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FACILITY FILE: MANATEE COUNTY  
LENA ROAD LF

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SOUTHWEST DISTRICT  
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**Specifications for Stage II Leachate Collection System**

**at the Lena Road Landfill**

**Project No. 485-0190-534**

**March, 1990**

**Project Owner:**

County of Manatee, Florida  
c/o Manatee County Purchasing Dept.  
2908 12th St. Ct. E.  
Bradenton, Florida 34208-3998

**Prepared By:**

Manatee County Public Works Dept..  
Engineering Division  
315 75th Street West  
Bradenton, Florida 34209  
Phone: 813-794-1939

**Approved By:**

**Thomas J. Zink, P.E., 36550**

**Date:**

**PROJECT NO. 485-0190-534**

**STAGE II LEACHATE COLLECTION SYSTEM  
AT LENA ROAD LANDFILL**

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**SECTION 00300**  
**BID FORM**  
**(Submit in Triplicate)**

**TO: Manatee County Purchasing**  
**2908 12th St. Ct. East**  
**Bradenton, FL 34208-3998**

**PROJECT IDENTIFICATION: Project No. 485-0190-534**  
**Stage II Leachate Collection System**  
**at the Lena Road Landfill**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the unit and lump sum prices entered in this bid form and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Project Manual. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of OWNER's Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
  - (a) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions progress, performance of furnishing of the Work.
  - (b) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing underground facilities at or contiguous to the site and assumes responsibility for the accurate location of said underground facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Paragraph 4.3 of the General Conditions.
  - (c) BIDDER has given written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof is acceptable to BIDDER.

00300-1



(d) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any groups, associations, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham BID; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

4. The following documents are attached to and made a condition of this Bid:

- (a) Required Bid Security in the form of \_\_\_\_\_
- (b) Completed Contractor's Questionnaire
- (c) Table I, Contractor's Proposed Unit and Lump Sum Bid Prices.

5. Communications concerning this Bid shall be addressed to the address of BIDDER indicated below:

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

SUBMITTED on \_\_\_\_\_, 19\_\_\_\_

FLORIDA Contractor's License # \_\_\_\_\_

COMPANY'S  
NAME: \_\_\_\_\_

AUTHORIZED  
SIGNATURE: \_\_\_\_\_

\_\_\_\_\_  
(Name and Title of Above Signer)

COMPANY'S  
ADDRESS: \_\_\_\_\_

STATE OF INCORPORATION: \_\_\_\_\_  
(if applicable)

(CORPORATE SEAL)

Attest \_\_\_\_\_  
(Secretary)

TELEPHONE: ( ) \_\_\_\_\_

**IF A PARTNERSHIP:**

**FIRM'S NAME:** \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_  
(General Partner)

\_\_\_\_\_  
(Print Name and Title of Above Signer)

**BUSINESS ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_

**TELEPHONE:** (       ) \_\_\_\_\_

**IF JOINT VENTURE:**

**SIGNATURE:** \_\_\_\_\_  
\_\_\_\_\_  
(Print Name of Above)

**ADDRESS:** \_\_\_\_\_

**TELEPHONE:** (       ) \_\_\_\_\_

**SIGNATURE:** \_\_\_\_\_  
\_\_\_\_\_  
(Print Name of Above)

**ADDRESS:** \_\_\_\_\_

**TELEPHONE:** (       ) \_\_\_\_\_

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a part to the joint venture should be in the manner indicated above).

TABLE 1 - BID FORM  
 CONTRACTOR'S UNIT AND LUMP SUM BID PRICES  
 STAGE II LEACHATE COLLECTION SYSTEM AT THE  
 LENA ROAD LANDFILL  
 PROJECT NO. 485-0190-534

ITEM NO. (1)	DESCRIPTION (2)	ESTIMATED QUANTITY (3)	UNIT OF MEASURE (4)	BID PRICE PER UNIT (5)	TOTAL BID PRICE (6)
1	HD Perforated Polyethelene Tubing	21,670	LF		
2	8" PVC Force Main AWWA C-900, Class 150	1,600	LF		
3	Leachate Pump Sta. No. 4 Complete	1	LS		
4	Vent Stakes	46	EA		
5	Manhole w/Warning Signs	47	EA		
6	Mobilization	1	LS		
	Total Bid, Items 1 thru 6				

Number of calendar days required for completion of work: \_\_\_\_\_ calendar days (not to exceed 150 calendar days after issuance of Notice to Proceed).

Prices are firm and irrevocable for a period of 60 days commencing with bid opening date and shall be considered firm and irrevocable for an additional \_\_\_\_\_ days.

**SECTION 00500**  
**FORM OF AGREEMENT**  
**BETWEEN**  
**MANATEE COUNTY FLORIDA**  
**AND THE CONTRACTOR AS IDENTIFIED BELOW**  
**ON THE BASIS OF A STIPULATED UNIT COST PROJECT PRICE**

THIS AGREEMENT is made and entered into by and between the COUNTY OF MANATEE, a political subdivision of the State of Florida, hereinafter referred to as the "OWNER" and \_\_\_\_\_ hereinafter referred to as the "CONTRACTOR", duly authorized to transact business in the State of Florida, with offices located at \_\_\_\_\_.

WITNESSETH, that the OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

**Article 1. WORK.**

The Contractor shall furnish all labor, materials, supplies and other items required to complete the Work for Project No. 485-0190-534, Stage II Leachate Collection System at the Lena Road Landfill, in strict accordance with specifications and any duly authorized subsequent addenda thereto, all of which are made a part hereof.

**Article 2. ENGINEER.**

The Project has been designed by (and all notices shall be addressed to):

County of Manatee  
Public Works Department  
Engineering Section  
315 75th St. W.  
Bradenton, FL 34209  
(813/794-1939)

who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

**Article 3. CONTRACT TIME.**

3.1 The Work will be completed and ready for final inspection within 365 calendar days from the date the Contract Time commences to run. (As indicated in the Notice to Proceed.)

3.2 Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER \$250.00 for each calendar day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is complete.

#### Article 4. PAYMENTS

4.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds as per the Contractor's stated Bid Prices contained in Table 1, "Contractor's Proposed Unit and Lump Sum Bid Prices" of the selected Contractor's Bid Form as accepted by the Owner.

#### Article 5. PAYMENT PROCEDURES

5.1 CONTRACTOR shall submit an application for payment to the Project Representative prior to any payment by the Owner. The Project Representative shall, within fifteen (15) days:

1. Provide contractor with written notice of acceptance of application for payment and make a recommendation to the OWNER that payment be made to the CONTRACTOR in the amount requested on the application for payment.

or

2. Provide CONTRACTOR with written notice of rejection of application for payment, giving CONTRACTOR the reasons for the rejection of the application for payment.

The Project Representative will not make a recommendation for payment to OWNER before acceptance of the amount of payment requested in the application for payment.

##### 5.1 Payments prior to final completion.

5.1.1 OWNER shall make progress payment on account of the contract price on the basis of CONTRACTOR'S application for payment and as recommended by the Project Representative.

5.1.2 CONTRACTOR can submit application for thirty (30) days after the contract time commences to run and every thirty days thereafter until final payment.

5.1.3 The amount requested in the application for payment shall be based on the number of units completed at the unit bid price stated in Column 5 of Table 1 of the CONTRACTOR'S Bid Form less 10% retainage.

5.2 Final Payment - Upon final completion and acceptance of the Work, OWNER shall pay the remainder of the Contract Price for work completed and equipment remaining in the possession of the OWNER.

