing shall be located parallel to the first brace and at 8'-0" to 10'-0" intervals. These shall be nailed to the top side of the bottom chord and shall overlap at least two trusses where connected. One complete bay of diagonal bracing shall be applied at the front and the extreme rear. This bracing shall be at approximately 45 degrees to the lateral bracing and run between the bearing wall and nearest lateral brace.
 - b. Web Member Plane: Install bracing on all web members as shown on truss shop drawings. Additional braces shall be nailed to these web members and at approximately 45 degree angles to the web members. Diagonal braces shall be between 12'-0" and 16'-0" in length and shall be repeated at approximately 20'-0" intervals along the spacing of the trusses.
 - c. Top Chord Plane: Top chords will be sufficiently braced when plywood roof sheathing is properly installed. Temporary erection bracing shall be applied as required.
 - d. Minimum size for diagonal and lateral wood braces shall be 2 x 4, with a minimum of two (2) 16d at the junction of each brace and each truss member.
 - e. All wood truss bracing shall conform to the Truss Plate Institute BWT-76.
 - f. The erection and handling of wood trusses shall be in accordance with Truss Plate Institute HET-80.
 - g. Erection bracing shall be installed to hold the trusses true and plumb and in safe condition until permanent truss bracing and bridging can be solidly nailed in place to form a structurally sound roof framing system. All components to be permanently fastened before the application of any loads.

F. Loading

1. Live load for snow shall be 30 pounds per square foot with no increase for short term loading.
2. Wind loading for uplift design for 90 mph.

2.5 INSULATION

A. Thermal resistance of insulation shall be not less than the R-values shown. R-values shall be determined at 75 degrees F in accordance with ASTM C 518. Insulation shall be the standard product of a manufacturer and factory marked or identified with manufacturer's name or trademark and R-value. Identification shall be on individual pieces or individual packages. Use insulation of this type when specified on documents:

1. Batt or Blanket

Mineral fiber, FS HH-I-521, Type I, Type II, Class C, width as required for wood construction.

2. Rigid Insulation

Polystyrene, ASTM C 578.

Mineral fiber, FS HH-I-558, Form A, Class 1.

Polyurethane or polyisocyanurate, FS HH-I-1972/GEN ASTM C 726.

2.6 VAPOR RETARDER

Vapor retarder shall be building paper conforming to FS UU-B-790, Type I, Grade D, style optional; asphalt-saturated felt conforming to ASTM D 226, Type I; or polyethylene sheeting conforming to ASTM D 2103, 6 mil thick.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS

A. General

Members shall be closely fitted, accurately set to required lines and levels, and rigidly secured in place. Nailing shall be in accordance with the recommended Nailing Schedule as contained in NFOPA-02. Where detailed nailing requirements are not specified, nail size and nail spacing shall be sufficient to develop an adequate strength for the connection without splitting the members. Installation of timber connections shall conform to applicable requirements of NFOPA-01. Members shall be framed for passage of ducts and pipes shall be cut, notched, or bored in accordance with applicable requirements of NFOPA-02.

Rafters, purlins, and joists shall be set with crown edge up. Leveling of joists, beams, and girders on masonry or concrete shall be with slate or steel; on wood or metal leveling shall be without shims.

B. Structural Members

Members shall be adequately braced before erection. Members shall be aligned and all connections completed before removal of bracing.

C. Roof Truss Brg. Plate

Wood plates shall be anchored using A.B. as detailed on plans.

D. Roof Framing

Provide end gable trusses covered with one half inch thick plywood sheathing. Set truss where exterior edge of truss aligns with outside of masonry wall. Set infill trusses according to documents.

E. Bridging

Wood bridging shall have ends accurately bevel-cut to afford firm contact and shall be nailed at each end with two nails. Metal bridging shall be installed as recommended by the Engineer. The lower ends of bridging shall be driven up tight and secured before ceiling sheathing has been installed.

F. Blocking

Blocking shall be provided as necessary for application of roof, sheathing, and ceiling sheathing, and other materials or building items, and to provide fire stopping. Blocking shall be cut to fit between framing members and rigidly nailed thereto.

G. Nailers and Nailing Strips

Nailers and nailing strips shall be provided as necessary for the attachment of finish materials. Nailers used in conjunction with roof deck installation shall be installed flush with the roof deck system. Stacked nailers shall be assembled with spikes or nails spaced not more than 18 inches on center and staggered. Beginning and ending nails shall not be more than 6 inches for nailer end. Ends of stacked nailers shall be offset approximately 12 inches in long runs and alternated at corners. Anchors shall extend through the entire thickness of the nailer. Strips shall be run in lengths as long as practicable, butt jointed, cut into wood framing members when necessary, and rigidly secured in place.

3.2 INSTALLATION OF SHEATHING

A. Plywood and Structural-Use Panels

Sheathing shall be applied with edges 1/8 inch apart at side and end joints, and nailed at supported edges at 6 inches on center and at intermediate supports 12 inches on center. Nailing of edges shall be 3/8 inch from the edges. Roof sheathing shall be applied with long dimension at right angles to supports, end joints made over supports, and end joints staggered.

3.3 INSTALLATION OF INSULATION

Insulation shall be installed after construction has advanced to a point that the installed insulation will not be damaged by remaining work. For thermal insulation the actual installed thickness shall provide the R-values shown. For acoustical insulation the installed thickness shall be as shown. Insulation shall be installed on the weather side of such items as electrical boxes and water lines. Unless otherwise specified, installation shall be in accordance with the manufacturer's recommendation.

END OF SECTION

SECTION 07000

THERMAL AND MOISTURE PROTECTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Roofing (Fiberglass shingles).
- B. Insulation.
- C. Caulking.
- D. Fascia, soffit and guttering.
- E. Damp-proofing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Fiberglass base shingles, 235#/sq., 12" x 36" class A fire rating.
- B. Batt insulation shall be R-30, as indicated on the drawings. Fiberglass Blanket or Blowing Insulation installed above the drywall ceiling in accordance with manufacturer's recommendations. Manufacturers: Owens-Corning Fiberglass Corporation.
- C. Caulking compound; conform to Federal Specification for Plastic Caulking Compounds, TT-C-598. Caulking primer by manufacturer of the caulking compound.
- D. Aluminum fascia shall be provided with factory baked-on finish. (Pre-Formed or Site Formed with hemmed edge.)
- E. Aluminum soffit material shall be pre-formed, perforated with factory baked-on finish.
- F. Guttering shall be continuous pre-formed with mitered corners (sealed watertight) and factory baked-on finish.

- G. Transparent exterior damp-proofing shall be Minwax colorless compound, as manufactured by Minwax Company, 11 West 42nd Street, New York, New York or White Roc 10 as manufactured by Sonneborne or Aqua Repel 91 by Karnak Chemical Corporation or approved equal. After all masonry work has been completed, cleaned, pointed and thoroughly dried, apply one coat of transparent exterior water proofing over the entire exterior masonry surfaces. This must be applied in accordance with manufacturer's specifications.

2.02 INSTALLATION

- A. Place roofing and fascia in accordance with manufacturer's directions
- B. Install insulation with vapor barrier toward conditioned side of space and attach per manufacturer's recommendations.
- C. Clean all joints of dirt, oil or other foreign matter. See that all surfaces are dry. Apply primer with brush as it comes in container. Apply calking compound with hand tool or gun; point flush with joint faces and remove excess material.
- D. Install aluminum fascia, soffit material and guttering per manufacturer's recommendations. Use nails same color as aluminum material being attached.
- E. Before beginning work, the damp-proofing subcontractor shall inspect surfaces to receive the damp-proofing and shall notify the Engineer in writing of any serious defects or conditions that will interfere with, or prevent a satisfactory installation. The beginning of application work shall imply acceptance of the surfaces. Surfaces to be damp-proofed, shall be cleaned free of dust, dirt, grease, paint, smears, etc. Caulk and point large cracks, open holes, joints, around pipes, etc. Surfaces shall be dry at time of application of damp-proofing.

END OF SECTION

SECTION 08000

DOORS & FRAMES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Doors and frames.
- B. Metal thresholds.
- C. Weather-stripping.
- D. Hardware (including locksets).

PART 2 - PRODUCTS

2.1 MATERIALS AND INSTALLATION

- A. Metal doors and frames.
 - 1. Exterior metal doors shall be constructed of two, formed cold rolled, galvanized steel sheets, No. 18 U.S. Standard Gauge metal, rigidly connected and reinforced, 1-3/4" thick, manufacturers' standard flush type product. Mortise, reinforce and drill for hardware. Fill with insulating material held firmly in place. Allow clearance of all sides for weather-stripping and threshold. Apply shop coat of baked on metallic primer. Size as shown on drawings. Out swinging door to have top cap.
 - 2. Hollow metal door frames shall be standard product of door manufacturer. Cold rolled, 16 U.S. Standard Gauge steel; integral stops and rabbets, head and jamb mitered, welded and ground smooth. Provide wall anchors at each jamb; sill anchors; mortise, reinforce and drill for hardware. Apply shop coat of Tnemec Series 37H77 Chem Prime. Provide spreaders to insure proper alignment. Size according to drawings and install in accordance with manufacturer's instructions, plumb and true with all hardware in proper working order.
- B. Metal Thresholds.
 - 1. Non-ferrous metal, manufacturer's standard product suitable for use with type of weather-stripping approved for Engineer.
 - 2. Set in mastic. Attach to concrete sill.

C. Metal Weather-stripping on Doors.

1. For top and both sides; non-ferrous metal, spring or interlocking type, approved by the Engineer as suitable for installation in geographical location of building. Attach to doors and/or frames in accordance with manufacturer's directions.
2. For bottom of doors; non-ferrous metal, or neoprene or vinyl, designed specifically for use with threshold selected.

D. Hardware.

1. Hinges for exterior doors; full mortise 4½" x 4¼" template steel butts; two ball bearings; 2 pair, manufacturer's standard product.
2. Cylinder locksets for exterior doors; provided by Contractor. (Latch bolt operated by knobs each side. Dead bolt operated by key from outside and turn knob from inside) to be provided by Contractor.
3. Coordinate keying with Owner.
4. Door closures shall be surface mounted, liquid checking, rack and pinion type; cast iron or non-ferrous case; non-gumming, non-evaporative liquid unaffected by extreme temperatures; without hold-open feature; manufacturer's standard product suitable for use on a doors as indicated on drawings.
5. Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Stops to match existing where possible.

E. Hardware Mounting Heights.

1. Mount hardware units at heights recommended in "Recommended Locations for Builders' Hardware" by NBHA, except as may be otherwise directed by the Engineer.
2. Installation: Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware into or onto surfaces which are later to be painted or finished in another way, install each item completely and then remove and store in a secure place during the finish application. After completion of the finishes reinstall each item. Do not install surface mounted items until finishes have been completed on the substrate. Adjust and check each operating item of hardware and each door, to insure proper operation or function of every unit. Lubricate moving parts with type lubrication recommended by manufacturer (graphite-type if not other recommended). Replace units which cannot be readjusted and lubricated to operate freely and smoothly as intended for the application made.

F. Manufacturer.

Numbers given in schedule are of the following manufacturers:

<u>Mfg. Product</u>	<u>Specified</u>	<u>Acceptable Substitutes</u>
Hinges	Hager	McKinney; Stanley
Locks	Yale	
Mortise Bolts	Trimco	Baldwin; Ives
Closers	LCN	Norton
Thresholds	National Guard	Reese, Rixon, Zero
Weather-stripping	National Guard	Reese, Stanley
Door Stops	Glynn Johnson	Ives, Trimco

G. Hardware Schedule

Set 1:

3 ea.	Hinge	BB1191NRP 4.5 x 4.5 26D
1 ea.	Lockset	CA 5407 x US26D
1 ea.	Closer	4114 - 1
1 ea.	Door Stop	GJFB 19
1 ea.	Threshold	883 x 36" x WS & PS
1 ea.	Weather-strip	PF181 x 17'

END OF SECTION

SECTION 09900

PROTECTIVE COATINGS AND PAINTING
PUMP STATIONS AND VALVE VAULTS

PART 1 - GENERAL

- A. The Contractor shall furnish all labor and materials to complete preparation of surfaces, protective coating application, painting and complete clean up of all new materials. Included in this work are concrete, masonry, metal and wood as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS AND APPLICATION

- A. The paint and paint products shall be Tnemec. Substitutions are not allowed. Should there be questions about coating application by the Project Engineer or his representatives the Engineer shall request the Contractor to conduct tests to determine the final film thickness. Cost of tests to be by Contractor.
- B. If thinning is necessary or desired for any application, the coating applied shall be built up to the same thickness specified with undiluted material. When thinning is desired, approval and inspection by the Project Engineer is required. When thinning is approved, only those products of the manufacturer supplying coating, for the particular thinning purpose shall be permitted. Thinning shall be done strictly in accordance with the manufacturer's instruction.
- C. Paint and coating shall be applied to substances with ambient and substrate temperature no less than five (5)°F above those temperatures recommended by the paint manufacturer. Paint and coatings shall not be applied if relative humidity exceeds 85%.
- D. ALL SURFACES SHALL BE PREPARED SO THEY ARE SMOOTH, CLEAN AND DRY. PAINT SHALL NOT BE APPLIED UNTIL THE PREPARED SURFACES ARE APPROVED BY THE PROJECT ENGINEER.

Surface preparation methods in the field shall include one or more of the following:

Sand Blasting (dry) SSPC-10	Solvent Cleaning
Brush Blasting	Power Tool Cleaning
Wet Sand Blasting	
Detergent Cleaning	
Galvanized Metal - Trisodium phosphate with water	

Approval of the surface preparation method shall be as directed by the Project Engineer subsequent to inspection of such substrate.

- E. All ferrous metal to be primed in the shop shall have all rust, dust and scale, as well as all other foreign substances, removed by sandblasting. Cleaned metal shall be primed immediately after cleaning to prevent new rusting. All ferrous metals not primed in the shop shall be sandblasted in the field prior to the application of the primer, pre-treatment or paint. Ferrous metal portions of stored equipment shall have all rust, dust and scale, as well as all other foreign substances removed by sandblasting. The aforementioned sandblasting shall be SSPC- 10 specification. All metals, whether to be shop or field primed, shall be wiped with a tack rag as required by the Project Engineer, prior to the application of the pre-treatment and/or primer.
- F. All concrete surfaces shall be cleaned of all dust, form oil, curing compounds and materials added while rubbing and other foreign matter. Concrete block masonry shall have all efflorescence, dirt, rust, oil and grease removed. Prior to applying the first coat, any nails, wire or other exposed metal shall be cleaned and spot primed.
- G. Wood surfaces shall be thoroughly cleaned and free of all foreign matter with cracks, nail holes and other defects properly filled with putty, colored to match the approved finish and smoothed. Knots and pitch streaks shall be sealed before applying primer. Sanding with the grain of the wood shall be done to effect a finish and then wiped clean with tack rags and thinner.
- H. Drying time between coats shall be in strict accordance with the paint manufacturer's detailed instructions.
- I. One (1) gallon of coating as originally furnished by the manufacturer, must not cover a greater square foot area than instructed by the manufacturer's label, no matter what method of application is chosen. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. On masonry, application rates will vary according to the surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the contractor's responsibility to achieve a protection and decorative finish either by decreasing the coverage rate or by applying additional coats of paint. When non-ferrous substrates are coated, the contractor shall inform the Project Engineer in writing and twenty-four (24) hours in advance to assure the quantity of coating applied to a given substrate.
- J. The Contractor shall paint all new equipment and piping with a finish coat.
- K. All existing structures, equipment, and piping which is to remain on-site will be prepared as stated previously and repainted with new structures, equipment, and piping. Existing paint and rust is to be removed and the surfaces inspected by the Project Engineer before new primer and paint is applied.

PART 3 - EXECUTION

3.01 PROTECTION AND CLEANING

- A. Before painting is started in an area, finish carpentry including corrections and adjustments, shall have been completed, the building cleaned of all debris, thoroughly broom cleaned and dusted out.
- B. Door knobs and escutcheons, before painting is begun, shall be protected either by covering them with cloth or by removal from the doors. Electrical switch plates, receptacle covers and thermostat covers shall be removed prior to the application of paint. These covers shall not be replaced until the final coat of paint is thoroughly dry and inspected. All paint spills and splatters shall be removed, and care must be exercised to avoid paint splatters on adjoining work and materials. At the completion of the painting, all unpainted work must be left free from paint marks of any kind and any markings or scratches on painted work shall be retouched.
- C. All abutting joints of dissimilar materials, door frames, metal and plastic attached to and installed in concrete, as well as other seams and joints selected by the Project Engineer, shall be caulked as per Project Engineer.

3.02 WORKMANSHIP

- A. Before commencing work on surfaces of any type, the Contractor shall carefully inspect same and satisfy that they are dry and in all other respects suitable to receive the specified treatment. If the condition of any surface is such that it cannot be made, the Contractor shall not undertake surface preparation until corrections have been made which will provide acceptable surface.
- B. Application of any coating to a surface will constitute acceptance of the surface by the Contractor. If, after treatment, the completed finish (or any portion thereof) blisters, cracks, peels or otherwise shows indication of dampness or other irregular conditions or surface, the Contractor shall, at his own expense, remove the applied treatment and refinish the part affected, to the satisfaction of the Project Engineer. The Contractor shall determine dryness of all moisture-holding materials by use of a reliable electronic moisture meter. Moisture test results shall be forwarded to the Project Engineer in writing.
- C. Each coat of material applied must be inspected and approved by the Project Engineer before the application of the succeeding specified coat; otherwise, no credit for the concealed coat will be given, and the Contractor shall assume the responsibility to re-coat the work in question.
- D. All work shall be done by skilled painters and all workmanship shall be of the highest quality, developing to the fullest the possibility of the materials and the process

specified.

- E. Materials shall be thoroughly stirred and evenly spread without runs, skips, sags, streaks, brush marks or other defects. Paint shall be cut sharply to lines. Care shall be exercised to avoid lapping of paint over hardware.
- G. Tops and bottoms of all metal doors shall have at least three (3) finish coats.
- H. All materials which have been shop-primed shall be properly prepared and spot primed in the field where necessary, before the field prime coat is applied.
- I. All equipment which arrives with a damaged finish coat will be spot primed and then patched, if homogeneity can be achieved, or it must be repainted completely. Any like equipment shall also be re-painted to match the newly repainted equipment, as determined by the Project Engineer. The color shall be similar to the original color, as determined by the Project Engineer. Field painting must match the original paint system.

3.03 MASONRY AND CONCRETE SEALING

After proper surface preparation, concrete work not painted shall be given one (1) coat of water sealing material. This material shall be Tnemec Prime A Pell 200 or equal.

3.04 FERROUS METAL PRIMERS

- A. Pipe, valves and appurtenances not buried in the ground shall be shop-primed with Tnemec 37-77 Chem Prime or equal at a minimum rate of 2.0 - 3.0 mils dry film thickness. Field prime coating shall be Tnemec high build epoxy 66 or equal applied at 2.0 - 3.0 mils dry film thickness. No coating shall be applied until proper surface preparation is completed.
- B. Buried pipes, valves and appurtenances shall be shop-primed with Tnemec 37-77 Chem Prime or equal, 2.0 - 3.0 mils dry film thickness. No coating shall be applied until proper surface preparation is completed.

3.05 FERROUS METAL FINISH COATING

In addition to the above primers, the Contractor shall complete the following:

- A. Pipe, valves and appurtenances not buried in the ground and not exposed to direct (outdoors) sunlight shall be given a field finish coat of Tnemec high build epoxy 66 or equal system at 3 mils dry film thickness. No coating shall be applied until proper preparation is completed. Pipes, valves and appurtenances installed outdoors shall be finished as outlined for non-submerged ferrous material.

- B. Buried pipes, valves and appurtenances shall be given two (2) field finish coats of Tnemec 46-413 coal tar epoxy or equal at the rate of 8.0 mils dry thickness per coat. No coating shall be applied until proper surface preparation is completed.

3.06 PIPING MARKERS AND SAFETY SIGNS

- A. The piping markers shall be formed from laminated plastic capable of withstanding normal washing to remove grease, oil, chemicals, etc. without discoloration, loss of gloss, staining, or other damage. All printing shall be sealed with butyrate plastic film. For pipe smaller than 3/4-inch in diameter, provide brass tags 1-1/2 inches in diameter with depressed 1/4-inch black-filled letters above 1/2-inch high black filled letters. Markers for pipe 3/4-inch to 6 inches in diameter, inclusive, shall be pre-formed to completely wrap around the pipe requiring no adhesives. Markers for pipe larger than 6 inches in diameter shall be pre-formed to the contour of the pipe and held in place with stainless steel spring fasteners. The size of lettering on each marker shall conform to ANSI A13.1. Each marker shall contain a descriptive legend as shown in the Pipe and Sign Color Schedule and a flow direction arrow.
- B. The markers shall be located adjacent to each valve and "tee", at each branch and riser takeoff, at each wall, floor and ceiling penetration, and at 25-foot intervals of horizontal piping. Manufacturers shall be the W.H. Brady Company, Seton Name Plate Corporation, or approved equal.

3.07 PAINTING SCHEDULE

- A. The following table lists the type of surface, generic coating, type of coating and the minimum coats of paint. The Owner will select colors to be used on this project relating to pump house structure. All piping colors are established by ANSI.

B. PAINT SCHEDULE AT PUMP HOUSE

TYPE OF SURFACE	GENERIC TYPE	NO. OF COATS	MIN. DRY, MILS. THICK PER COAT REFERENCE	TNEMEC PAINT NO.	TNEMEC PRIMER NO.
CMU Exterior & Interior	Waterborne acrylic epoxy	1	4		Series 113 Tnemec tufcoat
CMU Exterior & Interior	Waterborne acrylic epoxy	2	4 per coat	Series Tenemec Tufcoat	
Plywood & other interior wood surfaces	Primer.	1	2		Series 36 undercoat
	Finish.	2	2 per coat	Series 113 Tenemec Tufcoat	
Ferrous Metal Door Frames & HM Doors	Primer	1	2		Series 66
	Finish	2	2 per coat	Series 73, 74 or 75 Endura Shield	
Alum. Gutter & Dwn. Spouts					

PIPE AND SIGN COLOR SCHEDULE

PIPE AND
DESCRIPTIVE
LEGEND

LEGEND	COLOR	LETTERING COLOR	BACKGROUND COLOR
Potable Water	Blue SC06	Black	Green
Conduit	To Match Wall or Ceiling	N/A	N/A

3.08 COATING PROCEDURES

- A. All coating work shall meet the requirements of the coating manufacturer.
- B. All surfaces to be coated shall be in the proper condition to receive the specified coatings before any coatings are applied. Round off all sharp edges and rough welds. Remove all burrs and weld spatter. Remove oil, grease and heavy deposits of surface contaminants by solvent or detergent cleaning. All surfaces shall be clean, dry and free of any dirt, dust, grease, oils, salts, and other deleterious substances before coatings are applied.
- C. Whatever metal is cleaned during a working day shall be coated with primer on the same working day.
- D. Coat all interior and exterior weld seams surfaces by the brush method on field prime coat and field intermediate coats.
- E. Coatings shall be applied in such a manner to produce as uniform a thickness of coat and as complete a coverage as possible, free of lap marks.
- F. Each coat shall have air drying period of at least 24 hours.
- G. The dry film thickness specified shall be obtained. Additional coats shall be applied at the Contractor's expense, if required to achieve the specified dry film thickness.
- H. Only good, clean brushed and equipment shall be used. Clean all brushed, rollers, buckets and spray equipment at the end of each coating period.

END OF SECTION

SECTION 11010

WATER BOOSTER PUMPING STATION

PART I – GENERAL

1.1 WORK INCLUDED

A. Variable Speed Packaged Pumping System

1.2 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

- A. Hydraulic Institute
- B. ANSI – American National Standards Institute
- C. ASTM – American Society for Testing and Materials
- D. IEEE – Institute of Electrical and Electronics Engineers
- E. NEMA – National Electrical Manufacturers Association
- F. NEC – National Electrical Code
- G. ISO – International Standards Organization
- H. UL – Underwriters Laboratories, Inc.

1.3 RELATED SECTIONS

- A. 01300- Submittals
- B. 01600 - Material and Equipment
- C. 04200 - Masonry
- D. 06100 – Rough Carpentry
- E. 07000 - Thermal and Moisture Protection
- F. 08000 – Doors & Frames
- G. 09900 – Protective Coatings and Painting

PART 2 – PRODUCTS

2.1 OPERATING CONDITIONS

- A. The pump station shall be capable of delivering the fluid medium at the following capacities and heads when operating as follows:

GRASSY PUMP STATION

PUMP #1 & #2

Design GPM 57 @ 479 feet TDH;
 Maximum GPM 65 @ 350 feet TDH;
 Maximum discharge pressure 670 feet;
 Efficiency at design GPM 70%;
 NPSH requirements shall not exceed 10 feet
 at design GPM. Motor to be 15 h.p.

SR 1482 PUMP STATION

PUMP #1 & #2

Design GPM 75 @ 274 feet TDH;
 Maximum GPM 120 @ 175 feet TDH;
 Maximum discharge pressure 335 feet;
 Efficiency at design GPM 70%;
 NPSH requirements shall not exceed 10 feet
 at design GPM. Motor to be 10

- B. Furnish and install a pre-fabricated and tested variable speed packaged pumping system to pump to water storage tanks.
- C. The packaged pump system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed and built by the same manufacturer.
- D. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. and Canadian Standards.

2.2 PUMPS

- A. All pumps shall be ANSI/NSF 61 approved for drinking water.
- B. The pumps shall be of the in-line vertical multi-stage design.
- C. The head-capacity curve shall have a steady rise in head from maximum to minimum flow within the preferred operating region. The shut-off head shall be a minimum of 20% higher than the head at the best efficiency point.
- D. Small Vertical In-Line Multi-Stage Pumps (Nominal flow from 3 to 125 gallons per minute) shall have the following features:

1. The pump impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement.
2. The suction/discharge base shall have ANSI Class 250 flange or internal pipe thread (NPT) connections as determined by the pump station manufacturer.
3. Pump Construction.
 - a. Suction/discharge base, pump head, motor stool: Cast iron (Class 30)
 - b. Impellers, diffuser chambers, outer sleeve: 304 Stainless Steel
 - c. Shaft: 316 or 431 Stainless Steel
 - d. Impeller wear rings: 304 Stainless Steel
 - e. Shaft journals and chamber bearings: Silicon Carbide
 - f. O-rings: EPDM

Shaft couplings for motor flange sizes 184TC and smaller shall be made of cast iron or sintered steel. Shaft couplings for motor flange sizes larger than 184TC shall be made of ductile iron (ASTM 60-40-18).

Optional materials for the suction/discharge base and pump head shall be cast 316 stainless steel (ASTM CF-8M) resulting in all wetted parts of stainless steel.

4. The shaft seal shall be a balanced o-ring cartridge type with the following features:
 - a. Collar, Drivers, Spring: 316 Stainless Steel
 - b. Shaft Sleeve, Gland Plate: 316 Stainless Steel
 - c. Stationary Ring: Silicon Carbide
 - d. Rotating Ring: Silicon Carbide
 - e. O-rings: EPDM

The Silicon Carbide shall be imbedded with graphite.

5. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling and motor. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.

2.3 VARIABLE FREQUENCY DRIVES (Panel Mount)

The VFD shall convert incoming fixed frequency single-phase or three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.

- The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load.
- The VFD shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.
- The VFD shall utilize an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.
- VFD shall automatically boost power factor at lower speeds.
- The VFD shall be able to provide its full rated output current continuously at 110% of rated current for 60 seconds.
- An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation.
- Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.
- Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.
- The VFD shall have temperature controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.
- VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to -15% of the rated input voltage.
- The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. VFD's without a DC link reactor shall provide a 5% impedance line side reactor.
- VFD to be provided with the following protective features:
1. VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec.
 2. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
 3. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.
 4. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature

shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.

5. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. Speed can be reduced, but not stopped.
6. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.

VFD to be provided with the following interface features:

1. VFD shall provide an alphanumeric backlit display keypad, which may be remotely mounted using standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
2. VFD shall display all faults in plain text; VFD's, which can display only fault codes, are not acceptable.
3. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.
4. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.
5. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
6. A start guide menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning.
7. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
8. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
9. There shall be three programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. An additional digital input is preprogrammed for start/stop.
10. The VFD shall have two analog signal inputs. One dedicated for sensor input and one for external set point input.
11. One programmable analog output shall be provided for indication of a drive status.
12. The VFD shall provide two user programmable relays with selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.

13. The VFD shall store in memory the last 5 faults with time stamp and recorded data.
14. The VFD shall be equipped with a standard RS-485 serial communications port for communication to the multi-pump controller. The bus communication protocol for the VFD shall be the same as the controller protocol.

VFD service conditions:

7. Ambient temperature operating range, -10 to 45°C (14 to 113°F).
8. 0 to 95% relative humidity, non-condensing.
9. Elevation to 1000 meters (3,300 feet) without derating.
10. VFD's shall be rated for line voltage of 525 to 690VAC, 380 to 480VAC, or 200 to 240VAC; with +10% to -15% variations. Line frequency variation of \pm 2% shall be acceptable.
11. No side clearance shall be required for cooling of the units.

2.4 PUMP SYSTEM CONTROLLER

- A. The pump system controller shall be a standard product developed and supported by the pump manufacturer.
- B. The controller shall be microprocessor based capable of having software changes and updates via personal computer (notebook). The controller user interface shall have a VGA display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
- C. The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
- D. The controller shall display the following as status readings from a single display on the controller (this display shall be the default):
 - Current value of the control parameter, (typically discharge pressure)
 - Most recent existing alarm (if any)
 - System status with current operating mode
 - Status of each pump with current operating mode and rotational speed as a percentage (%)
- E. The controller shall have as a minimum the following hardware inputs and outputs:
 - Three analog inputs (4-20mA or 0-10VDC)
 - Three digital inputs

- Two digital outputs
 - Ethernet connection
 - Field Service connection to PC for advanced programming and data logging
- F. Pump system programming (field adjustable) shall include as a minimum the following:
- Water shortage protection (analog or digital)
 - Transducer Settings (Suction and Discharge Analog supply/range)
 - PI Controller (Proportional gain and Integral time) settings
 - High system pressure indication and shut-down
 - Low system pressure indication and shut-down
 - Low suction pressure/level shutdown (via digital contact)
 - Low suction pressure/level warning (via analog signal)
 - Low suction pressure/level shutdown (via analog signal)
 - Flow meter settings (if used, analog signal)
- G. The system controller shall be able to accept up to seven programmable set-points via a digital input, (additional input/output module may be required).
- H. The controller shall have advanced water shortage protection. When analog sensors (level or pressure) are used for water shortage protection, there shall be two indication levels. One level is for warning indication only (indication that the water level/pressure is getting lower than expected levels) and the other level is for complete system shut-down (water or level is so low that pump damage can occur). System restart after shut-down shall be manual or automatic (user selectable).
- I. The system pressure set-point shall be capable of being automatically adjusted by using an external set-point influence. The set-point influence function enables the user to adjust the control parameter (typically pressure) by measuring an additional parameter. (Example: Lower the system pressure set-point based on a flow measurement to compensate for lower friction losses at lower flow rates).
- J. The controller shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- K. The pump system controller shall store up to 24 warning and alarms in memory. The time, date and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions:
- | | |
|---|---------------------------------|
| High System Pressure | Low system pressure |
| Low suction pressure (warning and/or alarm) | Individual pump failure |
| VFD trip/failure | Loss of sensor signal (4-20 mA) |
| Loss of remote set-point signal (4-20mA) | System power loss |
- L. The pump system controller shall be mounted in a UL Type 3R rated enclosure. A self-certified NEMA enclosure rating shall not be considered equal. The entire control panel

shall be UL 508 listed as an assembly. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions.

Control panel options shall include, but not be limited to:

Pump Run Lights	Pump Alarm Lights
System Fault Light	Audible Alarm (80 db[A])
Surge Arrestor	Control Panel Internal Illumination
Emergency/Normal Operation Switches	Service Disconnect Switches

- M. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor (typically discharge pressure).
- N. The controller shall have a pump "Test Run" feature such that pumps are switched on during periods of inactivity (system is switched to the "off" position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of two to three (2-3) seconds every 24 hours, 48 hours or once per week (user selectable).
- O. The controller shall be capable of displaying instantaneous power consumption (Watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- P. The actual pump performance curves (5th order polynomial) shall be loaded (software) into the pump system controller.

2.5 SEQUENCE OF OPERATION

- A. The system controller shall operate equal capacity variable speed pumps to maintain a constant discharge pressure (system set-point). The system controller shall receive an analog signal [4-20mA] from the factory installed pressure transducer on the discharge manifold, indicating the actual system pressure. As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point all pumps in operation shall reach equal operating speeds. As flow demand decreases the pump speed shall be reduced while system set-point pressure is maintained. When all pumps in operation are running at low speed the system controller shall switch off pumps when fewer pumps are able to maintain system demand.
- B. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C. All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.

2.6 LOW FLOW STOP FUNCTION

The system controller shall be capable of stopping pumps during periods of low-flow or zero-flow without wasting water or adding unwanted heat to the liquid. Temperature based no flow shut-down methods that have the potential to waste water and add unwanted temperature rise to the pumping fluid are not acceptable.

Standard Low Flow Stop and Energy Saving Mode

If a low or no flow shut-down is required (periods of low or zero demand) a bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

- A. Low Flow Restart: If the drop in pressure is slow when the start pressure is reached (indicating the flow is still low), the pump shall start and the speed shall again be increased until the stop pressure is reached and the pump shall again be switched off.
- B. Normal Flow Restart: If the drop in pressure is fast (indicating the flow is greater than 10% of pump nominal flow) the pump shall start and the speed shall be increased until the system pressure reaches the system set-point.

[OPTIONAL] Low Flow Stop and Energy Saving Mode

The pump system controller shall be capable receiving a digital signal from a flow switch or an analog signal from a flow meter to indicate a low flow condition. A bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When low flow is detected (signal from flow switch or meter), the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band). The pump shall remain in the energy saving on/off mode during low flow indication. When low flow is no longer present (low flow indication ceases), the pump(s) shall resume constant pressure operation.

It shall be possible to change from the standard low flow stop to the optional low flow stop (and vice-versa) via the user interface.

2.7 TELEMETRY

- A. The contractor is to supply necessary telemetry equipment to operate the pump and or pumps based on water tank elevation or pressure switch. This will include but not limited to transducers, control panels, sensors and all other necessary equipment to operate the system. The system is to match existing Hyden – Leslie County Water District Telemetry System. The contractor is to supply all necessary equipment to control and operate the pump and tank system or pump and pressure switch. The telemetry system is to be US Filter or Engineer approved equal. Electrical service from Contract 15 provided drop pole shall be provided by this Contractor minimum 30 ‘ in height. The electrical panel shall be sized to accommodate telemetry circuitry.

2.8 SYSTEM CONSTRUCTION

- A. The suction and discharge manifolds shall be constructed of 316 stainless steel. Manifold connection sizes shall be as follows:
- 3 inch and smaller: Male NPT threaded
 - 4 inch through 8 inch: ANSI Class 150 rotating flanges
 - 10 inch and larger: ANSI Class 150 flanges
- B. Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
- B. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2” and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2” and larger shall have a body material of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.
- C. For systems that require a diaphragm tank, a connection of no smaller than 3/4” shall be provided on the discharge manifold.
- D. A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- E. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts

in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.

- F. Systems with a flooded suction inlet or suction lift configuration shall have a factory installed water shortage protection device on the suction manifold.
- G. The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber vibration dampers shall be fitted between each pumps and baseframe to minimize vibration.
- H. Depending on the system size and configuration, the control panel shall be mounted in one of the following ways:

On a 304 stainless steel fabricated control cabinet stand attached to the system skid.

On a 304 stainless steel fabricated skid, separate from the main system skid
On its own base (floor mounted with plinth)

2.9 TESTING

- A. The entire pump station shall be factory performance tested as a complete unit prior to shipment. Job-site programming shall be entered into the controller prior to shipment (details of installation requirements shall be communicated to the pump system manufacturer). A verified performance test report shall be made available from the system manufacturer.
- B. The system shall undergo a hydrostatic test of 350 psig for a minimum of 15 minutes prior to shipment.

3.0 WARRANTY AND EXECUTION

- A. The warranty period shall be a non-prorated period of 24 months from date of installation, not to exceed 30 months from date of manufacture.
- B. After the water booster pump station has been completely installed including the electrical service and has been put under pressure by the Contractor, then a factory service representative will be scheduled to visit the jobsite and put the booster station into trouble free, automatic operation. The service representative will be a regular employee of the booster pump station manufacturer.
- C. The service representative will spend one (1) full day at the jobsite. In addition to his start-up duties, he shall explain and demonstrate the operation of the booster pump station to a representative of the owner. The service representative at this time shall pass over to the owner's representative two (2) bound copies of the booster pump station maintenance and operation manual.
- D. A complete service report shall be made out and signed by the factory service

representative and a representative of either the owner or project engineer. Copies of the start-up report will be distributed as follows: one (1) copy each to the manufacturer's project file, consulting engineers project file, contractors project file and the owners equipment file.

3.1 ADDITIONAL COMPONENTS TO BE SUPPLIED

- A. The supplier shall also include a common basket strainer and isolating valve for the inlet line. A pressure gage to monitor strainer inlet pressure before the strainer shall be supplied along with an isolating valve/snubber.
- B. The package station supplier shall provide one single phase distribution panel for the building to include breakers for each pump, breakers for the building accessories, HOA/air temperature switch for the air intake louver/exhaust fan
- C. The control panel shall have all necessary power supply and contacts to allow for monitoring of the station via the specified Scada system.
- D. The package station supplier shall provide all piping, valves, fittings, flexible connectors and hardware to allow the installing contractor to connect to an elbow at the inlet/outlet connection on the pump skid. Piping from the elbows to the main line are to be furnished and installed by the contractor.

END OF SECTION

SECTION 11011

CONSTANT WATER PRESSURE BOOSTER PUMPING STATION

PART I – GENERAL

1.1 WORK INCLUDED

A. Variable Speed Packaged Pumping System

1.2 REFERENCE STANDARDS

The work in this section is subject to the requirements of applicable portions of the following standards:

- A. Hydraulic Institute
- B. ANSI – American National Standards Institute
- C. ASTM – American Society for Testing and Materials
- D. IEEE – Institute of Electrical and Electronics Engineers
- E. NEMA – National Electrical Manufacturers Association
- F. NEC – National Electrical Code
- G. ISO – International Standards Organization
- H. UL – Underwriters Laboratories, Inc.