#### Article 6. CONTRACTOR'S REPRESENTATIONS.

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

6.1. CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

6.2. CONTRACTOR has studied carefully all drawings of physical conditions upon which CONTRACTOR is entitled to rely.

6.3. CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies which pertain to the physical conditions at or contiguous to the site or which otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents including specifically the provisions of paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

6.4. CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents.

6.5. CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

6.6. CONTRACTOR has given OWNER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to CONTRACTOR.

#### Article 7. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

7.1. This Agreement

7.2. Performance and other Bonds and Insurance Certificate(s)

7.3. General Conditions

7.4. Specifications bearing the title: Effluent Filters at Southwest Regional Wastewater Treatment Plant

7.5 Drawings, consisting of a cover sheet and sheets numbered 1 of , through of , inclusive with each sheet bearing the following general title: Effluent Filters at Southwest Regional Wastewater Treatment Plant

7.6 Addenda numbers \_\_\_\_\_ to \_\_\_\_\_, inclusive.

7.7 Documentation submitted by CONTRACTOR prior to Notice of Award (pages \_\_\_\_\_ to \_\_\_\_\_, inclusive).

7.8 The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: all written Amendments and other documents amending, modifying, or supplementing the Contract Documents.

7.9 The documents listed in Paragraphs 8.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 7.

#### Article 8. MISCELLANEOUS

8.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

8.2 No assignment by a party hereto of any rights under or interest in the contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignee from any duty or responsibility under the Contract Documents.

8.3 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

The OWNER will pay, and the CONTRACTOR will accept in full consideration for the performance of the Contract, subject to additional and deductions as provided therein, the sum of \_\_\_\_\_ Dollars and \_\_\_\_\_ Cents (\$ \_\_\_\_\_).

\_\_\_\_\_  
CONTRACTOR

WITNESS:

\_\_\_\_\_  
BY:

Signature Date: \_\_\_\_\_

\_\_\_\_\_  
Type Name & Title of Signer

ATTEST: R. B. SHORE  
Clerk of the Circuit Court

COUNTY OF MANATEE, FLORIDA  
by Board of County Commissioners

\_\_\_\_\_  
BY:

PATRICIA M. GLASS, CHAIRMAN  
DATE: \_\_\_\_\_



## **SECTION 01005**

### **GENERAL REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 SCOPE AND INTENT**

###### **A. Description**

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract. The summary of work is presented in Section 01010.

###### **B. Work Included**

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefor.

The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

C. Public Utility Installations and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the Owner or other governmental body, which are required by this contract to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefor.

Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the Engineer, for the contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it

will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.

All Owner and other governmental utility departments and other owners of public utilities which may be affected by the work will be informed in writing by the Engineer within two weeks after the execution of the Contract or Contracts covering the work. Such notice will set out, in general, and direct attention to, the responsibilities of the Owner and other governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Plans and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Engineer, the Contractor shall give written notice to Owner and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Underground Utility Notification Center for Excavators (Call Candy)."

The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

## **1.02 PLANS AND SPECIFICATIONS**

### **A. Plans**

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large scale drawings in preference to small scale drawings.

**B. Copies Furnished to Contractor**

The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor as cost of reproduction.

**C. Supplementary Drawings**

When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and five paper prints thereof will be given to the Contractor.

**D. Contractor to Check Plans and Data**

The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

**E. Specifications**

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

**F. Intent**

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

**1.03 MATERIALS AND EQUIPMENT**

**A. Manufacturer**

The names of proposed manufacturers, materialmen, suppliers and dealers who are to furnish materials, fixtures, equipment, appliances or other fittings shall be submitted to the Engineer for approval. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless he shall be of good reputation and have a plant of ample capacity. He shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, whether provided for Part "A" or Part "B", shall be made by the same manufacturer.

**B. Delivery**

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

**C. Tools and Accessories**

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

**D. Installation of Equipment.**

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the Engineer during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the Engineer and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall, at his own expense, furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coat tar epoxy equal to Koppers 300M.

**E. Service of Manufacturer's Engineer**

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

**1.04 INSPECTION AND TESTING**

**A. General**

Inspection and testing of materials will be performed by the Owner unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the Owner.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

#### B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the Owner or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.

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



C. Inspections of Materials

The Contractor shall give notice in writing to the Engineer, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the Engineer notifies the Contractor, in writing, that the results of such tests are acceptable.

Five copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company, shall be forwarded to the Engineer for approval.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

**F. Preliminary Field Tests**

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

**G. Final Field Tests**

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the Owner. The Supplier shall assist in the final field tests as applicable.

**H. Failure of Tests**

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacement or otherwise. The decision of the Engineer as to whether or not the contractor has fulfilled his obligations under the contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the Owner, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment any may order the contractor to remove them from the site at his own expense.

In case the Owner rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the Owner may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

**I. Final Inspection**

During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

**1.05 TEMPORARY STRUCTURES**

**A. Temporary Fences**

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

**1.06 TEMPORARY SERVICES**

**A. First Aid**

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

## **1.07        LINES AND GRADES**

### **A.     Grade**

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

### **B.     Safeguarding Marks**

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

### **C.     Datum Plane**

All elevations indicated or specified refer to the Mean Seal Level Datum of the U.S.C. & G.S. (N.O.S.) which is 0.80 feet above the Mean Low Water Datum of the U.S. Army Corps of Engineers.

## **1.08        ADJACENT STRUCTURES AND LANDSCAPING**

### **A.     Responsibility**

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or

specified shall be included in the various Contract Items and no separate payments will be made therefor. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion to avoid interference with the work, payment therefor will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the Owner and to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.

Prior to the beginning of any excavations, The Contractor shall advise the Engineer of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

**B. Protection of Trees**

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance<sup>3</sup> with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at his proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.

3. The Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. If so ordered, the Owner will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod in the manner described in the Workmanship and Materials section.

D. Restoration of Fences

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the Engineer., The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefor, as part of the overhead cost of the work, and no additional payment will be made therefor.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

**C. Noise**

The Contractor shall eliminate noise to as great as extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

Except in the event of an emergency, no work shall be done between the hours of 7:00 P.M. and 7:00 A.M., or on Sundays. If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Owner shall be obtained before starting such items of the work.

**D. Access to Public Services**

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

**E. Dust prevention**

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

**1.10 CUTTING AND PATCHING**

The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Plans and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

**1.11 CLEANING**

**A. During Construction**

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefor develops.

**B. Final Cleaning**

At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

**1.12 MISCELLANEOUS**

**A. Protection Against Siltation and Bank Erosion**

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the Engineer which results from his construction operations.

**B. Protection of Wetland Areas**

The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Regulation.

**C. Existing Facilities**

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Specific Provisions.



**D. Use of Chemicals**

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01010**

### **SUMMARY OF WORK**

#### **PART 1 GENERAL**

##### **1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED**

- A. The work included in this Contract consists of the construction of Leachate Collection System, a pump station and a PVC force main.
- B. The Contractor shall furnish all labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.
- C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements and/or restoration required as a result of damages caused prior to acceptance by the Owner.
- D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

##### **1.02 RELATED REQUIREMENTS**

Section 01030: Special Project Procedures.

##### **1.03 CONTRACTS**

Construct all the work under a single contract.

**END OF SECTION**

**SECTION 01015**  
**CONTROL OF WORK**

**PART 1: GENERAL**

**1.01 WORK PROGRESS**

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

**1.02 PRIVATE LAND**

The Contractor shall not enter or occupy private land outside of easements, except by permission of the adjacent property owner.

**1.03 WORK LOCATIONS**

Work shall be located substantially as indicated on the drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

#### **1.04 OPEN EXCAVATIONS**

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

#### **1.05 DISTRIBUTION SYSTEMS AND SERVICES**

- A. The Contractor shall avoid interruptions to water, telephone, Cable TV, sewer, gas, or other related utility services. He shall notify the Engineer and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made.
- B. If it appears that utility service will be interrupted for an extended period, the Engineer may order the Contractor to provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be the minimum, consistent with existing conditions. The safety and integrity of the system is of prime importance in scheduling work.

**PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES**

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.
- B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Proposal.
- D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the Owner is required, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work under Article 10 of the General Conditions. If relocation of a privately owned utility is required, the Owner will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sundays and legal holidays) before excavating near their utilities.

**1.07 TEST PITS**

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer. No separate payment will be made.

**1.08 CARE AND PROTECTION OF PROPERTY**

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.
- B. All sidewalks which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice and as described in Section 04610.
- C. Along the location of this work all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated by the Engineer as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded.