1.3 RELATED SECTIONS

- A. 01300- Submittals
- B. 01600 - Material and Equipment
- C. 04200 - Masonry
- D. 06100 – Rough Carpentry
- E. 07000 - Thermal and Moisture Protection
- F. 08000 – Doors & Frames
- G. 09900 – Protective Coatings and Painting

PART 2 – PRODUCTS

2.1 OPERATING CONDITIONS

- A. The pump station shall be capable of delivering the fluid medium at the following capacities and heads when operating as follows:

SR I780 PUMP STATION

PUMP #1 & #2

Design GPM 50 @ 553 feet TDH;

- B. Furnish and install a pre-fabricated and tested Grundfos variable speed packaged pumping system to maintain constant water delivery pressure per the model numbers listed below. These systems have been selected in an effort to standardize on pump sizes for this contract and future pump stations for the water district. The same pumps, motors, variable frequency drives and control components should be used whenever possible to minimize spare parts inventory and operator service training.

SR 1780 PUMP STATION

-Grundfos BoosterpaQ # HYDRO MPC (CUE) E2CR10-16 /15hp/3 phase/ 240V – with 50 gallon inline mounted ASME diaphragm tank rated for 250 psi

- C. The packaged pump system shall be a standard product of a single pump manufacturer. The entire pump system including pumps and pump logic controller, shall be designed and built by the same manufacturer.
- D. The complete packaged water booster pump system shall be certified and listed by UL (Category QCZJ – Packaged Pumping Systems) for conformance to U.S. and Canadian Standards.

2.2 PUMPS

- A. All pumps shall be ANSI/NSF 61 approved for drinking water.
- B. The pumps shall be of the in-line vertical multi-stage design.
- C. The head-capacity curve shall have a steady rise in head from maximum to minimum flow within the preferred operating region. The shut-off head shall be a minimum of 20% higher than the head at the best efficiency point.
- D. Small Vertical In-Line Multi-Stage Pumps (Nominal flow from 3 to 125 gallons per minute) shall have the following features:
1. The pump impellers shall be secured directly to the pump shaft by means of a splined shaft arrangement.
 2. The suction/discharge base shall have ANSI Class 250 flange or internal pipe thread (NPT) connections as determined by the pump station manufacturer.

3. Pump Construction.

- | | |
|--|----------------------------|
| a. Suction/discharge base, pump head, motor stool: | Cast iron (Class 30) |
| b. Impellers, diffuser chambers, outer sleeve: | 304 Stainless Steel |
| c. Shaft | 316 or 431 Stainless Steel |
| d. Impeller wear rings: | 304 Stainless Steel |
| e. Shaft journals and chamber bearings: | Silicon Carbide |
| f. O-rings: | EPDM |

Shaft couplings for motor flange sizes 184TC and smaller shall be made of cast iron or sintered steel. Shaft couplings for motor flange sizes larger than 184TC shall be made of ductile iron (ASTM 60-40-18).

Optional materials for the suction/discharge base and pump head shall be cast 316 stainless steel (ASTM CF-8M) resulting in all wetted parts of stainless steel.

4. The shaft seal shall be a balanced o-ring cartridge type with the following features:

- | | |
|-------------------------------|---------------------|
| a. Collar, Drivers, Spring: | 316 Stainless Steel |
| b. Shaft Sleeve, Gland Plate: | 316 Stainless Steel |
| c. Stationary Ring: | Silicon Carbide |
| d. Rotating Ring: | Silicon Carbide |
| e. O-rings: | EPDM |

The Silicon Carbide shall be imbedded with graphite.

5. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling and motor. The entire cartridge shaft seal shall be removable as a one piece component. Pumps with motors equal to or larger than 15 hp (fifteen horsepower) shall have adequate space within the motor stool so that shaft seal replacement is possible without motor removal.

2.3 VARIABLE FREQUENCY DRIVES (Panel Mount)

The VFD shall convert incoming fixed frequency single-phase or three-phase AC power into a variable frequency and voltage for controlling the speed of three-phase AC induction motors. The VFD shall be a six-pulse input design, and the input voltage rectifier shall employ a full wave diode bridge; VFD's utilizing controlled SCR rectifiers shall not be acceptable. The output waveform shall closely approximate a sine wave. The VFD shall be of a PWM output design utilizing current IGBT inverter technology and voltage vector control of the output PWM waveform.

The VFD shall include a full-wave diode bridge rectifier and maintain a displacement power factor of near unity regardless of speed and load.

The VFD shall produce an output waveform capable of handling maximum motor cable distances of up to 1,000 ft. (unshielded) without tripping or derating.

The VFD shall utilize an output voltage-vector switching algorithm, or equivalent, in both variable and constant torque modes. VFD's that utilize Sine-Coded PWM or Look-up tables shall not be acceptable.

VFD shall automatically boost power factor at lower speeds.

The VFD shall be able to provide its full rated output current continuously at 110% of rated current for 60 seconds.

An empty pipe fill mode shall be available to fill an empty pipe in a short period of time, and then revert to the PID controller for stable operation.

Switching of the input power to the VFD shall be possible without interlocks or damage to the VFD at a minimum interval of 2 minutes.

Switching of power on the output side between the VFD and the motor shall be possible with no limitation or damage to the VFD and shall require no additional interlocks.

The VFD shall have temperature controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.

VFD shall provide full torque to the motor given input voltage fluctuations of up to +10% to -15% of the rated input voltage.

The VFD shall provide internal DC link reactors to minimize power line harmonics and to provide near unity power factor. VFD's without a DC link reactor shall provide a 5% impedance line side reactor.

VFD to be provided with the following protective features:

1. VFD shall have input surge protection utilizing MOV's, spark gaps, and Zener diodes to withstand surges of 2.3 times line voltage for 1.3 msec.
2. VFD shall include circuitry to detect phase imbalance and phase loss on the input side of the VFD.
3. VFD shall include current sensors on all three-output phases to detect and report phase loss to the motor. The VFD will identify which of the output phases is low or lost.
4. VFD shall auto-derate the output voltage and frequency to the motor in the presence of sustained ambient temperatures higher than the normal operating range, so as not to trip on an inverter temperature fault. The use of this feature shall be user-selectable and a warning will be exported during the event. Function shall reduce switching frequency before reducing motor speed.
5. VFD shall auto-derate the output frequency by limiting the output current before allowing the VFD to trip on overload. Speed can be reduced, but not stopped.

6. The VFD shall have the option of an integral RFI filter. VFD enclosures shall be made of metal to minimize RFI and provide immunity.

VFD to be provided with the following interface features:

1. VFD shall provide an alphanumeric backlit display keypad, which may be remotely mounted using standard 9-pin cable. VFD may be operated with keypad disconnected or removed entirely. Keypad may be disconnected during normal operation without the need to stop the motor or disconnect power to the VFD.
2. VFD shall display all faults in plain text; VFD's, which can display only fault codes, are not acceptable.
3. All VFD's shall be of the same series, and shall utilize a common control card and LCP (keypad/display unit) throughout the rating range. The control cards and keypads shall be interchangeable through the entire range of drives used on the project.
4. VFD keypad shall be capable of storing drive parameter values in non-volatile RAM uploaded to it from the VFD, and shall be capable of downloading stored values to the VFD to facilitate programming of multiple drives in similar applications, or as a means of backing up the programmed parameters.
5. A red FAULT light, a yellow WARNING light and a green POWER-ON light shall be provided. These indications shall be visible both on the keypad and on the VFD when the keypad is removed.
6. A start guide menu with factory preset typical parameters shall be provided on the VFD to facilitate commissioning.
7. VFD shall provide full galvanic isolation with suitable potential separation from the power sources (control, signal, and power circuitry within the drive) to ensure compliance with PELV requirements and to protect PLC's and other connected equipment from power surges and spikes.
8. All inputs and outputs shall be optically isolated. Isolation boards between the VFD and external control devices shall not be required.
9. There shall be three programmable digital inputs for interfacing with the systems external control and safety interlock circuitry. An additional digital input is preprogrammed for start/stop.
10. The VFD shall have two analog signal inputs. One dedicated for sensor input and one for external set point input.
11. One programmable analog output shall be provided for indication of a drive status.
12. The VFD shall provide two user programmable relays with selectable functions. Two form 'C' 230VAC/2A rated dry contact relay outputs shall be provided.
13. The VFD shall store in memory the last 5 faults with time stamp and recorded data.
14. The VFD shall be equipped with a standard RS-485 serial communications port for communication to the multi-pump controller. The bus communication protocol for the VFD shall be the same as the controller protocol.

VFD service conditions:

7. Ambient temperature operating range, -10 to 45°C (14 to 113°F).
8. 0 to 95% relative humidity, non-condensing.
9. Elevation to 1000 meters (3,300 feet) without derating.
10. VFD's shall be rated for line voltage of 525 to 690VAC, 380 to 480VAC, or 200 to 240VAC; with +10% to -15% variations. Line frequency variation of \pm 2% shall be acceptable.
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- B. The controller shall be microprocessor based capable of having software changes and updates via personal computer (notebook). The controller user interface shall have a VGA display with a minimum screen size of 3-1/2" x 4-5/8" for easy viewing of system status parameters and for field programming. The display shall have a back light with contrast adjustment. Password protection of system settings shall be standard.
- C. The controller shall provide internal galvanic isolation to all digital and analog inputs as well as all fieldbus connections.
- D. The controller shall display the following as status readings from a single display on the controller (this display shall be the default):
 - Current value of the control parameter, (typically discharge pressure)
 - Most recent existing alarm (if any)
 - System status with current operating mode
 - Status of each pump with current operating mode and rotational speed as a percentage (%)
- E. The controller shall have as a minimum the following hardware inputs and outputs:
 - Three analog inputs (4-20mA or 0-10VDC)
 - Three digital inputs
 - Two digital outputs
 - Ethernet connection
 - Field Service connection to PC for advanced programming and data logging
- F. Pump system programming (field adjustable) shall include as a minimum the following:
 - Water shortage protection (analog or digital)

- Transducer Settings (Suction and Discharge Analog supply/range)
 - PI Controller (Proportional gain and Integral time) settings
 - High system pressure indication and shut-down
 - Low system pressure indication and shut-down
 - Low suction pressure/level shutdown (via digital contact)
 - Low suction pressure/level warning (via analog signal)
 - Low suction pressure/level shutdown (via analog signal)
 - Flow meter settings (if used, analog signal)
- G. The system controller shall be able to accept up to seven programmable set-points via a digital input, (additional input/output module may be required).
- H. The controller shall have advanced water shortage protection. When analog sensors (level or pressure) are used for water shortage protection, there shall be two indication levels. One level is for warning indication only (indication that the water level/pressure is getting lower than expected levels) and the other level is for complete system shut-down (water or level is so low that pump damage can occur). System restart after shut-down shall be manual or automatic (user selectable).
- I. The system pressure set-point shall be capable of being automatically adjusted by using an external set-point influence. The set-point influence function enables the user to adjust the control parameter (typically pressure) by measuring an additional parameter. (Example: Lower the system pressure set-point based on a flow measurement to compensate for lower friction losses at lower flow rates).
- J. The controller shall be capable of receiving a remote analog set-point (4-20mA or 0-10 VDC) as well as a remote system on/off (digital) signal.
- K. The pump system controller shall store up to 24 warning and alarms in memory. The time, date and duration of each alarm shall be recorded. A potential-free relay shall be provided for alarm notification to the building management system. The controller shall display the following alarm conditions:
- | | |
|---|---------------------------------|
| High System Pressure | Low system pressure |
| Low suction pressure (warning and/or alarm) | Individual pump failure |
| VFD trip/failure | Loss of sensor signal (4-20 mA) |
| Loss of remote set-point signal (4-20mA) | System power loss |
- L. The pump system controller shall be mounted in a UL Type 3R rated enclosure. A self-certified NEMA enclosure rating shall not be considered equal. The entire control panel shall be UL 508 listed as an assembly. The control panel shall include a main disconnect, circuit breakers for each pump and the control circuit and control relays for alarm functions.

Control panel options shall include, but not be limited to:

Pump Run Lights

Pump Alarm Lights

System Fault Light

Audible Alarm (80 db[A])

Surge Arrestor

Control Panel Internal Illumination

Emergency/Normal Operation Switches

Service Disconnect Switches

- M. The controller shall be capable of receiving a redundant sensor input to function as a backup to the primary sensor (typically discharge pressure).
- N. The controller shall have a pump "Test Run" feature such that pumps are switched on during periods of inactivity (system is switched to the "off" position but with electricity supply still connected). The inoperative pumps shall be switched on for a period of two to three (2-3) seconds every 24 hours, 48 hours or once per week (user selectable).
- O. The controller shall be capable of displaying instantaneous power consumption (Watts or kilowatts) and cumulative energy consumption (kilowatt-hours).
- P. The actual pump performance curves (5th order polynomial) shall be loaded (software) into the pump system controller.

2.5 SEQUENCE OF OPERATION

- A. The system controller shall operate equal capacity variable speed pumps to maintain a constant discharge pressure (system set-point). The system controller shall receive an analog signal [4-20mA] from the factory installed pressure transducer on the discharge manifold, indicating the actual system pressure. As flow demand increases the pump speed shall be increased to maintain the system set-point pressure. When the operating pump(s) reach 96% of full speed (adjustable), an additional pump will be started and will increase speed until the system set-point is achieved. When the system pressure is equal to the system set-point all pumps in operation shall reach equal operating speeds. As flow demand decreases the pump speed shall be reduced while system set-point pressure is maintained. When all pumps in operation are running at low speed the system controller shall switch off pumps when fewer pumps are able to maintain system demand.
- B. The system controller shall be capable of switching pumps on and off to satisfy system demand without the use of flow switches, motor current monitors or temperature measuring devices.
- C. All pumps in the system shall alternate automatically based on demand, time and fault. If flow demand is continuous (no flow shut-down does not occur), the system controller shall have the capability to alternate the pumps every 24 hours, every 48 hours or once per week. The interval and actual time of the pump change-over shall be field adjustable.

2.6 LOW FLOW STOP FUNCTION

The system controller shall be capable of stopping pumps during periods of low-flow or zero-flow without wasting water or adding unwanted heat to the liquid. Temperature based no flow shut-down methods that have the potential to waste water and add unwanted temperature rise to the pumping fluid are not acceptable.

Standard Low Flow Stop and Energy Saving Mode

If a low or no flow shut-down is required (periods of low or zero demand) a bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

- A. Low Flow Restart: If the drop in pressure is slow when the start pressure is reached (indicating the flow is still low), the pump shall start and the speed shall again be increased until the stop pressure is reached and the pump shall again be switched off.
- B. Normal Flow Restart: If the drop in pressure is fast (indicating the flow is greater than 10% of pump nominal flow) the pump shall start and the speed shall be increased until the system pressure reaches the system set-point.

[OPTIONAL] Low Flow Stop and Energy Saving Mode

The pump system controller shall be capable receiving a digital signal from a flow switch or an analog signal from a flow meter to indicate a low flow condition. A bladder type diaphragm tank shall be installed with a pre-charge pressure of 70% of system set-point. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When low flow is detected (signal from flow switch or meter), the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band). The pump shall remain in the energy saving on/off mode during low flow indication. When low flow is no longer present (low flow indication ceases), the pump(s) shall resume constant pressure operation.

It shall be possible to change from the standard low flow stop to the optional low flow stop (and vice-versa) via the user interface.

2.7 TELEMETRY

- A. The contractor is to supply necessary telemetry equipment to operate the pump and or pumps based on water tank elevation or pressure switch. This will include but not limited to transducers, control panels, sensors and all other necessary equipment to operate the system. The system is to match existing Hyden – Leslie County Water District Telemetry System. The contractor is to supply all necessary equipment to control and operate the pump and tank system or pump and pressure switch. The telemetry system is to be US Filter or Engineer approved equal. Electrical service from Contract 15 provided drop pole shall be provided by this

Contractor minimum 30 ' in height. The electrical panel shall be sized to accommodate telemetry circuitry.

2.8 SYSTEM CONSTRUCTION

- A. The suction and discharge manifolds shall be constructed of 316 stainless steel. Manifold connection sizes shall be as follows:

3 inch and smaller: Male NPT threaded
4 inch through 8 inch: ANSI Class 150 rotating flanges
10 inch and larger: ANSI Class 150 flanges

- B. Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inch and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inch and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
- B. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material of stainless steel or epoxy coated iron (fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.
- C. For systems that require a diaphragm tank, a connection of no smaller than 3/4" shall be provided on the discharge manifold.
- D. A pressure transducer shall be factory installed on the discharge manifold (or field installed as specified on plans). Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be +/- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- E. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- F. Systems with a flooded suction inlet or suction lift configuration shall have a factory installed water shortage protection device on the suction manifold.
- G. The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber vibration dampers shall be fitted between each pumps and baseframe to minimize vibration.

- H. Depending on the system size and configuration, the control panel shall be mounted in one of the following ways:

On a 304 stainless steel fabricated control cabinet stand attached to the system skid.

On a 304 stainless steel fabricated skid, separate from the main system skid
On its own base (floor mounted with plinth)

2.9 TESTING

- A. The entire pump station shall be factory performance tested as a complete unit prior to shipment. Job-site programming shall be entered into the controller prior to shipment (details of installation requirements shall be communicated to the pump system manufacturer). A verified performance test report shall be made available from the system manufacturer.
- B. The system shall undergo a hydrostatic test of 350 psig for a minimum of 15 minutes prior to shipment.

3.0 WARRANTY AND EXECUTION

- A. The warranty period shall be a non-prorated period of 24 months from date of installation, not to exceed 30 months from date of manufacture.
- B. After the water booster pump station has been completely installed including the electrical service and has been put under pressure by the Contractor, then a factory service representative will be scheduled to visit the jobsite and put the booster station into trouble free, automatic operation. The service representative will be a regular employee of the booster pump station manufacturer.
- C. The service representative will spend one (1) full day at the jobsite. In addition to his start-up duties, he shall explain and demonstrate the operation of the booster pump station to a representative of the owner. The service representative at this time shall pass over to the owner's representative two (2) bound copies of the booster pump station maintenance and operation manual.
- D. A complete service report shall be made out and signed by the factory service representative and a representative of either the owner or project engineer. Copies of the start-up report will be distributed as follows: one (1) copy each to the manufacturer's project file, consulting engineers project file, contractors project file and the owners equipment file.

3.1 ADDITIONAL COMPONENTS TO BE SUPPLIED

- A. The package supplier should include one AMTROL ASME certified hydro pneumatic tank rated for a maximum pressure of 250 psi for each station
- B. The supplier shall also include a common basket strainer and isolating valve for the inlet line. A pressure gage to monitor strainer inlet pressure before the strainer shall be supplied along with an isolating valve/snubber.
- C. The package station supplier shall provide one single phase distribution panel for the building to include breakers for each pump, breakers for the building accessories, HOA/air temperature switch for the air intake louver/exhaust fan
- D. The control panel shall have all necessary power supply and contacts to allow for monitoring of the station via the specified Scada system.
- E. The package station supplier shall provide all piping, valves, fittings, flexible connectors and hardware to allow the installing contractor to connect to an elbow at the inlet/outlet connection on the pump skid. Piping from the elbows to the main line are to be furnished and installed by the contractor.

END OF SECTION

SECTION 15020

GATE VALVES

PART 1 GENERAL

1.01 SUMMARY

- A. Gate valves for buried pipelines shall be iron body, bronze mounted, resilient-seated gate valves with non-rising stems having either parallel or inclined seats in accordance with AWWA C509, "Resilient-Seated Gate Valves for Water and Sewerage Systems."
- B. Mechanical joint bell ends will be used in buried pipelines of mechanical joint and rubber seal type joint cast iron. Bell and flange ends will be used in exposed cast iron piping at the locations shown on the construction drawings.

1.02 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Material and component data.
 - 2. Performance data.
 - 3. Product warranties.
- B. Submit in accordance with Section 01300.

1.03 RELATED SECTIONS

- A. 01600 - Materials and Equipment.
- B. 01610 - Transportation and Handling

PART 2 PRODUCTS

2.01 OPERATING NUTS

Gate valves for buried pipelines shall be furnished with two (2) inch square wrench nuts. Nuts shall have a flanged base upon which shall be cast an arrow two (2) inches long showing the direction of opening, and the word "OPEN" in one-half (1/2) inch or larger letters, shall be cast on the nut to indicate clearly the direction to turn the wrench when opening the valve.

2.02. HANDWHEELS

Handwheels may be specified for operating valves in exposed piping on the construction drawings. The handwheels shall have an arrow and the word "OPEN", cast thereon, to clearly indicate the direction the handwheel is to be turned to open the valve. The diameter of the handwheel shall conform to the following dimensions for the various size gate valves.

Size of Valve	Diameter of Handwheel
4"	10"
6"	12"
8"	14"
10" and 12"	18"
16" and 18"	22"
24" and 30"	30"

2.03 HORIZONTAL MOUNTING

Gate valves in size sixteen (16) inches and larger may be installed in the horizontal position. Bronze tracks, rollers, and scrapers will be provided for valves to be installed in the horizontal position. Horizontal valves for pressure lines shall be furnished with beveled gear operators. The gear cases for buried service shall be totally enclosed, and the gear cases for exposed piping in a vault shall be of the extended type.

2.04 BYPASS VALVES

Bypasses shall be furnished on valves when so specified on the proposal sheets or shown on the construction drawings. The bypass valve shall be furnished of the same type as the main line valve to which it is fitted. The size requirements of the bypass shall be as follows:

Valve Diameter - Inches	Bypass Diameter - Inches
16-20	3
24-30	4
26-42	6
48	8

2.05 RISING STEM VALVES

Outside screw and yoke rising stem valves shall conform to all of the requirements of AWWA C509 except for the rising stem mechanism. The OS and Y valves shall have a rugged cast iron yoke machined to provide accurate stem

alignment. The OS and Y valves shall be furnished with handwheels. OS and Y valves shall only be installed where shown on the drawings.

2.06 UNDERWRITERS VALVES

Gate valves for fire protection systems shall be manufactured in conformance to the requirements of the Underwriters Laboratories, Inc., and the Associated Factory Mutuals Laboratories. Gate valves which support an indicator post shall contain a flange of the indicator post base. Such valves are specified on the construction drawings and shall bear the inspection label of the Underwriters Laboratories, Inc. Gate valves shall be M&H, Mueller or approved equal.

PART 3 EXECUTION

3.01 SPECIAL DETAILS

The details of other valve requirements and valve appurtenances such as special ends and materials, position indicators, floor stands, cylinders, chain operators, and extension stems and guides are described on the construction drawings.

3.02 SETTING GATE VALVES

Gate valves shall be installed of the size and the location as shown on the construction drawings. Vertical valves shall be set plumb and horizontal valves installed so that the valve body is level. The valves shall be set to the new pipe in the manner specified for cleaning, laying, and jointing pipe. Mechanical joint, rubber compression seal, or bell and spigot shall be used for buried pipelines. Other types of joints for pipelines within structures will be shown on the construction drawings.

3.03 CHAIN OPERATORS

All gate valves six (6) feet or more above the floor surface shall be equipped with a chain operator unless otherwise indicated on the construction drawings.

3.04 SPARE PARTS

The Contractor shall furnish the Owner one (1) valve rebuild/maintenance kit for each size and type of valve. Each Contractor shall also furnish the Owner one (1) 'T' type valve wrench.

END OF SECTION

SECTION 15065

FIRE HYDRANTS WITH AUXILIARY GATE VALVES

PART 1 - GENERAL

Fire hydrants with auxiliary gate valves shall be provided at the locations as shown on the plans or in locations as directed by the Engineer.

1.1 FIRE HYDRANTS

- A. The fire hydrants shall be of standard manufacturer and of a pattern approved by the Engineer. The name or mark of the manufacturer and the size of the valve openings shall be plainly cast in raised letters and be placed in the hydrant barrel as to be visible after the hydrant has been installed.
- B. As a minimum requirement, all hydrants shall be designed for a working pressure of 250 PSIG and in workmanship, design, and material, shall conform to the AWWA Standards, latest revision. The hydrant body shall be cast iron, fully mounted with approved non-corrodible material, and there shall be no moving bearings or contact surfaces or iron in contact with iron or steel. All contact surfaces shall be finished or machined to the best workmanlike manner and all wearing surfaces shall be easily renewable.
- C. The design of the hydrant shall be such that all working parts may be removed through the top of the hydrant and shall have the required AWWA specified number of turns of the stem to open the gate in area equal to the valve opening. Any change in the area of the water passage through the valve must have an easy curve, and all outlets must have round corners.
- D. Hydrants shall be provided with a breakaway safety flange, which will allow the hydrant barrel to separate at approximately ground level with the minimum breakage of hydrant parts. There shall also be provided at this point a safety stemmed coupling on the operating stem that will shear at the time of impact. All hydrants shall be equipped with o-ring stem seals.
- E. Fire hydrants shall have a six (6) inch inlet connection and be fitted with an auxiliary gate valve as described below. Two, 2 1/2-inch hose nozzles and one dumper nozzle shall be provided. All nozzles shall be fitted with cast iron thread caps with operating nuts of the same design and proportions as the hydrant stem nut. Caps shall be threaded to fit the corresponding nozzles and shall be fitted with suitable gaskets for positive water tightness under test pressures.
- F. The valves in all hydrants shall be 5-1/4 inches in diameter.
- G. The operating nut on the hydrant stems and nozzle caps shall be the same for all hydrants and shall be similar to those now in use by the Owner.
- H. All parts of the hydrant both inside and outside shall be cleaned and painted. All inside surfaces and outside surfaces below the ground line shall be coated with asphalt varnish and shall be covered with two coats, the first

having dried thoroughly before the second is applied. The outside of the hydrant above the finished ground shall be thoroughly cleaned and thereafter primed with one coat of paint of a durable composition and one additional coat of paint, color as selected by the Engineer.

- I. The contractor shall verify the depth of bury for each hydrant prior to placing an order with the manufacturer. Fire hydrants shall be standard AWWA C502, latest revision type. Fire hydrants shall be Kennedy Model K81, "Taylorsville" Model with Louisville Water Company threads or Engineer approved equal.

1.2 AUXILIARY GATE VALVES AND BOXES

The gate valves and boxes used as auxiliary gate valves shall be the same as gate valves and boxes specified for water distribution and transmission lines and other portions of these specifications. At the Contractor's option, he may purchase fire hydrants with a flanged inlet connection, and may use an auxiliary gate valve having a flanged end on one side and a connection on the other side suitable for the pipe to which it will be connected. In either case, the coat of the auxiliary gate valve and valve box shall be included in the cost of the fire hydrant. No separate payment will be made for these items.

1.3 INSTALLATION

- A. Hydrants and auxiliary gate valves shall be installed in such a manner that they shall be plumb and shall be set so that the lowest hose connection is at least fifteen (15) inches above the surrounding finished grade. All hydrants shall be inspected in the field on delivery to the job to insure proper operation before installation. Care shall be taken to insure that weep holes are not covered by concrete. Reference should be made to Standard Details to these specifications.
- B. The Contractor shall furnish the owner one (1) pentagon nut operating wrench per hydrant which shall be included as an incidental expense.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 15070

BLOW-OFF VALVE ASSEMBLY

PART I GENERAL

1.01 SUMMARY

- A. Blow-off valves shall be installed in accordance with the Standard Details and the specifications at locations shown on the plans and in other locations as directed by the Engineer.
- B. In general, blow-off valves are located at the end of mains for the purpose of clearing the main of sediment, obstacles, or impure water.

1.02 SUBMITTALS

- A. Manufacturer's Data:
 - 1. Material and component data.
 - 2. Performance data.
 - 3. Product warranties.
- B. Submit in accordance with Section 01300

1.03 RELATED SECTIONS

- A. 01300 - Submittals
- B. 01600 - Materials and Equipment
- C. 01610 - Transportation and Handling

PART 2 PRODUCTS

- A. The pipe from the main to the flush valve shall be of the same material and size as the main and connected to the main by means of a tee, or installed at the end of line.
- B. Do not use a corporation stop for this connection.
- C. The gate valve for the blow-off connection shall be a AWWA type gate valve with adjustable valve box, same size as water line with two inch operating nut, mechanical joint connections Mueller A-2380-8 or equal as approved by the Engineer. The gate valve and the 90° elbow riser fitting

must be securely anchored with concrete to prevent movement.

- D. The hydrant shall be model number 78 Mainguard hydrant as manufactured by the Kupferle Foundry Company or Engineer approved equal.
- E. All pipe beyond the gate valve shall be galvanized iron pipe, Schedule 40, with Class 150 malleable iron fittings, or Class 200 PVC with a cap at end of pipe riser. Pipe and PVC fittings shall be same size as main line.
- F. The flush valve enclosure shall be constructed of an 18" diameter by 30" depth concrete, or PVC meter box as approved by the Engineer.
- G. The cover shall be of cast iron construction, 4" deep with a non-recessed lid, with cast letters "WATER" and a pentagon lock nut Mueller H-10310, or equal as approved by the Engineer.
- H. A cast iron flap valve, Neenah #R-5004 or approved equal, shall be installed with stainless steel screen on each blowoff assembly.

PART 3 EXECUTION

- A. The cost for the gate valve and other listed appurtenances herein and/or on detail and supplied with blow-off valve assembly shall be included in unit price of blow-off valve assembly. No separate payment will be made for gate valves used with blow-off valves.

END OF SECTION

SECTION 15080
STANDARD SERVICES

PART 1 GENERAL

1.01 SUMMARY

- A. The work to be performed under this section shall include all labor, materials, equipment, excavation, backfill and testing necessary for the proper installation of all service connections. Details of service installations is shown in the Standard Details Section of the drawings.
- B. No attempt was made to show precise meter setting locations on the plans and the Contractor shall not place any service connection without approval of the location and type by the Engineer. However, in general the meter setting shall be set inside the customer property line and off of State, County, or Township Road Right of Way.
- C. The service shall include: A service clamp, corporation stop, service pipe, meter setting equipment, meter box and cover. If called for on the drawings or directed by the Engineer, a pressure reducing valve may be required.

1.02 RELATED SECTIONS

- A. 01300 - Submittals
- B. 01600 - Materials and Equipment
- C. 01610 - Transportation

PART 2 PRODUCTS

2.01 SERVICE CLAMP

All service clamps shall be single-strap type, Ford S70 furnished with neoprene gaskets cemented in place. Clamps shall be of the proper size for the pipe with which they are to be used. Clamps shall have a tapered AWWA thread, and shall be suitable for a minimum working water pressure of 200 PSIG. Clamps shall be as manufactured by the Ford Company or equal as approved by the Engineer.

2.02 CORPORATION STOP

All taps for service connections shall be made in the upper half of the main with

equipment designed for this purpose. No tap shall be closer than one foot from any joint in the main. Corporation stops shall be of the appropriate size for each service. Unless noted otherwise, all services shall be 3/4 inch. Corporation stops shall have a male AWWA threaded inlet, and an outlet suitable for connection to the service pipe. Corporation stops shall be 110 compression connection, Ford Catalog No. F-1002 Pack Joint or equal, if PVC Service Pipe is specified. If polybutylene service pipe is specified, Ford Catalog No. F1000 or equal shall be utilized. Insert stiffeners of proper length shall be provided with corporation stop if plastic pipe is used.

2.03 SERVICE PIPE

Service pipe shall be Class 267, polyethylene, N.S.F. approved. Service pipe shall run from the corporation stop to the inlet of the meter setting equipment. Service pipe for standard services shall be jacked or driven under paved roads without benefit of steel casing. Open trenches will not be permitted. Should the Contractor chose to use steel casing, it shall be done at no additional cost to the Owner. The jacking, boring, or pushing of service lines under state, county, or private roads or driveways is not a pay item. The unit price bid for service pipe shall include costs for jacking, pushing or boring service pipe as an incidental expense.

2.04 METER BOX AND COVER

- A. A meter box with cover shall be provided for each service and shall be as near the property line as possible and shall be located as directed by the Engineer. The meter box shall be concrete pipe (Class III), extruded ribbed PVC (0.450 inch minimum wall thickness), or polyethylene (0.300 inch wall thickness) construction. The size shall be 18" in diameter by 24" deep unless otherwise specified or required by the meter size.
- B. The meter box cover shall be of cast iron construction, with a recessed lid, with cast letters "WATER METER". The cover shall be RUSSCO model LC218 or equal as approved by the Engineer.
- C. Meter boxes and covers shall be set with backfill neatly compacted in place. In yards and other maintained areas, the top of the meter box cover shall be 1/2 inch to 1 inch above original grade, otherwise 2 inches above original grade.

2.05 METER SETTING EQUIPMENT

- A. The meter setting equipment shall consist of a copper meter yoke, with an inlet and outlet suitable for connection to the service pipe specified. The meter yoke shall be provided with a plain stop. Unless otherwise specified or required for the service, the yoke shall accept a 5/8 inch by 3/4 inch meter as

specified below. A 3/4 inch by 5 foot long section of the specified service pipe shall be installed on the customer side of the meter. The cost of this service pipe "pigtail" shall be included with the unit price bid for meter setting.

- B. Copper meter yokes shall have angle ball valve inlet, double check valve outlet and 7" rise. Regular meter yokes shall be Ford VBHH72-7W-44-33 or approved equal. If the meter setting is to include an individual PRV, the tandem yoke shall be Ford TVBHH72-7W-44-33 or approved equal.
- C. Meter yokes shall be supplied with two (2) end connections with baskets per meter setting. End connections shall be Ford Pack Joint or equal for 3/4" CTS or as required based upon type of service pipe used. Insert stiffeners (of approved length) shall be furnished and installed for each inlet and outlet meter setting service pipe connection.

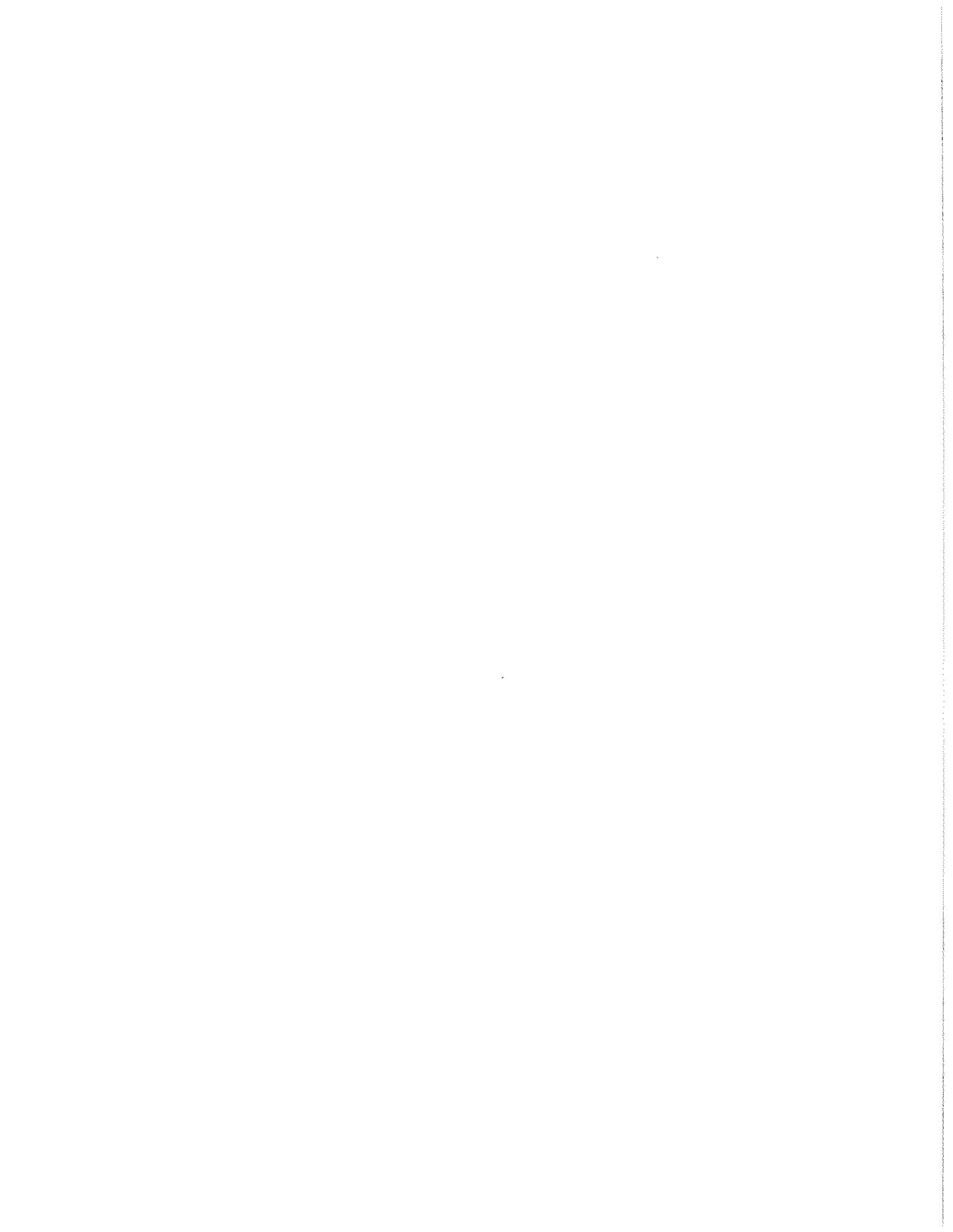
2.06 PRESSURE REDUCING VALVE (INDIVIDUAL)

When called for on the drawings or when directed by the Engineer, the Contractor shall install a pressure reducing valve, with strainer, equal to the size of the service. This valve shall be placed inside the meter box according to the standard drawings. Pressure reducing valves shall be A.W. Cash Company, No. E24U or Watts Catalog No. U5-B, or approved equal.

PART 3 EXECUTION

NOT USED

END OF SECTION



SECTION 15085

DISPLACEMENT TYPE DOMESTIC WATER METERS
(5/8", 3/4" or - 1" Size)

PART 1 GENERAL

1.01 SUMMARY

The work to be performed under this section shall include furnishing water meters to the Owner for their installation.

1.02 RELATED SECTIONS

- A. 01300 - Submittals
- B. 01600 - Materials and Equipment

PART 2 PRODUCTS

2.01 TYPE

- A. Furnish Magnetic Drive, Sealed Register, Positive Displacement Oscillating Piston Type Cold Water Meters.
- B. Size and Length

Unless specified otherwise on the drawings, meters shall be 5/8" x 3/4" and must conform to American Water Works Standard C-700 as most recently revised. Meters shall be Badger RCDL 25 Bronze or approved equal.

2.02 CASES

- A. All Meters shall have a non-corrosive Water Works bronze outer case with a separate measuring chamber which can be easily removed from the case. All meters shall have cast on them, in raised characters, the size and direction of flow through the meter. Case Iron frost bottoms, or bronze bottoms shall be provided on 5/8", 3/4" and 1". All main cases shall be guaranteed against defects in materials and workmanship for twenty-five (25) years from date of shipment.
- B. All external bolts and washers shall be of corrosion resistant material and be easily removed from the main case.