- D. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the Engineer. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.
- E. The protection, removal and replacement of existing physical features along the line of work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Proposal.

**1.09 MAINTENANCE OF TRAFFIC**

- A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the Engineer.
- B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheelguards or fences, or take other safety measures which are satisfactory to the Owner.
- C. Detours around construction areas will be subject to the approval of the Owner and the Engineer. Where detours are permitted, the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured, the Contractor shall expedite construction operations and periods when traffic is being detoured, will be strictly controlled by the Owner and subject to conditions in Section 04020.

**1.10 WATER FOR CONSTRUCTION PURPOSES**

- A. In locations where public water supply is available, the Contractor may purchase water for all construction purposes.
- B. The express approval of the Water Department meters for water utilization shall be obtained in writing. Hydrants shall only be operated under the supervision of Water Department personnel.
- C. The Contractor shall be responsible for paying all water tap fees incurred for the purpose of obtaining a potable water service or hydrant meter.

**1.11 MAINTENANCE OF FLOW**

The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer and Owner well in advance of the interruption of any flow.

**1.12 CLEANUP**

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

**1.13 COOPERATION WITHIN THIS CONTRACT**

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



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

#### **1.14 PROTECTION OF CONSTRUCTION AND EQUIPMENT**

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

#### **1.15 CONSTRUCTION WITHIN RIGHT-OF-WAY**

Where pipelines are installed within FDOT right-of-way all excavation backfill and compaction for the purpose of reconstructing roadways and/or adjacent slopes contiguous thereto shall be in accordance with FDOT or MCPWD Standards and Specifications. Contractor shall satisfy the authorized representative of the FDOT with respect to proper safety procedures, construction methods, required permitting, etc., within the FDOT right-of-way.

**1.16**

**CONNECTION TO WORK BY OTHERS**

- A. Sewer Lines - All gravity sewer lines and manholes shown at the respective locations shall be included in the unit price bid for each item furnished and installed under this Contract as stipulated on the Contract Drawings. Plugs shall be installed at each termination stub and the lines shall be tested as required.
- B. Force Mains - All force mains shall be installed to the connection points shown on the Construction Drawings as a part of the unit price bid for the force main pipe.

**END OF SECTION**

## **SECTION 01030**

### **SPECIAL PROJECT PROCEDURES**

#### **PART 1: GENERAL**

##### **1.01 PROJECT PRECONSTRUCTION MEETINGS**

- A. The Engineer shall schedule and conduct a preconstruction meeting, monthly progress meetings and specifically called meetings throughout the progress of the work. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents. Engineer will attend meetings to ascertain that the work is expedited consistent with the Contract Documents and construction schedule.
- B. The Engineer shall schedule a pre-construction meeting to be held within 15 days after date of Notice to Proceed. The pre-construction meeting shall be held at the Engineer's office. Attendance at the pre-construction meeting shall include Owner's representative, Engineer, Resident Project Representative and Contractor's Superintendent. The pre-construction meeting shall consist of at least the following items:
1. Distribution and discussion of:
    - a. List of major subcontractors and suppliers
    - b. Project Construction Schedules
    - c. All Utility Company arrangements
  2. Critical work sequencing
  3. Project Coordination
    - a. Designation of responsible personnel
    - b. Procedure for communication
  4. Procedures and processing of:
    - a. Field decisions and field orders
    - b. Proposal requests
    - c. Submittals
    - d. Change orders
    - e. Request for Payment

5. Procedures and requirements for maintaining Record Drawings

6. Construction facilities, controls & construction aids

C. The Engineer shall schedule and hold periodic meetings with the Contractor as required by the progress of the work. These periodic progress meetings shall be held at the project field office or the Engineer's office as determined by the Engineer.

**1.02 PERMITS**

Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the Owner to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the Engineer. The costs for obtaining all permits shall be borne by the Contractor.

**1.03 CONNECTIONS TO EXISTING SYSTEM**

The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the terminus of the existing systems all as shown on the Drawings or where directed by the Owner. The cost for this work and for the actual connection to the existing systems shall be included in the price bid for the project and shall not result in any additional cost to the Owner. The termination point for each contract shall be as shown on the Contract Drawings.

**1.04 RELOCATIONS**

The Contractor shall be responsible for the relocation of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be included in the price bid for the project. No relocation of the items under this Contract shall be done without approval from the Engineer.

**1.05        EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES**

- A.    The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various water, gas, telephone, electrical, or other utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines so as to avoid damage to the existing lines. Cost for relocation of all existing lines shall be included in the price bid for the project. Should damage occur to an existing line, the Contractor shall bear the cost of all repairs.
- B.    It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the Contractor.
- C.    The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction.
- D.    The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified, or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Engineer of the location of the pipeline or utility and shall reroute or relocate the pipeline or utility as directed. Cost for relocation of existing pipelines or utilities shall be included in the price bid for the project.
- E.    The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the Engineer and/or the owner of the utility.

- F. It is intended that wherever existing utilities such as water, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated in the Drawings. However, when in the opinion of the Engineer this procedure is not feasible, he may direct the use of fittings for a utility crossing as detailed on the Drawings. No deflections will be allowed in the gravity sanitary sewer lines or in existing storm sewer lines.

**1.06 SUSPENSION OF WORK DUE TO WEATHER**

Refer to FDOT Standards and Specifications Book, Section 8.

**1.07 HURRICANE PREPAREDNESS PLAN**

- A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning.
- B. In the event of inclement weather, or whenever Engineer shall direct, Contractor will and will cause Subcontractors to protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or Subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

**1.08 POWER SUPPLY**

Electricity as may be required for construction and permanent power supply, shall be secured and purchased by the Contractor.

#### **1.09 SALVAGE**

Any existing equipment or material, including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the Engineer or Owner and if so shall be protected for a reasonable time until picked up by the Owner. Any equipment or material not worthy of salvaging, as directed by the Engineer, shall be disposed of by the Contractor at no additional cost.

#### **1.10 DEWATERING**

- A. The Contractor with his own equipment shall do all pumping necessary to prevent flotation of any part of the work during construction operations.
- B. The Contractor shall, for the duration of the Contract and with his own equipment, pump out water and wastewater which may seep or leak into the excavations.

#### **1.11 ADDITIONAL PROVISIONS**

- A. Before commencing work on any of the existing structures or equipment, the Contractor shall notify the Engineer, in writing, at least 10 calendar days in advance of the date he proposes to commence such work.
- B. The Contractor shall provide at his own expense all necessary temporary facilities for access to and for protection of, all existing structures. The Owner's personnel must have ready access at all times to the existing structures. The Contractor is responsible for all damage to existing structures, equipment and facilities caused by his construction operations and must repair all such damage when and as ordered by the Engineer.

#### **1.12 CONSTRUCTION CONDITIONS**

The Contractor shall strictly adhere to the specific requirements of the governmental unit(s) or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

**1.13 PUBLIC NUISANCE**

- A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.
- B. Sound levels must meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance). Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the engineer or County for excessive noise shall not relieve the contractor of the other portions of this specification including, but not limited to contract time and contract price.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

**1.14 WARRANTIES**

- A. All material supplied under these Specifications shall be warranted by the Contractor and the manufacturers for a period of one (1) year. Warranty period shall commence on the date of Owner acceptance.
- B. The material shall be warranted to be free from defects in workmanship, design and materials. If any part of the system should fail during the warranty period, it shall be replaced at no expense to the Owner.
- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining warranties from each of the respective suppliers or manufacturers for all the material specified under these contract specifications.
- D. In the event that the manufacturer is unwilling to provide a one-year warranty commencing at the time of Owner acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty starting at the time of equipment delivery to the job site. This two-year warranty shall not relieve the Contractor of the one-year warranty starting at the time of Owner acceptance of the equipment.