2.03 REGISTERS - HERMETICALLY SEALED

The register must be of straight reading type and have a large test or sweep hand. It shall read in gallons of volume. All reduction gearing shall be contained

in a permanently hermetically sealed, tamperproof enclosure made from a corrosion resistant material and will be secured to the upper main case by means of a locking device located in the interior of the meter so the register cannot be removed externally. The sealed register shall be guaranteed against defects in materials and workmanship for fifteen (15) years from date of shipment.

2.04 MEASURING CHAMBER

- A. The measuring chamber shall be of Water Works bronze or a suitable synthetic polymer and shall not be cast as part of the main case. All piston assemblies shall be interchangeable in all measuring chamber assemblies of the same size. The chamber's bottom plate shall be held in place without the use of fasteners.
- B. There shall be no stuffing box. The motion of the piston will be transmitted to the sealed register through the use of a direct magnetic drive without any intermediate mechanical coupling.
- C. All meters must be provided with a corrosion resistant strainer which is easily removable from the meter without the meter itself being disconnected from the pipeline.
- D. Change gears will not be allowed to calibrate the meter. All registers of a particular registration and meter size shall be identical and completely interchangeable.
- E. Meters shall conform to current AWWA test flow and accuracy standards.
- F. Meters shall operate up to a working pressure of 150 pounds per square inch, without leakage or damage to any parts. The accuracy shall not be affected when operating at this pressure due to possible distortion.

PART 3 EXECUTION

3.01 GUARANTEE

- A. Quotations shall be accepted only from those companies who are actively engaged in the manufacturing of all parts for their meter in the United States of America and who have a minimum of five years of satisfactory operating experience with their meter. All meters will be guaranteed against defects in materials and workmanship for a period of one (1) year from date of shipment.

END OF SECTION

SECTION 16010

BASIC MECHANICAL/ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. General Requirements specifically applicable to Division 16.

1.2. CONTRACT DOCUMENTS

- A. The Instructions to Bidders, General and Special Conditions and all other Contract Documents shall apply to the Electrical Contractor's work as well as to each of his subcontractor's work.
- B. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.

1.3. WORK SEQUENCE

- A. Construct Work in sequence under provisions of this specification.
- B. Schedule power outages with owners' representative.

1.4. COORDINATION

- A. Coordinate the Work specified in this Division under provisions of this specification.
- B. Prepare drawings showing proposed rearrangement of Work to meet job conditions, including changes to Work specified under other Sections. Obtain permission of Engineer/ Engineer before proceeding.

1.5. REFERENCES

- A. ANSI/IEEE C2 - National Electrical Safety Code.
- B. ANSI/NFPA 70 - National Electrical Code.
- C. NECA - Standard of Installation.

1.6. REGULATORY REQUIREMENTS

- A. Conform to ANSI/NFPA 70 as incorporated in the Kentucky Building Code.
- B. Conform to ANSI/IEEE C2.
- C. Conform to Kentucky Building Code.
- D. Conform to 702 KAR 4:070.
- E. Inspections: Contractor is to pay for electrical inspection and is to provide a final certificate of inspection.

1.7. SUBMITTALS

- A. Submit inspection and permit certificates under provisions of this specification.
- B. Include certificate of final inspection and acceptance from authority having jurisdiction.
- C. Submit shop drawings as specified in other divisions of this specification.
 - 1. Shop drawings and/or manufacturer's descriptive literature shall have the Engineer project numbers indicated thereon and shall be clearly referenced to the specification section number, schedule, materials, etc., so the Engineer may readily determine the particular item the Contractor or subcontractor proposes to furnish. Each submission shall also contain Date Submitted. If shop drawings and/or other items are transmitted by correspondence, each item of correspondence shall bear the Engineer project number.
 - 2. The Contractor shall submit with such promptness as to cause no delay in his own work or in that of any other Contractor, with a two (2) week allowance for the Engineer's review, eight (8) copies plus those required by the Contractor and his suppliers, of all Shop drawings and schedules required for the work of the various trades, and the Engineer shall pass on them with reasonable promptness, making desired corrections relating to the design concept. The Contractor shall make any corrections required by the Engineer, and if the Engineer so requests file with him eight (8) corrected copies and furnish such other copies as may be needed. The Engineer's approval of such drawings or schedules shall not relieve the Contractor from responsibility for deviations from drawings or specifications, unless he has in writing called to the Engineer's attention such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings or schedules. The term "as specified" will not be acceptable as shop drawings must be submitted on all equipment.

3. The Contractor shall request that shop drawings be prepared by the subcontractors and be submitted to him for approval. The Contractor shall correct the shop drawings in colored pencil, if necessary, return them to the subcontractor for correction, then submit correct shop drawings in their final form to the Engineer for approval. All shop drawings must not only bear the Contractor's stamp of approval, but shall show evidence that he has thoroughly checked each drawing submitted. Any drawings submitted without this evidence and stamp of approval will not be considered and will be returned to the Contractor for proper resubmission.
4. Schedules, brochures or equipment, operating instructions and manuals, material literature, etc. shall be processed by the Contractor and submitted to the Engineer for approval in the same manner as outlined herein for shop drawings.
5. The Contractor shall maintain at least one (1) set of all approved shop drawings and specification documents at the site for reference.

PART 2 – PRODUCTS

2.1. MATERIALS AND EQUIPMENT

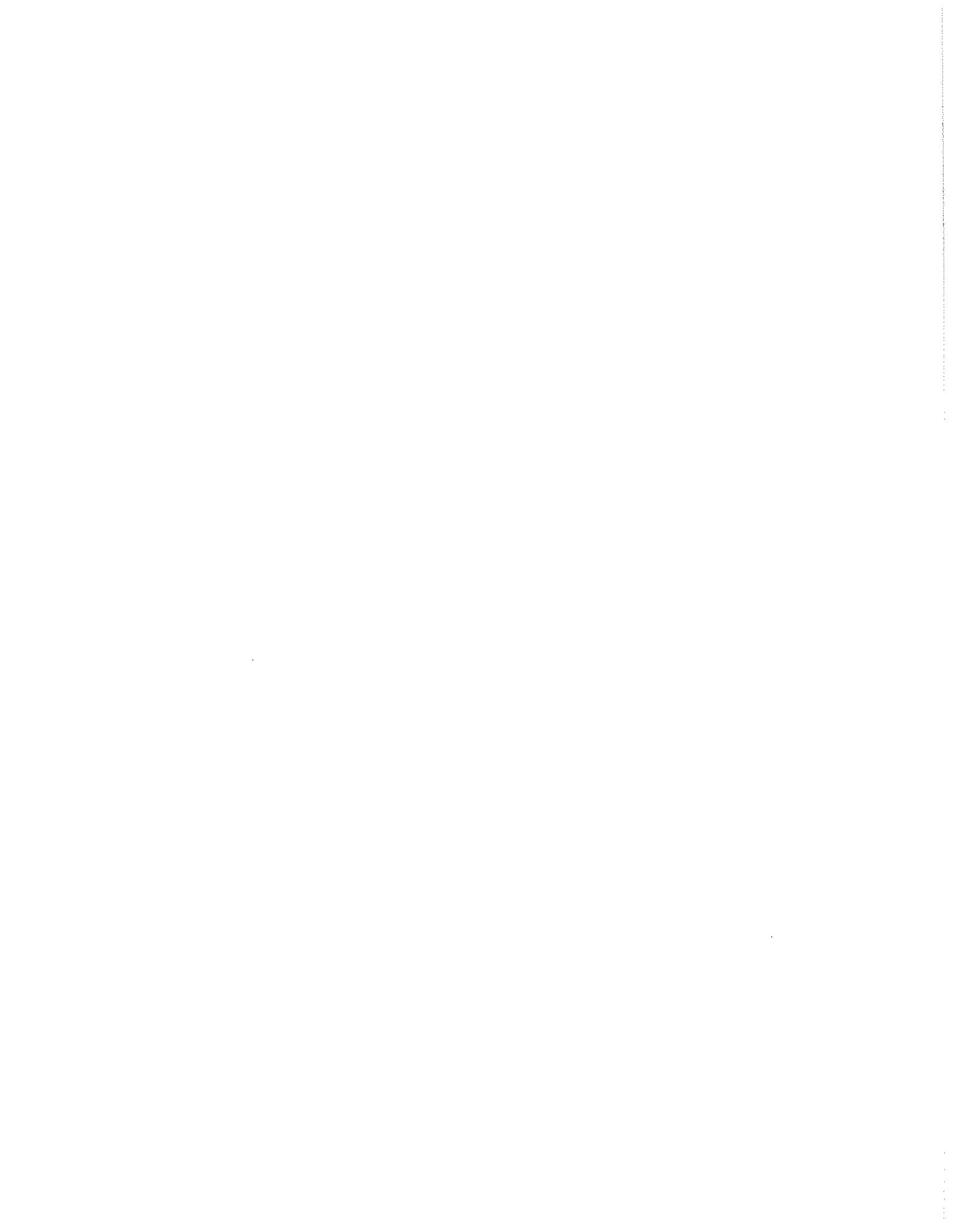
- A. Materials and Equipment: Acceptable to the authority jurisdiction as suitable for the use intended.
- B. Unregistered Bidders are required to obtain 10 day prior approval.

PART 3 - EXECUTION

3.1. WORKMANSHIP

- A. Install Work using procedures defined in NECA Standard of Installation.

END OF SECTION



SECTION 16111

CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Rigid metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Thickwall nonmetallic conduit.
- F. Fittings and conduit bodies.

1.2 RELATED SECTIONS

- A. Section 16130 - Boxes.
- B. Section 16170 - Grounding and Bonding.
- C. Section 16190 - Supporting Devices.
- D. Section 16195 - Electrical Identification.

1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. NECA "Standard of Installation."

F. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

1.4 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, nonmetallic conduit, fittings, conduit bodies.

1.6 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01720.

B. Accurately record actual routing of conduits larger than 2 inches.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle Products to site under provisions of Section 01600.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.9 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:
 - 1. More than Five Feet from Foundation Wall:
 - 2. Use thickwall nonmetallic conduit with galvanized rigid steel elbows through concrete slab.
 - 3. Within Five Feet from Foundation Wall:
 - 4. Use thickwall nonmetallic conduit with galvanized rigid steel elbows through concrete slab.
- C. In or Under Slab on Grade:
 - 1. Use thickwall nonmetallic conduit with galvanized rigid steel elbows through concrete slab.
 - 2. Minimum Size: 3/4 inch.
- D. Outdoor Locations, Above Grade:
 - 1. Use rigid steel and intermediate metal conduit.
- E. Wet and Damp Locations:
 - 1. Use thickwall nonmetallic conduit.
- F. Dry Locations:
 - 1. Concealed: Use electrical metallic tubing.
 - 2. Exposed: Use electrical metallic tubing.

2.2 RIGID METAL CONDUIT

- A. Manufacturers:
 - 1. Allied Tube & Conduit.
 - 2. Wheatland Tube Co.
 - 3. Triangle PWC, DAC.
 - 4. Substitutions: Under provisions of Section 01300.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Intermediate Metal Conduit (IMC): Rigid steel.
- D. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

2.3 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Alflex Corp.
 - 2. AFC Co.
 - 3. Electri-Flex Corp.
 - 4. Substitutions: Under provisions of Section 01300.
- B. Description: Interlocked steel construction.
- C. Fittings: ANSI/NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Alflex Corp.
 - 2. AFC Co.
 - 3. Electri-Flex Corp.
 - 4. Substitutions: Under provisions of Section 01300.
- B. Description: Interlocked aluminum construction with PVC jacket.
- C. Fittings: ANSI/NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied Tube & Conduit.
 - 2. Wheatland Tube Co.
 - 3. Triangle PWC, DAC.
 - 4. Substitutions: Under provisions of Section 01300.

- B. Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel, compression type.

2.6 THICKWALL NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. Carlon.
 - 2. Cantex Industries.
 - 3. Electri-Flex Corp.
 - 4. Substitutions: Under provisions of Section 01300.
- B. Description: NEMA TC 2; Schedule 40 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 16190.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route conduit parallel and perpendicular to walls.

- K. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- L. Route conduit in and under slab from point-to-point.
- M. Do not cross conduits in slab.
- N. Provide two coats of asphaltum paint on all underground or underslab metal conduits.
- O. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- P. Cut conduit square using saw or pipecutter; de-burr cut ends.
- Q. Bring conduit to shoulder of fittings; fasten securely.
- R. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- S. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- T. Install no more than equivalent of four 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender or factory elbows for bends in metal conduit larger than 2 inch size.
- U. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- V. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Ground and bond conduit under provisions of Section 16170.
- Z. Exposed surface mounted conduit feeding device boxes in finished areas shall be mounted securely to wall with one-hole straps and offset at device box connections. Conduit hangers with exposed bolts used to space the conduit from the wall shall not be acceptable for this type installation.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.
- B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket. Coordinate location with roofing installation.

END OF SECTION

SECTION 16123
BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

- A. Section 16111 - Conduit.
- B. Section 16130 - Boxes.
- C. Section 16195 - Identification.

1.3 REFERENCES

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

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide for each cable assembly type.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

- A. Determine required separation between cable and other work.
- B. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - BUILDING WIRE AND CABLE

- A. Capital Wire and Cable.
- B. General Cable.
- C. Carol.
- D. Substitutions: Under provisions of Section 01300.

2.2 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: ANSI/NFPA 70, Type THHN/THWN.

2.3 WIRING CONNECTORS

- A. Split Bolt Connectors:
 - 1. Burndy.

2. IlSCO.
 3. Kearney.
 4. Substitutions: Under provisions of Section 01300.
- B. Solderless Pressure Connectors:
1. Buchanan.
 2. Ideal.
 3. Thomas & Betts.
 4. Substitutions: Under provisions of Section 01300.
- C. Spring Wire Connectors:
1. Buchanan.
 2. Ideal.
 3. Thomas & Betts.
 4. Substitutions: Under provisions of Section 01300.
- D. Compression Connectors:
1. Buchanan.
 2. Ideal.
 3. Thomas & Betts.
 4. Substitutions: Under provisions of Section 01300.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 WIRING METHODS

- A. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
- B. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
- C. Above Accessible Ceilings: Use only building wire, Type THHN/THWN insulation, in raceway.
- D. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.

- E. Exterior Locations: Use only building wire, Type THHN/THWN insulation, in raceway.
- F. Underground Installations: Use only building wire, Type THHN/THWN insulation, in raceway.

3.3 INSTALLATION

- A. Install products in accordance with manufacturers instructions.
- B. Use solid conductor for feeders and branch circuits 12 AWG and smaller.
- C. Use stranded conductors for control circuits.
- D. Use conductor not smaller than 12 AWG for power and lighting circuits.
- E. Use conductor not smaller than 16 AWG for control circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet.
- G. Pull all conductors into raceway at same time.
- H. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- I. Protect exposed cable from damage.
- J. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- K. Use suitable cable fittings and connectors.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- P. Use solderless pressure connectors with insulating covers for copper conductor

splices and taps, 8 AWG and smaller.

- Q. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- R. Terminate stranded conductors under screws using crimp-on wire terminals. Wrapping stranded wire around screw stem and tightening shall not be permitted.

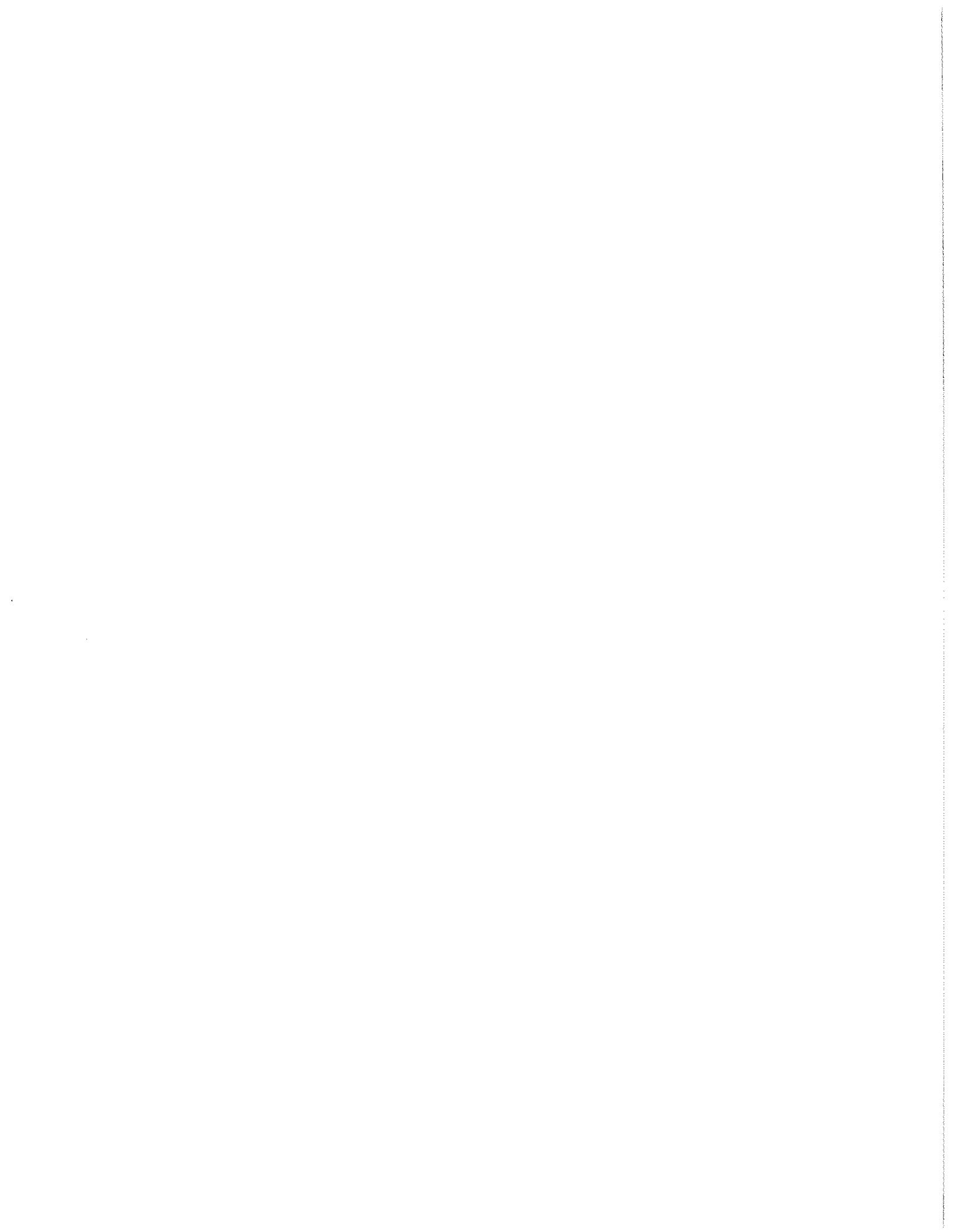
3.4 INTERFACE WITH OTHER PRODUCTS

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

3.5 FIELD QUALITY CONTROL

- A. Inspect wire and cable for physical damage and proper connection.
- B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- C. Verify continuity of each branch circuit conductor.

END OF SECTION



SECTION 16130

BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling device boxes.
- B. Pull and junction boxes.

1.2 RELATED SECTIONS

- A. Section 16140 - Wiring Devices: Wall plates in finished/unfinished areas.
- B. Section 16160 - Cabinets and Enclosures.