**END OF SECTION**



**SECTION 01045**  
**CUTTING AND PATCHING**

**PART 1: GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the work or to:
  - 1. Make its several parts fit together properly.
  - 2. Uncover portions of the work to provide for installation of ill-timed work.
  - 3. Remove and replace defective work.
  - 4. Remove and replace work not conforming to requirements of Contract Documents.
  - 5. Provide penetrations of non-structural surfaces for installation of piping and electrical conduit.

**1.02 RELATED REQUIREMENTS**

- A. Section 01010: Summary of Work.
- B. Section 04210: Excavation for Structures

**PART 2: PRODUCTS**

**2.01 MATERIALS**

Comply with specifications and standards for each specific product involved.

**PART 3: EXECUTION**

**3.01 INSPECTION**

- A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.

- B. After uncovering work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Engineer. Do not proceed with work until Engineer has provided further instructions.

### **3.02 PREPARATION**

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions or Project from damage.
- C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations free from water.

### **3.03 PERFORMANCE**

- A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work which has been cut or removed; install new products to provide completed work in accord with requirements of contract documents.
- E. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

**END OF SECTION**

**01045-2**

## **SECTION 01050**

### **FIELD ENGINEERING AND SURVEYING**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

- A. The Contractor shall provide and pay for field surveying services required for the project.
- B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the work of his contract.
  - 1. All survey work required in execution of Project.
  - 2. All costs of construction layout shall be included in the unit and lump sum prices contained in the respective contracts.
  - 3. Civil, structural or other professional engineering services specified or required to execute Contractor's construction methods.

##### **1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract.
- B. Section 01010: Summary of Work.

##### **1.03 QUALIFICATION OF SURVEYOR OR ENGINEER**

All construction staking shall be conducted by or under the supervision of a Florida registered professional land surveyor approved by the Owner. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the Engineer.

##### **1.04 SURVEY REFERENCE POINTS**

- A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.

B. Locate and protect control points prior to starting work and preserve all permanent reference points during construction. All costs associated with the replacement of control points shall be borne by the Contractor.

1. Make no changes or relocations without prior written notice to Engineer.
2. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
3. Require surveyor to replace Project control points which may be lost or destroyed.
  - a. Establish replacements based on original survey control.

**1.05 PROJECT SURVEY REQUIREMENTS**

The Contractor shall establish temporary bench marks as needed, referenced to data established by survey control points.

**1.06 RECORDS**

Maintain a complete, accurate log of all control and survey work as it progresses.

**1.07 SUBMITTALS**

- A. Submit name and address of registered surveyor to Engineer for Owner's approval.
- B. Submit certificate signed by Registered Surveyor certifying that elevations and locations of improvements are in conformance, or nonconformance, with Contract Documents.

**END OF SECTION**

**SECTION 01090**  
**REFERENCE STANDARDS**

**PART 1: GENERAL**

**1.01 REQUIREMENTS**

Abbreviations and acronyms used in Contract Documents  
  
to identify reference standards.

- 1.02**
- A. Application:** When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes established stricter standards.
  - B. Publication Date:** The most recent publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

**1.03 ABBREVIATIONS, NAMES AND ADDRESSES OF ORGANIZATIONS**

Obtain copies of reference standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

<b>AA</b>	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
<b>AASHTO</b>	American Association of State Highway and Transportation Officials 444 North Capital Street, N.W. Washington, DC 20001
<b>ACI</b>	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
<b>AI</b>	Asphalt Institute Asphalt Institute Building College Park, MD 20740

<b>AISC</b>	<b>American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020</b>
<b>AISI</b>	<b>American Iron and Steel Institute 1000 16th Street NW Washington, DC 20036</b>
<b>ANSI</b>	<b>American National Standards Institute 1430 Broadway New York, NY 10018</b>
<b>ASHRAE</b>	<b>American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329</b>
<b>ASME</b>	<b>American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017</b>
<b>ASTM</b>	<b>American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103</b>
<b>AWWA</b>	<b>American Water Works Association 6666 West Quincy Avenue Denver, CO 80235</b>
<b>AWS</b>	<b>American Welding Society 2501 N.W. 7th Street Miami, FL 33125</b>
<b>CRSI</b>	<b>Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601</b>
<b>FDOT</b>	<b>Florida Department of Transportation Standards Specifications for Road and Bridge Construction Tallahassee, FL</b>
<b>FS</b>	<b>Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407</b>
<b>MCPWD</b>	<b>Manatee County Public Works Department 6615 Cortez Road West Bradenton, FL 34207</b>

<b>MLSFA</b>	<b>Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601</b>
<b>MMA</b>	<b>Monorail Manufacturer's Association 1326 Freeport Road Pittsburgh, PA 15238</b>
<b>NAAMM</b>	<b>National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601</b>
<b>NEMA</b>	<b>National Electrical Manufacturer's Assoc. 2101 L Street, N.W. Washington, DC 20037</b>
<b>PCA</b>	<b>Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076</b>
<b>PCI</b>	<b>Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606</b>
<b>SDI</b>	<b>Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107</b>
<b>SMACNA</b>	<b>Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180</b>
<b>SSPC</b>	<b>Steel Structures Painting Council Pittsburg, PA</b>
<b>UL</b>	<b>Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062</b>

**END OF SECTION**

## **SECTION 01150**

### **MEASUREMENT AND PAYMENT**

#### **PART 1 SCOPE OF WORK**

##### **1.01 SCOPE**

This section defines the method which will be used to determine the quantities of work performed or materials supplied and establishes the basis upon which payment will be made.

##### **1.02 ESTIMATED QUANTITIES**

The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The Owner or Engineer does not assume any responsibility that the final quantities will remain in accordance with the estimated quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for the satisfactorily completed quantity of each item.

##### **1.03 WORK OUTSIDE AUTHORIZED LIMITS**

No payment will be made for work constructed outside the authorized limits of work.

##### **1.04 MEASUREMENT STANDARDS**

Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

##### **1.05 AREA MEASUREMENTS**

In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.



**1.06 LUMP SUM ITEMS**

Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum item.

**1.07 UNIT PRICE ITEM**

Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work.

Clearing, grubbing and grading except as hereinafter specified.

Trench excavation, including necessary pavement and rock removal, except as otherwise specified.

Dewatering and disposal of surplus water.

Structural fill, backfill, and grading.

Replacement of unpaved roadways, grass and shrubbery plots.

Cleanup and miscellaneous work.

Foundation and borrow materials, except as hereinafter specified.

Testing and placing system in operation.

Any material and equipment required to be installed and utilized for the tests.

Pipe, structures, pavement replacement and/or appurtenances included within the limits of lump sum work, unless otherwise shown.

Maintaining the existing quality of service during construction.

Maintaining or detouring of traffic.

Appurtenant work as required for a complete and operable system.

Seeding and hydromulching.

As-built drawings.

2.01

**BID ITEM - 8" HD PERFORATED POLYETHELENE TUBING**

Measurement - The quantity for payment will be the number of linear feet of leachate collection pipe, including filter aggregate and backfill, satisfactorily furnished and installed, as measured horizontally along the centerline of the pipe from center to center of manholes or structures.

Payment - Payment for furnishing and installing 8" HD Perforated Polyethylene Tubing will be made at the contract unit price per linear foot as listed in the Bid. Such price and payment shall be full compensation for all plant, labor, materials and equipment required to satisfactorily furnish and construct the 8" HD Perforated Polyethylene Tubing.

2.02

**BID ITEM - VENT STACKS**

Measurement - The quantity for payment for gas vent stacks will be the actual number of perforated PVC gas vents satisfactorily constructed.

Payment - Payment for constructing vent stacks will be made at the contract unit price listed in the Bid. Such price and payment shall be full compensation for furnishing all plant, labor, materials and equipment required for constructing vent stacks.

2.03

**BID ITEM - LEACHATE PUMP STATION NO. 4**

Payment of the applicable lump sum price shall be full compensation for furnishing all plant, labor and equipment, earthwork, dewatering, grading, electrical, flow metering and control within the limits shown on the drawings. Also included is the 20 foot section of gravity sewer to the wet well and furnishing electrical power supply. Payment for Leachate Pump Station shall include all work required for the construction of a fully operable pump station.

2.04

**BID ITEM - 8" PVC FORCE MAIN, CLASS 150**

Measurement - The quantity for payment will be the actual number of linear feet satisfactorily furnished and installed, as measured along the length of the centerline of the completed pipeline, without deduction for the length of valves, fittings or outfall structures. Separate payment will not be made for fittings, valves, thrust anchorage, and outfall structures. The cost of these items shall be incorporated into the force main unit price.

Payment - Payment of the contract unit price shall be full compensation for furnishing all plant, labor, materials and equipment to furnish and install pipe and fittings complete with any bolts, glands, gaskets, accessories, connections and thrust anchorage.

2.05

**BID ITEM - MANHOLES WITH WARNING SIGNS**

Measurement - Measurement under this item will be considered as a structure consisting of a bottom slab, barrel section and top section with frame and cover, warning sign, necessary fittings and appurtenances for connecting pipes and other appurtenances as shown on the drawings. Depth shall be total depth as shown on the drawings. The quantity for payment for the basic manhole unit will be the actual number of manholes satisfactorily constructed.

Payment - Payment for constructing manholes will be made at the contract unit price listed in the Bid for the total depth as shown on the drawings. Such price and payment shall be full compensation for furnishing all plant, labor, materials, equipment and incidentals and constructing the manhole complete with foundation, frame and cover, warning sign, connections and coatings,.

2.06

**BID ITEM - MOBILIZATION**

Measurement and payment for this item shall include full compensation for the required 100 percent Performance Bond, 100 percent Payment Bond, all required insurance for the project and the Contractor's mobilization cost. Payment for mobilization shall not exceed 15 percent of the total contract cost unless the Contractor can prove to the Owner that his actual mobilization cost exceeds 15 percent.

END OF SECTION

## **SECTION 01310**

### **CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS**

#### **PART 1: GENERAL**

##### **1.01 GENERAL**

- A. Construction under this contract must be coordinated with the Owner and accomplished in a logical order to maintain utilization and process flow through existing facilities and to allow construction to be completed within the time allowed by Contract Documents.

##### **1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS**

- A. No work shall be done between 7:00 P.M. and 7:00 A.M. nor on Sundays or legal holidays without the written permission of the Owner. However, emergency work may be done without prior permission.
- B. Night work may be established by the Contractor as regular procedure with the written permission of the Owner. Such permission, however, may be revoked at any time by the Owner if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.
- C. Due to potential health hazards and requirements of the State of Florida and the U.S. Environmental Protection Agency, existing facilities must be maintained in operation.
- D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, heating, ventilating, air conditioning, lighting, temporary structure, or other materials, equipment and systems required to maintain the existing facility's operations. All details of temporary piping and temporary construction are not necessarily shown on the Plans or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to insure that construction will not interrupt proper collection and pumping.

- E. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

#### **1.03      PROGRESS OF THE WORK**

- A. The work shall be executed with such progress as may be required to prevent any delay to the general completion of the work. The work shall be executed at such times and in or on such parts of the project and with such forces, materials and equipment to assure completion of the work in the time established by the Contract.

#### **1.04      RELATED REQUIREMENTS**

- A. Section 00700: Standard General Conditions of Construction Contracts.
- B. Section 01010: Summary of Work.
- C. Section 01030: Special Project Procedures.
- D. Section 01340: Shop Drawings, Working Drawings and Samples

### **PART 2:      PROGRESS SCHEDULE SUBMITTALS**

#### **2.01      GENERAL REQUIREMENTS**

- A. As required under Article 2.6, 2.9, 6.6 and 14.2 of the General Conditions, the Contractor shall submit a critical path schedule as described herein.
- B. The critical path schedule requirement will consist of estimated and preliminary progress schedules, monthly progress status reports (Monthly Status Reports), a start-up schedule, an as-built schedule report and revisions to the schedules and analyses as prescribed. The planning, scheduling, management and execution of the work is the sole responsibility of the Contractor. The progress schedule requirement is established to

allow Engineer to review Contractor's planning, scheduling, management and execution of the work; to assist Engineer in evaluating work progress and make progress payments and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.

- C. The current Schedule, if concurred by Owner, shall have legal status as long as it is used by Contractor for planning, organizing, directing, managing and executing the work in accordance with the Contract Documents. Legal status will further imply that Contractor will use the schedule to report progress and, further, that Contractor and Owner will use the schedule for determining delay(s) in achieving the contract date(s) stipulated in the Agreement subject to the requirements of this Section of the General Requirements.
- D. Engineer will, upon receipt and review of each schedule submittal, either indicate in writing a recommendation of concurrence and present the submittal to Owner, or return the submittal to Contractor indicating in writing, Engineer's reasons for refusing to recommend concurrence. In the latter case, Contractor will be required to make the necessary corrections and resubmit. If Contractor fails to provide submittals as required, he will be deemed not to have provided a basis upon which progress may be evaluated, which may constitute reasons for refusing to recommend progress payments.
- E. Engineer's review of the schedule submittals shall be only for conformance with the information given in the Contract Documents and shall not extend to the means, methods, sequences and techniques or procedures of construction or to safety precautions or programs incident thereto. Engineer's review of the schedule submittals will be predicated on a Contractor's stamp of approval signed off by Contractor and those subcontractors and suppliers performing work under an appropriate agreement with Contractor. Contractor's stamp of approval on any schedule submittal shall constitute a representative to Owner and Engineer that Contractor has either determined or verified all data on the submittal, or assumes full responsibility for doing so and that Contractor and his subcontractors and suppliers, have reviewed and coordinated the sequences shown in the submittal with the requirements of the work under the Contract Documents.

## **2.02**

### **FORM OF SCHEDULES**

- A. Prepare schedules in the form of a horizontal bar chart diagram. The diagram shall be time-scaled and sequenced by work areas. Horizontal time scale shall identify the first work day of each week.
- B. Activities shall be at least as detailed as the Schedule of Prices. Activity durations shall be in whole working days. In addition, activity man-days shall be shown for each activity or alternatively, tabulated in a accompanying report.
- C. Diagrams shall be neat and legible and submitted on sheets at least 8-1/2 inches by 11 inches suitable for reproduction. Scale and spacing shall allow space for notations and future revisions.

## **2.03**

### **CONTENT OF SCHEDULES**

- A. Each monthly schedule shall be based on data as of the last day of the current pay period.
- B. Description for each activity shall be brief but convey the scope of work described.
- C. Activities shall identify all items of work that must be accomplished to achieve substantial completion, such as items pertaining to Contractor's installation and testing activities; items pertaining to the approval of regulatory agencies; contractor's time required for submittals, fabrication and deliveries; the time required by Engineer to review all submittals as set forth in the Contract Document; items of work required of Owner to support pre-operational, startup and final testing; time required for the relocation of utilities. Activities shall also identify interface milestones with the work of other contractors performing work under separate contracts with Owner.
- D. Schedules shall show the complete sequence of construction by activities. Dates for beginning and completion of each activity shall be indicated as well as projected percentage of completion for each activity as of the first day of each month.
- E. Submittals schedule for shop drawing review, product data, and samples shall show the date of contractor submittal and the date approved submittals will be required by the Engineer, consistent with the time frames established in the Specifications.

- F. For Contract change orders granting time extensions, the impact on the Contract date(s) shall equal the calendar-day total time extension specified for the applicable work in the Contract change orders.
- G. For actual delays, add activities prior to each delayed activity on the appropriate critical path(s). Data on the added activities of this type shall portray all steps leading to the delay and shall further include the following: separate activity identification, activity description indicating cause of the delay, activity duration consistent with whichever set of dates below applies, the actual start and finish dates of the delay or, if the delay is not finished, the actual start date and estimated completion date.
- H. For potential delays, add an activity prior to each potentially delayed activity on the appropriate critical path(s). Data for added activities of this type shall include alternatives available to mitigate the delay including acceleration alternatives and further show the following: separate activity identification, activity description indicating cause of the potential delay and activity duration equal to zero work days.