1.3 REFERENCES

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

1.4 SUBMITTALS FOR CLOSEOUT

- A. Operation and Maintenance Data: Submittals for Project closeout.
- B. Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.

- B. Provide Products listed and classified by Underwriters Laboratories, Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 DEVICE BOXES (RECESSED)

- A. Sheet Metal Device Boxes: NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
- B. Nonmetallic Device Boxes: NEMA OS 2.
- C. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- D. Wall Plates for Finished/Unfinished Areas: As specified in Section 16140.

2.2 DEVICE BOXES (SURFACE)

- A. Cast Aluminum Device Boxes: NEMA FB 1, aluminum.
 - 1. Surface mounted device boxes shall be cast aluminum box with threaded conduit openings. Exterior of box shall be smooth with unused conduit openings filled with flush sealing plugs. Exterior of box, surface conduit and hangers shall be painted to match wall finish. Standard wall plates as specified in Section 16140 shall be used. Wall plate size shall be selected to match the exterior dimension of the box as closely as possible to avoid overhanging edge of box. Box shall be mounted using mounting ears in wet locations and mounted through holes in the back of the box in dry locations.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer for wet locations.

2.3 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 16160.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install boxes in accordance with NECA "Standard of Installation."
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- C. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- D. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Adjust box location up to 10 feet if required to accommodate intended purpose.
- E. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- F. Maintain headroom and present neat mechanical appearance.
- G. Install boxes to preserve fire resistance rating of partitions and other elements.
- H. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- I. Align adjacent wall mounted device boxes for switches, thermostats, and similar devices.
- J. Use flush mounted device box in finished areas.
- K. Locate flush mounted device box in masonry wall to require cutting wall of masonry unit in block opening only. Coordinate masonry cutting to achieve neat opening.
- L. Do not install flush mounted boxes back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
- M. Secure flush mounted boxes to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- N. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

- O. Use adjustable steel channel fasteners for hung ceiling outlet box.
- P. Do not fasten boxes to ceiling support wires.
- Q. Support boxes independently of conduit.
- R. Use gang box where more than one device is mounted together. Do not use sectional box.
- S. Use gang box with plaster ring for single device outlets.
- T. Use cast device box in exterior locations exposed to the weather and other wet locations.
- U. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate installation of device boxes for equipment connected under Section 16180.

3.3 ADJUSTING

- A. Section 01650 - Testing, Adjusting, and Balancing: Adjusting installed work.
- B. Adjust flush-mounting devices to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

3.4 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16141
WIRING DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Wall switches.
- B. Receptacles.
- C. Device plates and box covers.

1.02 REFERENCES

- A. NEMA WD 1 - General-Purpose Wiring Devices.
- B. NEMA WD 5 - Specific-Purpose Wiring Devices.

1.03 RELATED SECTIONS

- A. 01300 - Submittals.
- B. 01600 - Materials and Equipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - WALL SWITCHES.

- A. Hubbell.
- B. Pass & Seymour.
- C. Arrow Hart.
- D. Slater.

2.02 WALL SWITCHES

- A. Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP: NEMA WD; 1 AC general use snap switch with toggle handle, rated 20 amperes and 120 volts AC. Handle: Ivory plastic.
- B. Pilot Light Type: Lighted handle.

C. Locator Type: Lighted handle.

2.03 ACCEPTABLE MANUFACTURERS - RECEPTACLES

- A. Hubbell.
- B. Pass & Seymour.
- C. Arrow Hart.
- D. Slater.

2.04 RECEPTACLES

- A. Convenience and Straight-blade Receptacles: NEMA WD 1.
- B. Locking-Blade Receptacles: NEMA WD 5.
- C. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20 R, ivory plastic face.
- D. Specific-use Receptacle Configuration: NEMA WD 1 or WD 5; type as indicated on Drawings, ivory plastic face.
- E. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter.

2.05 ACCEPTABLE MANUFACTURERS - WALL PLATES

- A. Hubbell.
- B. Pass & Seymour.
- C. Arrow Hart.
- D. Slater.

2.06 WALL PLATES

- A. Cover Plates: Stainless Steel.
- B. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device covers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install wall switches 48 inches above floor, OFF position down.
- B. Install convenience receptacles 18 inches above floor, grounding pole on bottom.
- C. Install specific-use receptacles at heights shown on Contract Drawings.
- D. Install stainless steel plates on outlet boxes and junction boxes in unfinished areas, and on surface-mounted outlets.
- E. Install devices and wall plates flush and level

END OF SECTION

SECTION 16195
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Wire and cable markers.

1.2 RELATED SECTIONS

- A. Section 16130 - Boxes.

1.3 REFERENCES

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

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure.

2. Communication cabinets.
3. Motor Starters.

C. Letter Size:

1. Use 1/8 inch letters for identifying individual equipment and loads.
2. Use 1/4 inch letters for identifying grouped equipment and loads.

2.2 WIRE MARKERS

A. Manufacturers:

1. Panduit.
2. Brady.
3. Thomas & Betts.
4. Substitutions: Under provisions of Section 01300.

B. Description: Tape, split sleeve, or tubing type wire markers.

C. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.

D. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings

2.3 UNDERGROUND WARNING TAPE

A. Manufacturers:

1. Panduit.
2. Thomas & Betts.
3. Thor Enterprises.
4. Substitutions: Under provisions of Section 01300.

B. Description: 4 inch wide plastic tape, colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates.

3.2 APPLICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using adhesive.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

END OF SECTION



SECTION 16440
DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Disconnect switches.
- B. Fuses.
- C. Enclosures.

1.2 REFERENCES

- A. ANSI/UL 198C - High-Intensity Capacity Fuses; Current Limiting Types.
- B. ANSI/UL 198E - Class R Fuses.
- C. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
- D. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted.
- E. NEMA KS 1 - Enclosed Switches.

1.3 SUBMITTALS

- A. Submit product data under Section 01300 - Submittals.
- B. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

1.4 RELATED SECTION

- A. Section 01600 - Materials and Equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

- A. Square D.
- B. General Electric.
- C. Westinghouse.

- D. Substitutions: Approved equal.

2.2 DISCONNECT SWITCHES

- A. Fusible Switch Assemblies: NEMA KS 1; FS W-S-865; quick- make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: FS W-F-870. Designed to accommodate Class R fuses.
- B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; GD; FS W-S-865; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1; Type 1 or 3R.

2.3 ACCEPTABLE MANUFACTURERS - FUSES

- A. Buss.
- B. LittellFuse.
- C. Gould.
- D. Substitutions: Approved equal.

2.4 FUSES

- A. Fuses 600 Amperes and Less: ANSI/UL 198C, Class J or RK1; current limiting, dual-element, time delay, one-time fuse, 250 and 600 volt.
- B. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install disconnect switches where indicated on Drawings.
- B. Install fuses in fusible disconnect switches.

END OF SECTION

SECTION 16470

PANELBOARDS

PART 1 - GENERAL

1.1. WORK INCLUDED

- A. Distribution panelboards.
- B. Branch circuit panelboards.

1.2. RELATED SECTIONS

- A. Section 16190 - Supporting Devices.
- B. Section 16195 - Electrical Identification: Engraved nameplates.

1.3. REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation."
- B. NEMA AB 1 - Molded Case Circuit Breakers.
- C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- D. NEMA KS 1 - Enclosed Switches.
- E. NEMA PB 1 - Panelboards.
- F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NFPA 70 - National Electrical Code.

1.4. SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

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

1.5. PROJECT RECORD DOCUMENTS

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

1.6. OPERATION AND MAINTENANCE DATA

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

1.7. QUALITY ASSURANCE

Perform Work in accordance with NECA Standard of Installation.

1.8. QUALIFICATIONS

Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.9. REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

1.10. MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01700.
- B. Provide two of each panelboard key.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

- A. Square D.
- B. General Electric.
- C. Westinghouse/Cutler Hammer.
- D. Substitutions: Under provisions of Section 01300.

2.2. DISTRIBUTION PANELBOARDS

- A. Panelboards: NEMA PB 1, circuit breaker type.
- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum integrated short circuit rating: 22,000 amperes rms symmetrical for 240 volt panelboards, or as indicated.
- D. Molded Case Circuit Breakers: NEMA AB 1. Provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- E. Molded Case Circuit Breakers with Current Limiters: NEMA AB 1. Provide circuit breakers with replaceable current limiting elements, in addition to integral thermal and instantaneous magnetic trip in each pole.
- F. Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower, with melting alloy overload relay. Coil operating voltage: 240 volts, 60 Hertz. Size as shown on Drawings. Provide HAND-OFF-AUTO selector, STOP-START pushbutton station, and GREEN indicating light in front cover.
- G. Provide circuit breaker accessory trip units and auxiliary switches as indicated.
- H. Enclosure: As indicated.
- I. Cabinet Front: Surface type, fastened with concealed trim clamps. Provide hinged door with flush lock. Finish in manufacturer's standard gray enamel.

2.3. BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB1, circuit breaker type.

- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum integrated short circuit rating: 22,000 amperes rms symmetrical for 240 volt panelboards, or as indicated.
- D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.
- E. Enclosure: As indicated.
- F. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.

PART 3 – EXECUTION

3.1. INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb. Provide supports in accordance with Section 16190.
- C. Height: 6 ft to top of panelboard; install panelboards taller than 6 ft with bottom no more than 4 inches above floor.
- D. Provide filler plates for unused spaces in panelboards.
- E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- F. Provide engraved plastic nameplates under the provisions of Section 16195.

3.2. FIELD QUALITY CONTROL

Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

SECTION 16480
MOTOR CONTROL

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Magnetic motor starters.
- B. Motor control centers.
- C. Motor starter panel boards.

1.02 RELATED WORK

- A. Section 16190 - Supporting Devices: Housekeeping pads.

1.03 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. ANSI/IEEE 344 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
- C. ANSI/UL 198C - High-Intensity Capacity Fuses; Current-Limiting Types.
- D. ANSI/UL 198E - Class R Fuses.
- E. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service.
- F. FS W-P-115 - Power Distribution Panel.
- G. FS W-F-870 - Fuseholders (For Plug and Enclosed Cartridge Fuses).
- H. FS W-S-865 - Switch, Box, (Enclosed), Surface-Mounted.
- I. NEMA AB 1 - Molded Case Circuit Breakers.
- J. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- K. NEMA KS 1 - Enclosed Switches.
- L. NEMA PB 1 - Panel boards.

- M. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panel boards Rated 600 Volts or Less.

1.04 SUBMITTALS

- A. Submit shop drawings and product data under provisions of this specification.
- B. Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.
- C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.
- D. Submit manufacturers' instructions under provisions of this specification.

1.05 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of this specification.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of this specification.
- B. Deliver in 60-inch maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.
- C. Store and protect products under provisions of this specification.
- D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

1.07 SPARE PARTS

- A. Keys: Furnish 3 each to Owner.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Substitutions: Approved equal.

2.02 MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Full Voltage Starting: Non-reversing type.
- C. Coil Operating Voltage: 120 volts, 60 Hertz.
- D. Size: NEMA ICS 2; size as shown on Drawings.
- E. Overload Relay: NEMA ICS 2; melting alloy.
- F. Enclosure: NEMA ICS 6; Type 1.
- G. Auxiliary Contacts: NEMA ICS 2; two and normally closed field convertible contacts in addition to seal-in contact.
- H. Pushbuttons: NEMA ICS 2; START/STOP in front cover.
- I. Indicating Lights: NEMA ICS 2; RUN: green in front cover.
- J. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO locking type in front cover.
- K. Relays: NEMA ICS 2.

2.04 CONTROLLER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

- A. Molded Case Thermal-Magnetic Circuit Breakers: NEMA AB\1; FS W-C-375; circuit breakers with integral thermal and instantaneous magnetic trip in each pole.
- B. Motor Circuit Protector: NEMA AB 1; FS W-C-375; circuit breakers with integral instantaneous magnetic trip in each pole.
- C. Nonfusible Switch Assemblies: NEMA KS 1; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle. Provide interlock to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

2.05 ACCEPTABLE MANUFACTURERS - MOTOR CONTROL CENTER

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Substitutions: Approved equal.

2.06 MOTOR CONTROL CENTER

- A. Motor Control Centers: NEMA ICS 2; Class I Type A.
- B. Main Overcurrent Protection: As scheduled.
- C. Motor Starters: As scheduled.
- D. Feeder Tap Units: As scheduled.
- E. Voltage Rating: 120/240 volts, three phase, four wire, 60 Hertz.
- F. Horizontal Bussing: Copper with a continuous current rating of 400 amperes. Include copper ground bus entire length of control center.
- G. Vertical Bussing: NEMA ICS 2; copper.
- H. Integrated Equipment Short Circuit Rating: 22K amperes rms symmetrical at 600 volts.
- I. Configuration: Units front mounting only, accessible from the front and rear.

- J. Enclosure: ANSI/NEMA ICS 6; Type 1 or 12.
- K. Finish: Manufacturer's standard gray enamel.
- L. Seismic Requirements: ANSI/IEEE 344; Class I.

2.07 ACCEPTABLE MANUFACTURERS - MOTOR STARTER PANELBOARD

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Substitutions: Approved equal.

2.08 MOTOR STARTER PANELBOARD

- A. Motor Starter Panel boards: NEMA PB 1; circuit breaker type.
- B. Motor Starters: As indicated on Drawings.
- C. Enclosure: NEMA PB 1; Type 1.
- D. Provide surface cabinet front with concealed trim clamps, and hinged door with flush lock. Finish in manufacturer's standard gray enamel.
- E. Provide motor starter panel boards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all motor starter panel boards.
- F. Minimum Integrated Short Circuit Rating: 22K amperes rms symmetrical at 240 volts, three phase.

2.09 FUSES

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Motor Starter Panel board Installation: In conformance with NEMA PB 1.1.
- C. Install fuses in fusible switches.

- D. Select and install heater elements in motor starters to match installed motor characteristics.
- E. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION

**SECTION 7
CONTRACT AND BOND FORMS**

**"CONTRACT No. 15 PHASE II-A - WATERLINE
EXTENSIONS"**

AGREEMENT

PAYMENT BOND

PERFORMANCE BOND

CERTIFICATE OF INSURANCE

NOTICE OF AWARD

NOTICE TO PROCEED

CHANGE ORDER

PARTIAL PAYMENT REQUEST

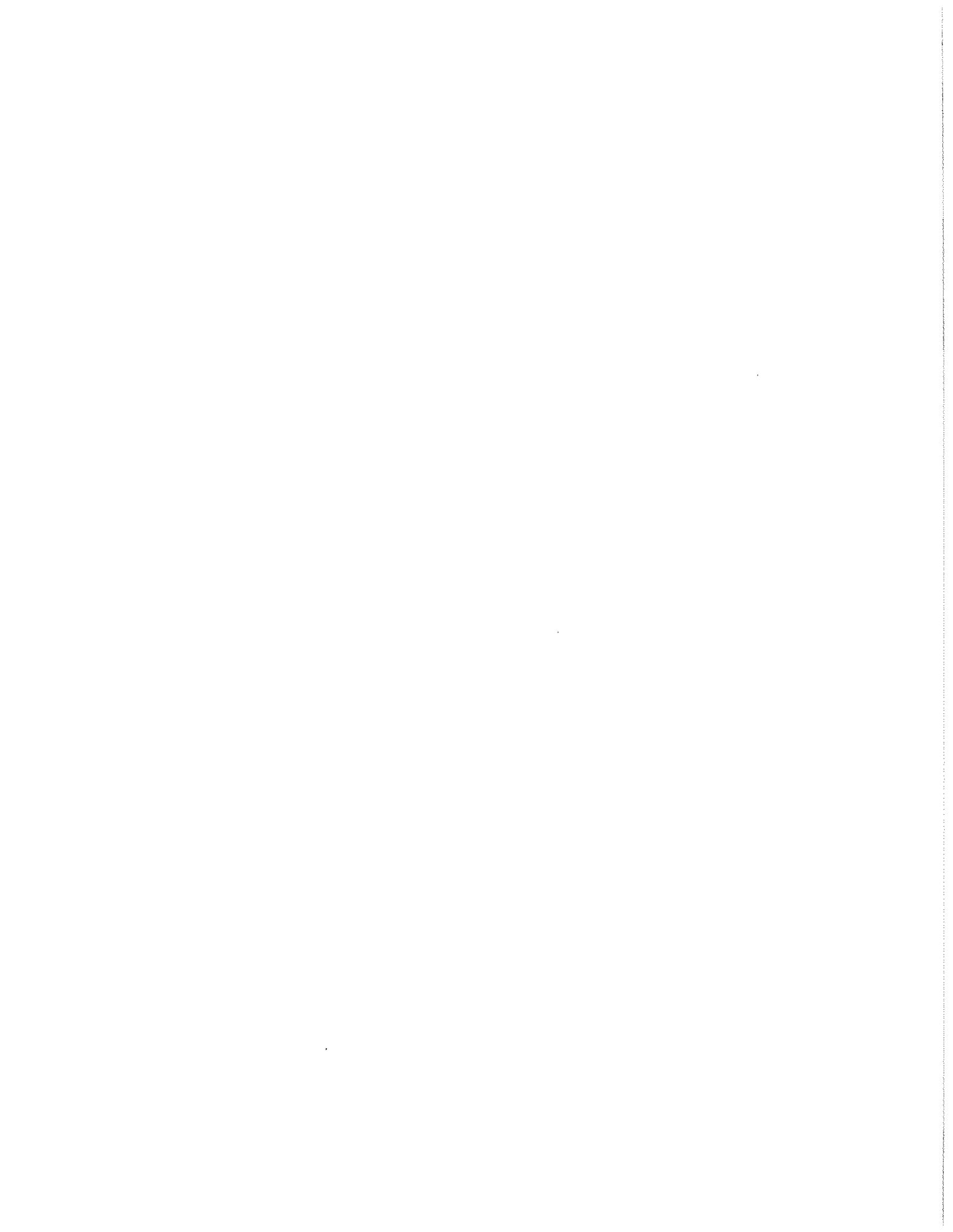
CERTIFICATE OF SUBSTANTIAL COMPLETION

FORM OF WAIVER AND RELEASE OF LIEN

(General Contractor)

FORM OF WAIVER AND RELEASE OF LIEN

(Sub-Contractor)



AGREEMENT

THIS AGREEMENT, made this the _____ day of _____, and between The Hyden-Leslie County Water District hereinafter called "OWNER", and _____ doing business as a (corporation, partnership, or individual) hereinafter called "CONTRACTOR."

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of: **Contract No. II-A - Waterline Extensions.**
2. The CONTRACTOR will furnish all the material, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the Project Work described herein.
3. The CONTRACTOR will commence the Work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will complete the same within **300** calendar days unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS. If the Work is not completed within the **300** calendar days specified. Liquidated Damages will be deducted from the compensation otherwise due him at the rate **\$500.00** per calendar day that the Work remains uncompleted.
4. The CONTRACTOR agrees to perform all of the Work described in the CONTRACT DOCUMENTS and to comply with the terms therein for the sum of \$_____ as shown in the Bid Schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
 - A. Advertisement for Bids

- B. Instructions to Bidders
- C. Bid Form with Certifications
- D. Bid Bond with Power of Attorney
- E. Agreement
- F. General and Supplemental Conditions
- G. Special Conditions
- H. Payment Bond with Power of Attorney
- I. Performance Bond with Power of Attorney
- J. Notice of Award
- K. Notice to Proceed
- L. Change Order
- M. Certificate of Substantial Completion
- N. All Conditions and Technical SPECIFICATIONS prepared or issued by Sisler-Maggard Engineering, PLLC, dated April, 2013 or as amended.
- Q. DRAWINGS prepared by Sisler-Maggard Engineering, PLLC, consisting of 72 sheets for Contract No. II-A – Contract No. 15 - Waterline Extensions and dated April, 2013 for SME Project No. 07080.