#### **2.04 SUPPORTING NARRATIVE**

- A. Status and scheduling reports identified below shall contain a narrative to document the project status, to explain the basis of Contractor's determination of durations, describe the contract conditions and restraints incorporated into the schedule and provide an analysis pertaining to potential problems and practical steps to mitigate them.
- B. The narrative shall specifically include:
  - 1. Actual completion dates for activities completed during the quarterly report period and actual start dates for activities commenced during the quarterly report period.
  - 2. Anticipated start dates for activities scheduled to commence during the following quarterly report period.
  - 3. Changes in the duration of any activity and minor logic changes.
  - 4. The progress along the critical path in terms of days ahead or behind the Contract date.



5. If the Monthly Status Report indicates an avoidable delay to the Contract completion date or interim completion dates as specified in the Agreement, Contractor shall identify the problem, cause and the activities affected and provide an explanation of the proposed corrective action to meet the milestone dates involved or to mitigate further delays.
6. If the delay is thought to be unavoidable, the Contractor shall identify the problem, cause, duration, specific activities affected and logic restraints of each activity.
7. The narrative shall, in addition, also discuss all change order activities whether included or not in the revised/current schedule of legal status. Newly introduced change order work activities and the CPM path(s) that they affect, must be specifically identified. All change order work activities added to the schedule shall conform with the sequencing and Contract Time requirements of the applicable Change Order.
8. Original Contract date(s) shall not be changed except by Contract change order. A revision, as specified in Article 2.09 below, need not be submitted when the foregoing situations arise unless required by Engineer. Review of a report containing added activities will not be construed to be concurrence with the duration or restraints for such added activities; instead the corresponding data as ultimately incorporated into the applicable Contract change order shall govern.
9. Should Engineer require additional data, this information shall be supplied by Contractor within 10 calendar days.

## **2.05**

### **SUBMITTALS**

- A. Contractor shall submit estimated and preliminary progress schedules (as identified in the Instructions to Bidders and the General Conditions), monthly status reports, a start-up schedule and an as-built schedule report all as specified herein.
- B. All schedules, including estimated and preliminary schedules, shall be in conformance with Articles 2.01, 2.02 and 2.03 above.

- C. The finalized progress schedule discussed in Article 2.9 of the General Conditions (Section 00700) shall be the first monthly status report and as such shall be in conformance with all applicable specifications contained herein.
- D. Monthly Status Report submittals shall include three copies of a time-scaled (days after notice to proceed) diagram showing all contract activities and supporting narrative. The initial detailed schedule shall use the notice to proceed as the data date. The finalized schedule, if concurred with by Owner pursuant to paragraph 2.01(D), shall be the work plan to be used by the Contractor for planning, scheduling, managing and executing the work.
- E. The schedule diagram shall be formatted in accordance with Article 2.02 above. The diagram shall include (1) all detailed activities included in the preliminary and estimated schedule submittals, (2) calendar days prior to substantial completion, (3) summary activities for the remaining 60 days. The critical path activities shall be identified, including critical paths for interim dates, if possible.
- F. Contractor shall submit monthly progress schedules with each month's application for payment. Engineer will review schedules and return review copy within 10 days after receipt. If required, Contractor shall resubmit within 7 days after return of review copy.
- G. Contractor shall submit the number of monthly status reports which the Contractor requires, plus five copies which will be retained by the Engineer.

## **2.06 MONTHLY STATUS REPORTS**

- A. Contractor shall submit three copies of detailed schedule status reports on a monthly basis with the Application for Payment. The first such status report shall be submitted with the first Application for Payment and include data as of the last day of the pay period. The Monthly Report shall include a "marked-up" copy of the latest detailed schedule of legal status and a supporting narrative including updated information as described in paragraph 2.04. The Monthly Report will be reviewed by Engineer and Contractor at a monthly schedule meeting and Contractor will address Engineer's comments on the subsequent monthly report. Monthly status reports shall be the basis for evaluating Contractor's progress.

- B. The "marked-up" diagram shall show, for the latest detailed schedule of legal status, percentages of completion for all activities, actual start and finish dates and remaining durations, as appropriate. Activities not previously included in the latest detailed schedule of legal status shall be added, except that contractual dates will not be changed except by change order. Review of a marked-up diagram by Engineer will not be construed to constitute concurrence with the time frames, duration, or sequencing for such added activities; instead the corresponding data as ultimately incorporated into an appropriate change order shall govern.

## **2.07**

### **STARTUP SCHEDULE**

- A. At least 90 calendar days prior to the date of substantial completion, Contractor shall submit a time-scaled (days after notice to proceed) diagram detailing the work to take place in the period between 60 days prior to substantial completion and substantial completion, together with a supporting narrative. Engineer shall have 20 calendar days after receipt of the submittal to respond. Upon receipt of Engineer's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by Owner, shall be the Work Plan to be used by Contractor for planning, managing, scheduling and executing the remaining work leading to substantial completion.
- B. The time-scaled diagram shall use the latest schedule of legal status for those activities completed ahead of the last 60 calendar days prior to substantial completion and detailed activities for the remaining 60-day period within the time frames outlined in the latest schedule of legal status.
- C. Contractor will be required to continue the requirement for monthly reports, as outlined in Article 2.05 above. In preparing this report, Contractor must assure that the schedule is consistent with the progress noted in the startup schedule.

**2.08****AS-BUILT SCHEDULE**

After substantial completion, but prior to final payment, Contractor shall submit an as-built schedule report and time-scaled as-built diagram. The documents shall reflect all as-built critical paths. The diagram shall be prepared in accordance with Articles 2.02 and 2.03, in addition to the following:

- A. All Contract activities, including all added activities, shall be shown.
- B. Activity durations shall be the actual number of separate work days during which work was performed on the activity.
- C. Contract milestone completions shall be plotted on the date of the Substantial Completion Reports.

**2.09****REVISIONS**

- A. All revised Schedule Submittals shall be made in the same form and detail as the initial submittal and shall be accompanied by an explanation of the reasons for such revisions, all of which shall be subject to review by Engineer and concurrence by Owner. The revision shall incorporate all previously made changes to reflect current as-built conditions. Minor changes to the approved submittal may be approved at monthly meetings; a minor change is not considered a revision in the context of this paragraph.
- B. A revised schedule submittal shall be submitted for review, when required by Engineer, for one of the following reasons:
  - 1. Owner or Engineer directs a change that affects the date(s) specified in the Agreement or alters the length of a critical path.
  - 2. Contractor elects to change any sequence of activities so as to affect a critical path of the current schedule documents.

- C. If, prior to agreement on an equitable adjustment to the Contract time, Engineer requires revisions to the schedule in order to evaluate planned progress, Contractor shall provide an interim revised submittal for review with change effect(s) incorporated as directed. Interim revisions to the documents which are recommended to the Owner for concurrence will be incorporated in the next Monthly Status Report.

END OF SECTION

## **SECTION 01340**

### **SHOP DRAWINGS, PROJECT DATA AND SAMPLES**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

- A. The Contractor shall submit to the Engineer for review and approval, such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including, but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.
- B. Within thirty (30) calendar days after the effective date of the Agreement, the Contractor shall submit to the Engineer a complete list of preliminary data on items for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items and the date on which each Shop Drawing shall be submitted. Review of this list by the Engineer shall in no way relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawing.
- C. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:
  - 1. Submittal description and number assigned.
  - 2. Date to Engineer.
  - 3. Date returned to Contractor (from Engineer).
  - 4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
  - 5. Date of Resubmittal and Return (as applicable).
  - 6. Date material released (for fabrication).
  - 7. Projected date of fabrication.
  - 8. Projected date of delivery to site.
  - 9. Status of O&M manuals submitted.

**1.02 RELATED REQUIREMENTS**

- A. General and Supplementary Conditions.
- B. Section 01310: Construction Schedules.
- C. Section 01600: Material and Equipment.
- D. Section 01720: Project Record Documents.
- E. Section 01730: Operating and Maintenance Data.
- F. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Working Drawings and Samples will be needed.

**1.03 CONTRACTOR'S RESPONSIBILITY**

- A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.
- B. Determine and verify:
  - 1. Field measurements.
  - 2. Field construction criteria.
  - 3. Catalog numbers and similar data.
  - 4. Conformance with Specifications and indicate all variances from the Specifications.
- C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

- D. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the Engineer, with no exceptions taken.
- E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the Engineer receives them.
- F. The Contractor shall submit five (5) copies of descriptive or product data submittals to complement shop drawings for the Engineer plus the number of copies which the Contractor requires. The Engineer will retain five (5) sets. All blueprint shop drawings shall be submitted with one (1) set of 3 mil thick polyester film reproducibles. The Engineer will review the blueprints and return to the Contractor the set of marked-up sepias with appropriate review comments.
- G. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by Engineer of the necessary Shop Drawings.

**1.04 ENGINEER'S REVIEW OF SHOP DRAWINGS**

- A. The Engineer's review of drawings, data and samples submitted by the Contractor will cover only general conformity to the Specifications, external connections and dimensions which affect the installation.
- B. The review of drawings and schedules will be general and shall not be construed:
  - 1. as permitting any departure from the Contract requirements;
  - 2. as relieving the Contractor of responsibility for any errors, including details, dimensions and materials;
  - 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.



- C. If the drawings or schedules as submitted describe variations per subparagraph (1.05.D) and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting any exception.
- D. When reviewed by the Engineer, each of the Shop Drawings will be identified as having received such review being so stamped and dated. Shop Drawings stamped "NOT APPROVED" and with required corrections shown will be returned to the Contractor for correction and resubmittal.
- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.
- G. The Engineer will review a submittal/resubmittal a maximum of three (3) times after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's actual payroll cost.
- H. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor and will be considered not approved until resubmitted.

**1.05**

**SHOP DRAWINGS**

- A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.
- B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.
- C. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:
  - 1. Number and title of the drawing.
  - 2. Date of Drawing or revision.
  - 3. Name of project building or facility.
  - 4. Name of contractor and subcontractor submitting drawing.
  - 5. Clear identification of contents and location of the work.
  - 6. Specification title and number.
- D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.

- E. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.
- F. 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.
- G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and have been in operation for a period of at least one (1) year.
- H. Only the Engineer will utilize the color "red" in marking shop drawing submittals.
- I. Before final payment is made, the Contractor shall furnish to Engineer five (5) sets of record shop drawings all clearly revised, complete and up to date showing the permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, yard piping, electrical system and instrumentation system.

#### 1.06 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and falsework; for underpinning; and for such other work as may be required for construction, but does not become an integral part of the project.

- B. Copies of working drawings as noted in subparagraph 1.06A, above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work.
- C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied, by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the Owner and Engineer shall have no responsibility therefor.

**1.07 SAMPLES**

- A. The Contractor shall furnish, for the review of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the Engineer.
- B. Samples shall be of sufficient size and quantity to clearly illustrate:
  - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
  - 2. Full range of color, texture and pattern.
  - 3. A minimum of two samples of each item shall be submitted.
- C. Each sample shall have a label indicating:
  - 1. Name of product.
  - 2. Name of Contractor and Subcontractor.
  - 3. Material or equipment represented.

4. Place of origin.
  5. Name of Producer and Brand (if any).
  6. Location in project.
- (Samples of finished materials shall have additional markings that will identify them under the finished schedules.)

- D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required in subparagraph 1.07B above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Review of a sample shall be only for the characteristics or use named in such and shall not be construed to change or modify any Contract requirements.
- E. Reviewed samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the reviewed samples. Samples which failed testing or were rejected will be returned to the Contractor at his expense, if so requested at time of submission.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION**

## **SECTION 01410**

### **TESTING AND TESTING LABORATORY SERVICES**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

- A. Owner will employ and pay for the services of an Independent Testing Laboratory to perform testing specifically indicated on the Contract Documents or specified in the Specifications and may at any other time elect to have materials and equipment tested for conformity with the Contract Documents.
  - 1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
  - 2. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the work of the Contract.

##### **1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract.
- B. Respective section of specifications: Certification of products.
- C. Each specification section listed: Laboratory tests required and standards for testing.
- D. Testing laboratory inspection, sampling and testing is required for, but not limited to the following:
  - 1.. Section 02221: Earth Excavation and Backfill in Trenches
  - 2. Section 02575: Pavement Repair and Replacement
  - 3. Section 03300: Cast in Place Concrete
  - 4. Section 03410: Precast Concrete Structures
  - 5. Section 03455: Precast Concrete Manholes

**1.03        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.

**1.04        CONTRACTOR'S RESPONSIBILITIES**

- A.    Cooperate with laboratory personnel, provide access to Work, to Manufacturer's operations.**
- 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 material mixes which require control by the testing laboratory.**
- D.    Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor and no extra charge to the Owner shall be allowed on account of such testing and certification.**
- 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 facilitate 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 or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience and as approved by the Engineer.
- H. If the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the Contractor shall pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

END OF SECTION



## **SECTION 01510**

### **TEMPORARY AND PERMANENT UTILITIES**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

Coordinate with the applicable power company and pay all cost for temporary and permanent power supply. Furnish, install and maintain temporary utilities required for construction and testing of each pump station and remove on completion of work.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 01010: Summary of Work
- B. Section 01590: Field Offices

##### **1.03 REQUIREMENTS OF REGULATORY AGENCIES**

- A. Comply with National Electric Code.
- B. Comply with Federal, State and Local codes and regulations and with utility company requirements.
- C. Comply with County Health Department regulations.

#### **PART 2: PRODUCTS**

##### **2.01 MATERIALS, GENERAL**

Materials for temporary utilities may be "used". Materials for permanent electrical utilities must be new, adequate in capacity for the required usage, must not create unsafe conditions and must not violate REQUIREMENTS of applicable codes and standards..

##### **2.02 TEMPORARY ELECTRICITY AND LIGHTING**

Arrange with the applicable utility company for temporary power supply for each pump station. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

**2.03 PERMANENT ELECTRICITY AND LIGHTING**

The Contractor shall be responsible for coordinating with the applicable power company and paying all cost for providing permanent electrical power to all pumping stations constructed under this contract.

**2.04 TEMPORARY WATER**

- A. Arrange with utility service company, provide water for construction purposes; pay all costs for installation, maintenance and removal, and service charges for water used.
- B. Protect piping and fitting against freezing.

**2.05 PERMANENT WATER**

Contractor shall be responsible for coordinating with the appropriate utility and paying all cost involved for obtaining water taps for all lift stations.

**2.06 TEMPORARY SANITARY FACILITIES**

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.

**PART 3: EXECUTION**

**3.01 GENERAL**

- A. Maintain and operate systems to assure continuous service.
- B. Modify and extend systems as work progress requires.

**3.02 REMOVAL**

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.

**END OF SECTION**

## **SECTION 01590**

### **ENGINEER'S FIELD OFFICE**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

- A. Contractor shall furnish, install and maintain one temporary field office during the entire construction period for the sole use of the Engineer.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01010: Summary of Work
- B. Section 01510: Temporary Utilities

##### **1.03 OTHER REQUIREMENTS**

- A. Prior to installation of the Engineer's field office, the Contractor shall consult with the Engineer on location, access and related facilities.
- B. All site use approvals shall be obtained by the Contractor.
- C. Upon completion of construction, the Contractor shall remove the field office and restore the site to its original condition.

##### **1.04 REQUIREMENTS FOR FACILITIES**

- A. Construction:
  - 1. The field office shall be structurally sound, weathertight, with floors raised above ground.
  - 2. At Contractor's option, portable or mobile buildings may be used.