R. ADDENDA
No. _____, dated _____, 2013

- 6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions & Supplemental Conditions such amounts as required by the CONTRACT DOCUMENTS.
- 7. This Agreement shall be binding upon all parties hereto and their respective heirs,

executors, administrators, successors and assigns.

IN WITNESS WHEREOF, the parties hereto have executed or caused to be executed by their duly authorized officials, this Agreement in 6 (six) counterparts each of which shall be deemed an original on the date first above written.

(SEAL)

ATTEST:

NAME: _____
(PLEASE TYPE)
TITLE: _____

(SEAL)

ATTEST:

NAME: _____
(PLEASE TYPE)
TITLE: _____

OWNER: Hyden-Leslie County Water District

BY: _____

NAME: Fred Ratliff
(PLEASE TYPE)

TITLE: Chairman

ADDRESS: 325 Wendover Rd.
Hyden, Kentucky 41749

PHONE: 606-672-2791
FAX: 606-672-7510

CONTRACTOR: _____

BY: _____

NAME: _____
(PLEASE TYPE)

TITLE: _____

ADDRESS: _____

PHONE: _____

FAX: _____

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called Principal,

and _____
(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

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

THE CONDITION OF THIS OBLIGATION is such that whereas, the PRINCIPAL entered into a certain contract with the OWNER, dated the ____ day of _____, 2013 a copy of which is hereto attached and made a part hereof for the construction of: **Contract No. 15 – PHASE II-A - Waterline Extensions.**

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modifications thereof, including all amounts due for materials, lubricants, oil, gasoline, coal, and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and for all labor

cost incurred in such WORK including that by a SUBCONTRACTOR, and to any mechanic or materialman lienholder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

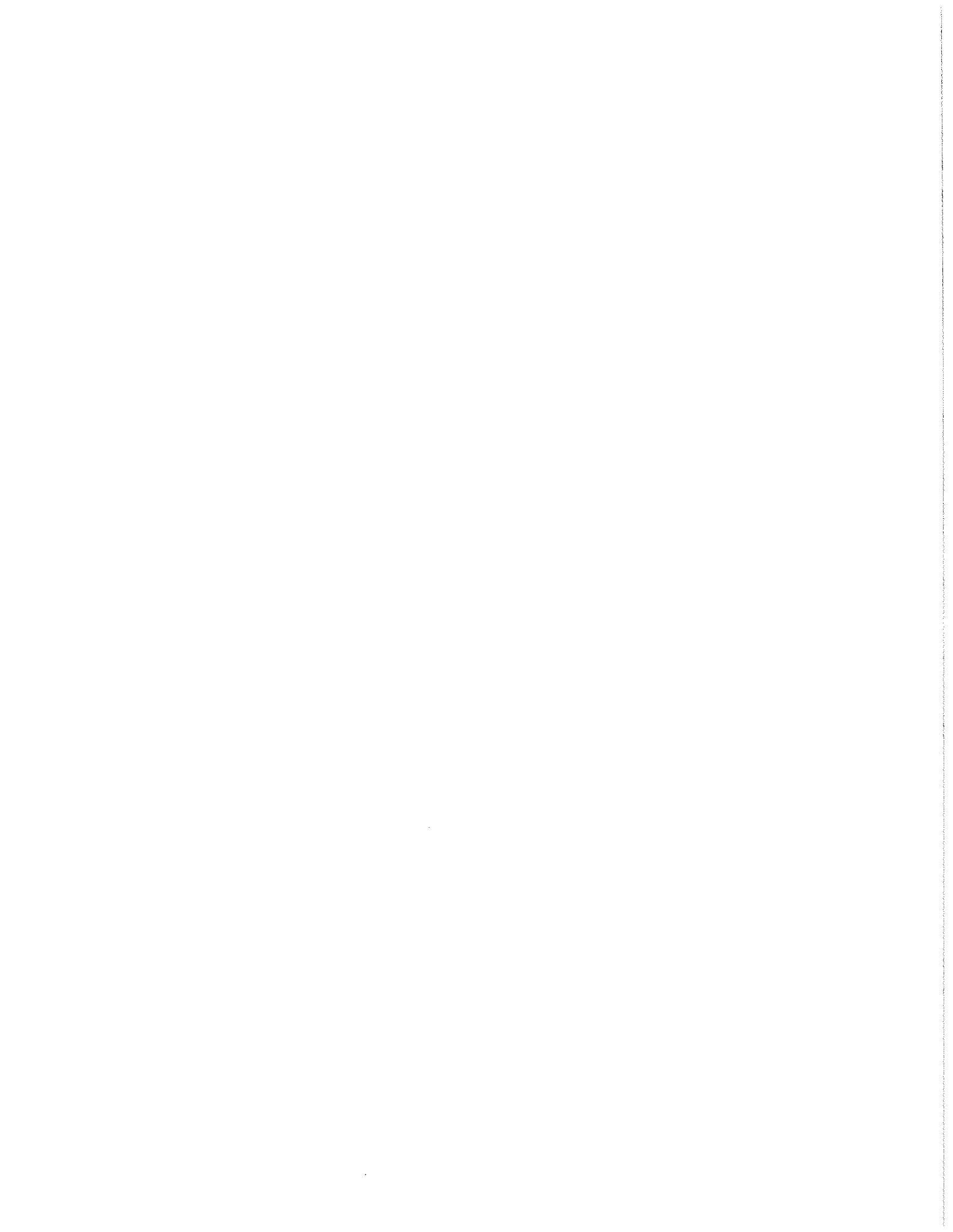
PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, and persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

PROVIDED, FURTHER, that the said Surety for value received 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 of the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no suit or action shall be commenced hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL (or with the GOVERNMENT in the event the GOVERNMENT is performing the obligations of the OWNER), shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, is being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction hereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

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

PROVIDED, FURTHER, that no financial settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.



IN WITNESS WHEREOF, this instrument is executed in 6 (six) counterparts,
(number)

each one of which shall be deemed an original, this the _____ day of _____, 2013

ATTEST:

(Principal)

(Principal Secretary)

(SEAL)

BY: _____ (s)

(Witness as to Principal)

(Address)

(Address)

(Surety)

ATTEST:

BY: _____
Attorney-in-Fact

(Witness to Surety)

(Address)

(Address)

NOTE: Date of BOND must not be prior to date of CONTRACT. If CONTRACTOR is a partnership, all partners shall execute BOND.

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

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

_____, hereinafter called Principal,
and
(Corporation, Partnership or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

(Name of Owner)

(Address of Owner)

hereinafter called OWNER in the total aggregate sum of _____ Dollars (\$)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the ____ day of _____, 2013, a copy of which is hereto attached and made a part hereof for the construction of:

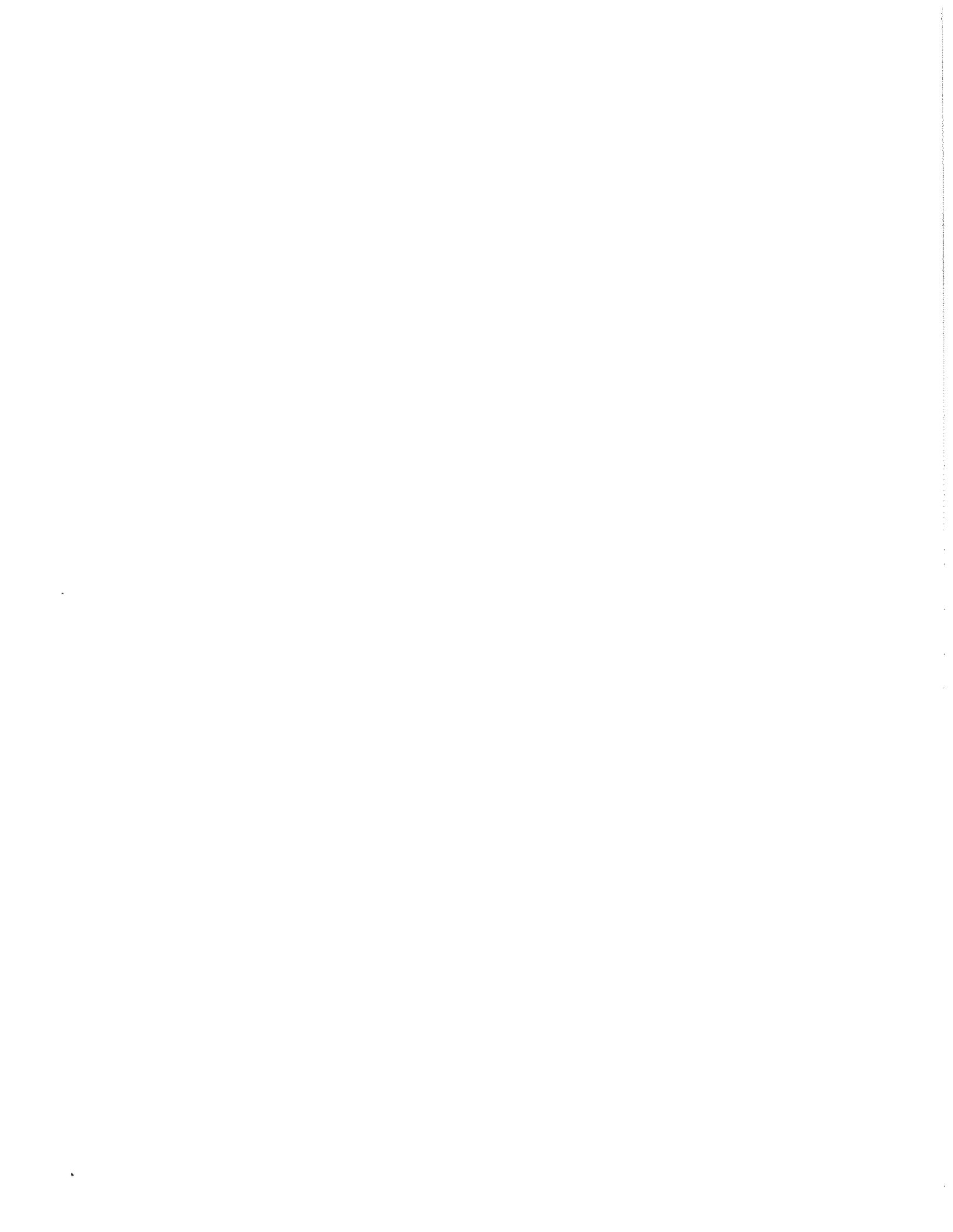
Contract No. 15 – PHASE II-A - Waterline Extensions

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the SURETY and during the one year guaranty period, and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then his obligation shall be void otherwise to remain in full force and effect.

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

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

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



IN WITNESS WHEREOF, this instrument is executed in 6 (six) counterparts,
(number)
each one of which shall be deemed an original, this the ____ day of ____, 2013.

ATTEST:

(Principal)

(Principal Secretary)
(SEAL)
(s)

BY: _____

(Witness as to Principal)

(Address)

(Address)

ATTEST:

(Surety)

(Surety Secretary)
(SEAL)
(s)

BY: _____

(Witness to Surety)

(Attorney-in-Fact)

(Typed Name)

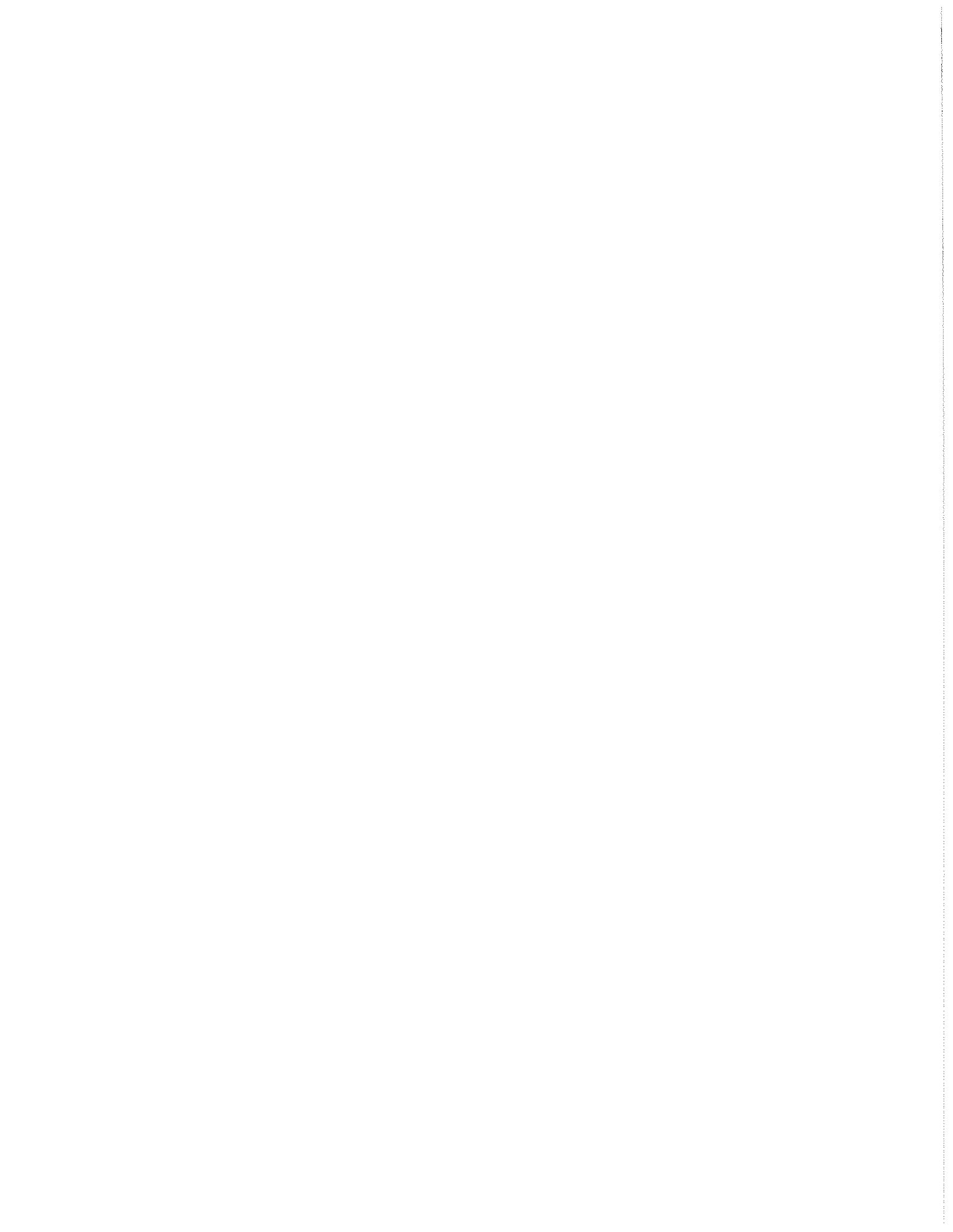
(Address)

(Phone)

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

If CONTRACTOR is a partnership, all partners shall execute BOND.

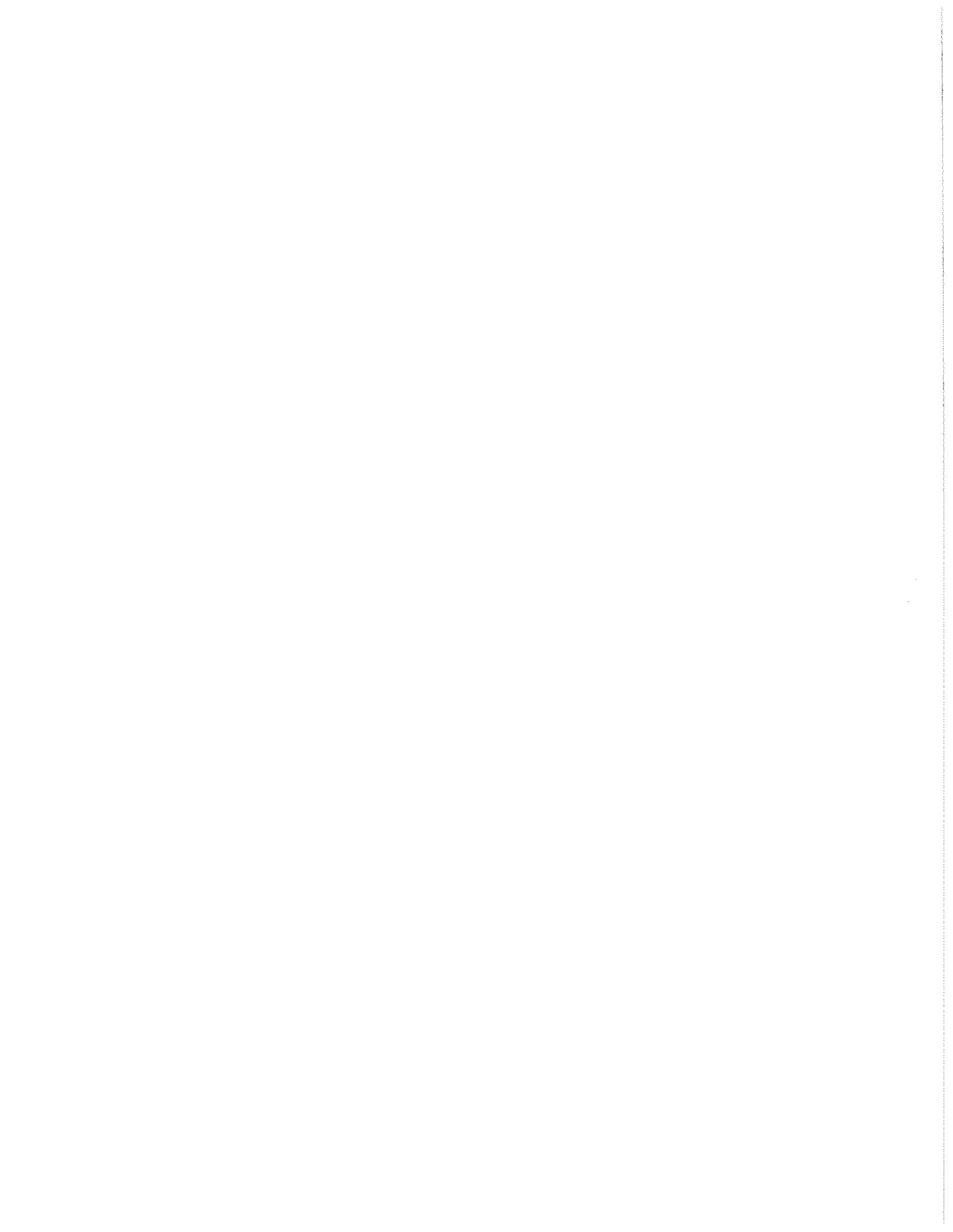
IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.



CERTIFICATE OF INSURANCE

TO BE FURNISHED

BY SUCCESSFUL BIDDER



NOTICE OF AWARD

TO: _____

PROJECT Description: The project includes but is not limited to, the construction of:

Contract No. 15 – PHASE II-A - Waterline Extensions

The OWNER has considered the BID submitted by you for the above described WORK in response to its for Bids received _____, and Instructions for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ _____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, and Payment BOND and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 2013.

OWNER

BY: _____
Fred Ratliff

TITLE: Chairman

ACCEPTANCE OF NOTICE

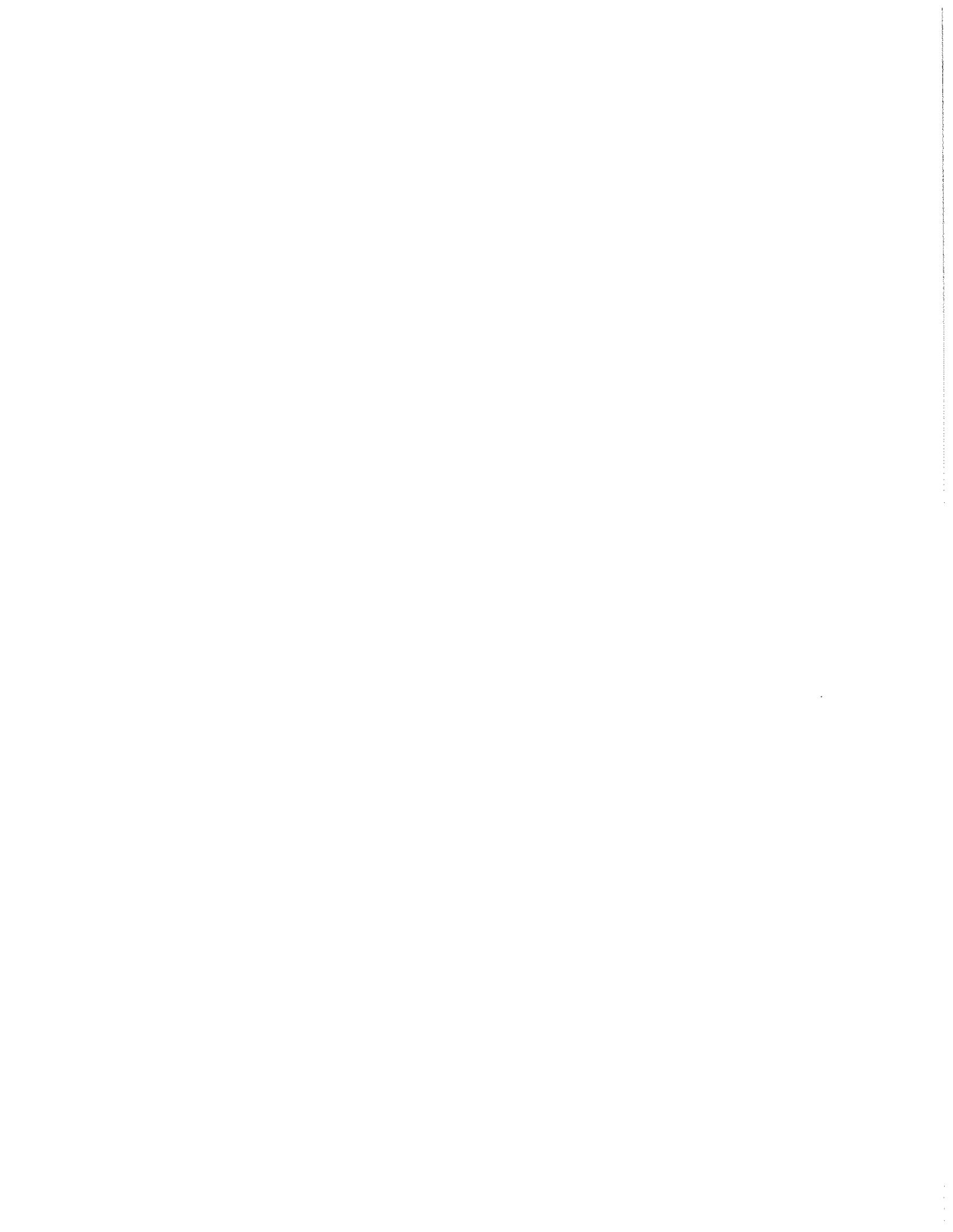
Receipt of the above NOTICE OF AWARD is hereby acknowledged

by _____

this the _____ day of _____, 2013.

By: _____

Title: _____



NOTICE TO PROCEED

TO: _____
(Contractor)

DATE: _____

ADDRESS:

OWNER'S PROJECT NO. 07080
PROJECT Contract No. 15
OWNER'S CONTRACT NO. II-A - Waterline Extensions

You are hereby notified to commence WORK in accordance with the Agreement dated _____ on or before _____ and you are to complete the WORK within **300 consecutive calendar days** thereafter. The date of completion of all WORK is therefore _____.

Owner

By: _____

Name: Fred Ratliff

Title: Chairman

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by

this the _____ day of _____, 2013.

By: _____

Name: _____

Title: _____

CHANGE ORDER

Order No. _____

Date: _____

Agreement Date: _____

NAME OF PROJECT: _____

OWNER: _____

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

Change to CONTRACT PRICE:

Original CONTRACT PRICE \$ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER \$ _____

The CONTRACT PRICE due to this CHANGE ORDER will be increased by: \$ _____

The new CONTRACT PRICE including this CHANGE ORDER will be \$ _____

Change to CONTRACT TIME:

The CONTRACT TIME will be increased by _____ calendar days.

The date for completion of all work will be _____ [Date].

Approvals Required:

To be effective this Order must be approved by the Federal agency if it changes the scope or objective of the PROJECT, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

Requested by: _____
Contractor Date

Recommended by: _____
Sisler-Maggard Engineering, PLLC. Date

Approved by: _____
Hyden-Leslie County Water District Date

**PAY REQUEST FORM
WILL BE FURNISHED ON DISC
BY THE ENGINEER
AT PRE-CONSTRUCTION CONFERENCE**

CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No: _____ ENGINEER's Project No.: 07080
Project Contract No. 15 Phase II-A - Waterline
Extensions

CONTRACTOR
Contract For _____

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

To _____
OWNER

And To _____
CONTRACTOR

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

_____ DATE OF SUBSTANTIAL COMPLETION

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

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

RESPONSIBILITIES:

OWNER:

CONTRACTOR:

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

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

Executed by ENGINEER on _____ 2013

Sisler-Maggard Engineering, PLLC
ENGINEER

By:

Joseph F. Sisler, P.E., P.L.S., President

CONTRACTOR accepts this Certificate of Substantial Completion on _____ 2013

CONTRACTOR

By: _____

OWNER accepts this Certificate of Substantial Completion on _____ 2013

Hyden-Leslie County Water District
OWNER

By: _____

Fred Ratliff, Chairman

FORM OF WAIVER AND RELEASE OF LIEN

(General Contractor)

TO WHOM IT MAY CONCERN:

WHEREAS, the undersigned has performed or furnished, is performing, or furnishing, or will perform or furnish labor or material, fuel, equipment, tools, etc., in connection with the construction of Contract No. 15 Phase II-A - Waterline Extensions for Hyden-Leslie County Water District at Leslie County, Kentucky

NOW, THEREFORE, THESE PRESENTS WITNESS, that the undersigned, for a good and valuable consideration to the undersigned well and truly paid at or before the signing and delivery hereof, the receipt whereof is hereby acknowledged, does hereby waive, release and relinquish any and all claims, liens and rights and claims of liens which the undersigned now has, or may hereafter have, on or against the said premises and the building, plant, equipment and machinery of their Owner, Hyden-Leslie County Water District, or on or against Hyden-Leslie County Water District, on account of labor performed or to be performed or material, fuel, equipment, tools, etc., furnished or to be furnished by the undersigned for use in or in connection with the construction and erection of said project; so that Hyden-Leslie County Water District, its successors and assigns, shall and my have, hold and enjoy the same freed and discharged now has or might or could have if these presents had not been made.

IN WITNESS WHEREOF, the undersigned has hereunto set his hand and seal this _____ day of _____, 2013.

Name of General Contractor

By _____
Signature of Officer or Partner

Title or Officer

WITNESS:

FORM OF WAIVER AND RELEASE OF LIEN

(Sub-Contractor)

TO WHOM IT MAY CONCERN:

WHEREAS, the undersigned has performed or furnished, is performing, or furnishing, or will perform or furnish labor or material, fuel, equipment, tools, etc., in connection with the construction of Contract No. 15 – Phase II A - Waterline Extensions for Hyden-Leslie County Water District at Leslie County, Kentucky.

NOW, THEREFORE, THESE PRESENTS WITNESS, that the undersigned, for a good and valuable consideration to the undersigned well and truly paid at or before the signing and delivery hereof, the receipt whereof is hereby acknowledged, does hereby waive, release and relinquish any and all claims, liens and rights and claims of liens which the undersigned now has, or may hereafter have, on or against the said premises and the building, plant, equipment and machinery of their Owner, Hyden-Leslie County Water District, or on or against Hyden-Leslie County Water District, its successors and assigns, or on or against the General Contractor Hyden-Leslie County Water District, his or its heirs, executors, administrators, successors and assigns, under the laws of the Commonwealth of Kentucky, on account of labor performed or to be performed, or material, fuel, equipment, tools, etc., furnished or to be furnished by the undersigned for use in or in connection with the construction and erection of said building; so that the said Hyden-Leslie County Water District, its successors and assigns, shall may have, hold and enjoy same freed and discharged from all liens, claims and demands whatsoever which the undersigned now has or might or could have if these presents had not been made.

IN WITNESS WHEREOF, the undersigned has hereunto set his hand and seal this _____ day of _____, 2013.

Name of Sub-Contractor

By _____
Signature of Officer or Partner

Title or Officer

WITNESS:

SECTION 8

BID FORMS AND BID BONDS

BID FORMS INCLUDING SUBCONTRACTORS & MANUFACTURERS LIST

BID BOND WITH POWER OF ATTORNEY

BIDDER'S QUALIFICATIONS STATEMENT

**Forms presented in this Section 8 must be used. No Substitutes will be allowed.
An extra set of the above forms will be furnished to each plan holder for preparation of bids.**

All of the above forms must be submitted with bids on each contract.

BID FORM
HLCWD – CONTRACT NO. 15 – Phase II-A - WATERLINE EXTENSIONS

BIDDER'S PROPOSAL

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____, doing business as (a partnership, or a corporation, or an individual) _____, to **Hyden-Leslie County Water District** (hereinafter called "OWNER").

In compliance with the Advertisement for Bids, BIDDER hereby proposes to furnish all equipment, materials, and labor for the work required to construct the **Contract No. 15 Phase II-A - Waterline Extensions** in strict accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

BID SCHEDULE

ITEM DESCRIPTION	APPROX. QUANTITY	UNIT COST	TOTAL COST
1. 4" C900 DR 14 PVC Waterline	86,000	LF	_____
2. 4" Class 250 PVC Waterline	76,000	LF	_____
3. 3" Class 250 PVC Waterline	46,000	LF	_____
4. 3" Class 200 PVC Waterline	25,000	LF	_____
5. 2" Class 250 PVC Waterline	34,000	LF	_____
6. 2" Class 200 PVC Waterline	3,200	LF	_____
7. 1" Class 250 Polyethylene Service Line	5,000	LF	_____
8. ¾" Class 200 Polyethylene Service Line	7,500	LF	_____
9. 4" Gate Valve	37	EA	_____
10. 3" Gate Valve	15	EA	_____
11. 2" Gate Valve	18	EA	_____
12. Leak Detection Assembly (All sizes)	12	EA	_____
13. Blowoff Assembly Valve (All sizes)	70	EA	_____
14. Air Release Valves (All sizes)	20	EA	_____
15. Pavement Replacement (HD) (county roads)	2,500	SY	_____
16. Pavement Replacement (LD) (driveways, etc.)	2,500	SY	_____

17.	Gravel Surface Replacement	8,000	SY	_____	_____
18.	Concrete Surface Replacement	100	SY	_____	_____
19.	Concrete Encasement	500	SY	_____	_____
20.	Large Stream Crossing (All sizes)	800	LF	_____	_____
21.	Tie new 2" to existing 3"	1	EA	_____	_____
22.	Tie new 3" to existing 3"	1	EA	_____	_____
23.	Tie new 4" to existing 4"	2	EA	_____	_____
24.	Tie new 2" to existing 2" w/ Wet Tap	2	EA	_____	_____
25.	Tie new 2" to existing 3" w/ Wet Tap	1	EA	_____	_____
26.	Tie new 2" to existing 4" w/ Wet Tap	2	EA	_____	_____
27.	Tie new 2" to existing 6" w/ Wet Tap	3	EA	_____	_____
28.	Tie new 2" to existing 8" w/ Wet Tap	1	EA	_____	_____
29.	Tie new 3" to existing 3" w/ Wet Tap	3	EA	_____	_____
30.	Tie new 3" to existing 4" w/ Wet Tap	1	EA	_____	_____
31.	Tie new 3" to existing 6" w/ Wet Tap	3	EA	_____	_____
32.	Tie new 4" to existing 4" w/ Wet Tap	4	EA	_____	_____
33.	Tie new 4" to existing 6" w/ Wet Tap	1	EA	_____	_____
34.	5/8" x 3/4" Meter Assembly	48	EA	_____	_____
35.	5/8" x 3/4" Meter Assembly w/PRV	159	EA	_____	_____
36.	Bore & Jack w/4" WL. & 8" Steel Casing	360	LF	_____	_____
37.	Bore & Jack w/3" WL. & 6" Steel Casing	80	LF	_____	_____
38.	Bore & Jack w/2" WL. & 4" Steel Casing	180	LF	_____	_____
39.	Flush Hydrant Assembly w/Gate Valve	1	EA	_____	_____
40.	Pump Station (Hell for Certain)	1	EA	_____	_____

41. Pump Station (Grassy)	1	EA	_____	_____
42. Pump Station (S.R. 1780)	1	EA	_____	_____
43. Fiberglass Markers	150	EA	_____	_____
44. Monitoring Telemetry w/ antenna at Pump Stations	3	EA	_____	_____
45. Horizontal Directional Drilling 4" HDPE (DR11) (D.I.P.S.)	180	LF	_____	_____

TOTAL AMOUNT BID (ITEMS No. 1 – 45) _____

BIDDER agrees to perform all of the Work described in the Specifications and shown on the Plans for the bid price of : _____ Dollars and _____ Cents (\$ _____). (Amount shall be shown in both words and figures. The Unit Price shall govern. The Owner will make corrections in extensions and additions to determine the Total Bid Amount for Award.

The quantities of each item on the bid, as finally ascertained at the close of the contract, will determine the total payments to accrue under the contract.

No bid will be considered unless all items in the Bid Schedule are priced, and only one contract will be awarded.

The bid will be awarded in the aggregate total of the Bid Schedule.

The above price shall include all labor, materials, overhead, profit, insurance, and other costs necessary to cover the finished work of the several kinds called for including incidentals not set out as specific bid items and in accordance with Basis for Payment (Section 01740 of Specifications). The price per foot for pipe installation includes all labor, materials, excavation backfill, clean-up, seeding, testing etc., for a finished product. Changes shall be processed in accordance with Article 14 of the General Conditions.

By submission of this Bid, the BIDDER certifies, and in the case of a joint Bid, each party thereto certifies as to its own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this bid, with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence work under this Contract on or before a date to be specified in the Notice to Proceed and to fully complete the project within 300 consecutive calendar days thereafter. BIDDER further agrees to pay as liquidated damages, the sum of \$500.00 for each consecutive calendar day thereafter as provided in Article 13 of the General Conditions.

Accompanying this Proposal is a certified check or standard Bid Bond in the sum of Dollars (\$ _____) in accordance with the Information for Bidders to the OWNER that the amount of the bid security deposited with this Bid fairly and reasonably represents

the amount of damages the OWNER will suffer due to the failure of this BIDDER to fulfill his agreements as provided in this Proposal.

BIDDER acknowledges receipt of the following Addenda:

Addenda #1	Dated	Addenda #4	Dated
Addenda #2	Dated	Addenda #5	Dated
Addenda #3	Dated	Addenda #6	Dated

BIDDER agrees that the OWNER reserves the right to delete the whole or any part of the Project from the Contract.

BIDDER understands that the OWNER reserves the right to reject any or all Bids and to waive any informalities in the Bidding.

BIDDER agrees that this Bid shall be good and may not be withdrawn for a period of forty-five (45) calendar days after the actual date of bid opening.

Within ten (10) calendar days after receiving written notice of the acceptance of this Bid by the OWNER, the Bidder will execute and deliver to the OWNER six (6) copies of the Agreement and such other required Contract Documents.

BIDDER: _____

BY: _____

TYPED NAME: _____

TITLE: _____

(Seal - If bid is by a corporation)

ADDRESS: _____

DATE SIGNED: _____

PHONE NO.: _____

FAX NO.: _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____ as Principal, and _____ as Surety, are hereby held and firmly bound unto _____ as OWNER in the penal sum of _____ (\$ _____) for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns. Signed, this ____ day of, _____, 2013. The Condition of the above obligation is such that whereas the Principal has submitted to a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing for the

Phase II-A – Contract No. 15 - Waterline Extensions

NOW THEREFORE,

- (a) If said BID shall be rejected, or in the alternate.
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then the obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID, and said Surety does hereby waive notice of any such extension.

IN WITNESS HEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal: _____

Surety: _____

BY: _____

Signature: _____

Typed Name: _____

DATE: _____

PHONE: _____

FAX: _____

IMPORTANT:

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

BIDDER'S QUALIFICATIONS

The Bidder's Qualifications are required by the Owner to be submitted as set forth herewith:

1. Name of Firm : _____
2. This Firm is Corporation or _____Partnership or _____Proprietorship.
3. A permanent place of business is maintained at:

Street	City	State	Zip Code
--------	------	-------	----------

4. The following construction plant and equipment will be made available for use on this contract:

5. In the event the contract is awarded the undersigned, surety bonds will be furnished by:

6. Experience of Contractor on other similar work:

Total Contract	Client Name & Address	Phone	Reference
----------------	-----------------------	-------	-----------

Contract No. _____

Type _____ \$ _____

7. We now have the following jobs under contract and bonded:

Total Contract	Percent Completed	Client Name & Address	Phone	Name of Reference
Contract No. \$ _____				
Location _____				
Contract No. \$ _____				
Location _____				
Contract No. \$ _____				
Location _____				
Contract No. \$ _____				
Location _____				

8. FINANCIAL STATEMENT: SEE ATTACHED BALANCE SHEET

Statement of Assets and Liabilities as of _____, 2013.

This Statement should be prepared by applicant, his bookkeeper, or accountant. Audit report by CPA or licensed accountant may be required.

ASSETS

LIABILITIES

Cash in Bank
Cash on Hand

Notes Payable
(a) Banks
(b) Material men
(c) Other

Accounts Receivable (Including Retentions)

(a) Completed Contracts
(b) Uncompleted Contracts

Accounts Payable
Unbilled Job Costs

(a) Sub-Contractors

(b) Material men

Other Accounts Receivable	
Marketable Securities	Billings in Excess of Job Costs
Materials in Stock Not Included in Items above	Current Debt (Due in 1 Year)
(a) For Jobs underway	(a) Equipment
(b) Other	(b) Real Estate
Income Tax	
(a) Current	
Automobiles	
Sub-Total Current Assets	Sub-Total Current Liabilities
Notes Receivable	Equipment Debt-Over 1 year
Cash Value Life Insurance	Real Estate Debt-Over 1 year
Equipment at Book Value	
Real Estate at Book Value	
(a) Business	
(b) Homestead	
(c) Investment	
Automobiles	
Furniture & Fixtures	Capital Stock Surplus & Undivided Profits
Total Assets	Total Liabilities

TOTAL ASSETS MUST EQUAL TOTAL LIABILITIES

Respectfully Submitted: _____

Company Name

Signature Address

Name Typed

Title Date

Phone Fax

ATTEST: _____