**B. Office for Field Engineer:**

1. A separate office for sole use of the Engineer with secure entrance doors and key and lock shall be provided.
2. Area: 250 sq. ft. minimum, with minimum dimension of 8 ft.
3. Windows:
  - a. Minimum of three (3).
  - b. Operable sash and insect screens.
  - c. Locate field office to provide maximum view of construction areas.
4. Furnishings:
  - a. Two standard size chairs and desks with three drawers each.
  - b. One drafting table: 39 in. x 72 in. x 36 in. high, with one equipment drawer.
  - c. One metal, double-door storage cabinet with lock and key.
  - d. One plan rack to hold a minimum of six sets of project drawings.
  - e. One standard four-drawer legal-size metal filing cabinet with lock and key.
  - f. Six linear ft. of bookshelves.
  - g. One swivel arm chair.
  - h. Two straight chairs.
  - i. One drafting table stool.
  - j. One waste basket.
  - k. One tackboard, 36 in. x 30 in.
  - l. One fire extinguisher.
  - m. One first aid kit.

**5. Services:**

- a. Adequate lighting.
- b. Exterior lighting at entrance door.
- c. Automatic heating and mechanical cooling equipment to maintain comfort conditions.
- d. Minimum of four 110 volt duplex electric convenience outlets, at least one on each wall.
- e. Electric distribution panel: Two circuits minimum 110 volt, 60 hertz service.
- f. Convenient access to drinking water and toilet facilities.
- g. Telephone: One private direct line instrument.

**PART 2: PRODUCTS**

**2.01 MATERIALS, EQUIPMENT, FURNISHINGS**

May be new or used, but must be serviceable, adequate for required purpose and must not violate applicable codes or regulations.

**PART 3: EXECUTION**

**3.01 PREPARATION**

Fill and grade site as necessary for temporary structure to provide positive surface drainage.

**3.02 INSTALLATION**

- A. Construct temporary field office on proper foundation and provide connections for all utility services.
  - 1. Secure portable or mobile building when used.
  - 2. Provide steps and landings at entrance doors.

**END OF SECTION**

## **SECTION 01600**

### **MATERIAL AND EQUIPMENT**

#### **PART 1: GENERAL**

##### **1.10 REQUIREMENTS INCLUDED**

###### **A. Material and equipment incorporated into the work:**

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.
3. Manufactured and Fabricated Products:
  - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
  - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
  - c. Two or more items of the same kind shall be identical by the same manufacturer.
  - d. Products shall be suitable for service conditions.
  - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is specified.

##### **1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract.
- B. Section 01010: Summary of Work.
- C. Section 01340: Shop Drawings, Product Data and Samples.

- D. Section 01710: Cleaning.
- E. Section 01730: Operating and Maintenance Data.

### 1.03 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies such instructions to parties involved in the installation, including two copies to Engineer.
  - 1. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
  - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.
  - 2. Do not proceed with work without clear instructions.
- C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

### 1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.
  - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
  - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

## **1.05 STORAGE AND PROTECTION**

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.**
  - 1. Store products subject to damage by the elements in weathertight enclosures.
  - 2. Maintain temperature and humidity within the ranges required by manufacture's instructions.
- B. Exterior Storage**
  - 1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
  - 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and free from damage or deterioration.**
- D. Protection After Installation**
  - 1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

## **1.06 SUBSTITUTIONS AND PRODUCT OPTIONS**

- A. Products List**
  - 1. Within 30 days after contract date, submit to Engineer a complete list of major products proposed to be used.



**B. Contractor's Options**

1. For products specified only by reference standard, select any product meeting than standard.
2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions or any product or manufacturer not specifically named.

**END OF SECTION**

## **SECTION 01620**

### **STORAGE AND PROTECTION**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

Provide secure storage and protection for products to be incorporated into the work and maintenance and protection for products after installation and until completion of work.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 01600: Material and Equipment
- B. The respective Section of Specifications: Special requirements for specific products.

##### **1.03 STORAGE**

- A. Store products immediately on delivery and protect until installed in the work.
  - 1. Store in accord with manufacturer's instructions, with seals and labels intact and legible.
- B. Store products subject to damage by elements in substantial weathertight enclosures.
  - 1. Maintain temperatures within ranges required by manufacturer's instructions.
  - 2. Provide humidity control for sensitive products, as required by manufacturer's instructions.
  - 3. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.

**C. Exterior Storage**

1. Provide substantial platform, blocking or skids to support fabricated products above ground, prevent soiling or staining.
  - a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
  - b. Prevent mixing of refuse or chemically injurious materials or liquids.

- D. Arrange storage in manner to provide easy access for inspection.

**1.04 MAINTENANCE OF STORAGE**

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

1. State of storage facilities is adequate to provide required conditions.
2. Required environmental conditions are maintained on continuing basis.
3. Surfaces of products exposed to elements are not adversely affected.
  - a. Any weathering of products, coatings and finishes is not acceptable under requirements of these Contract Documents.

- B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

1. Equipment shall not be shipped until approved by the Engineer. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Engineer 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 by him. These instructions shall be carefully followed.
5. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to insure 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.
7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

**1.05        PROTECTION AFTER INSTALLATION**

- A.    Provide protection of installed products to prevent damage from subsequent operations.    Remove when no longer needed, prior to completion of work.
- B.    Control traffic to prevent damage to equipment and surfaces.
- C.    Provide coverings to protect finished surfaces from damage.

**END OF SECTION**

## **SECTION 01710**

### **CLEANING**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

Execute cleaning during progress of the work and at completion of the work, as required by the General Conditions.

##### **1.02 RELATED REQUIREMENTS**

- A. Conditions of the Contract.
- B. Each Specification Section: Cleaning for specific products of work.

##### **1.03 DISPOSAL REQUIREMENTS**

Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

#### **PART 2: PRODUCTS**

##### **2.01 MATERIALS**

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

#### **PART 3: EXECUTION**

##### **3.01 DURING CONSTRUCTION**

- A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.

- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

### 3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

### 3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.
- B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- C. Prior to final completion or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

END OF SECTION

**SECTION 01720**  
**PROJECT RECORD DOCUMENTS**

**PART 1: GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. Contractor shall maintain at the site for the Owner one record copy of:
1. Drawings.
  2. Specifications.
  3. Addenda.
  4. Change Orders and other modifications to the Contract.
  5. Engineer's field orders or written instructions.
  6. Approved shop drawings, working drawings and samples.
  7. Field test records.
  8. Construction photographs.

**1.02 RELATED REQUIREMENTS**

- A. Section 01340: Shop Drawings, Working Drawings and Samples.
- B. Section 01380: Construction Photographs.
- C. Section 01050: Field Engineering and Surveying.

**1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES**

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
1. Provide files and racks for storage of documents.
  2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.



- D. Make documents and samples available at all times for inspection by the Engineer.

#### 1.04 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by the Engineer.

#### 1.05 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.

- 1. Do not conceal any work until required information is recorded.

- C. Drawings; Legibly mark to record actual construction:

- 1. Depths of various elements of foundation in relation to finish first floor datum.
  - 2. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.
  - 3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
  - 4. Field changes of dimension and detail.
  - 5. Changes made by Field Order or by Change Order.
  - 6. Details not on original contract drawings.
  - 7. Equipment and piping relocations.
  - 8. Major architectural and structural changes including relocation of doors, windows, etc.
  - 9. Architectural schedule changes according to Contractor's records and shop drawings.

- D. Specifications and Addenda; Legibly mark each Section to record:

- 1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
  - 2. Changes made by field order or by change order.

**E. Shop Drawings (after final review and approval):**

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

**1.06 SUBMITTAL**

**A. Prior to substantial completion, deliver Record Documents to the Engineer.**

**B. Accompany submittal with transmittal letter in duplicate, containing:**

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of Contractor or his authorized representative.

**END OF SECTION**

## **SECTION 01730**

### **OPERATING AND MAINTENANCE DATA**

#### **PART 1: GENERAL**

##### **1.01 REQUIREMENTS INCLUDED**

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.

Prepare operating and maintenance data as specified in this and as referenced in other pertinent sections of Specifications.

- B. Instruct Owner's personnel in maintenance of products and equipment and systems.
- C. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

##### **1.02 RELATED REQUIREMENT**

- A. Section 01340: Shop Drawings, Product Data and Samples

##### **1.03 FORM OF SUBMITTALS**

- A. Prepare data in form of an instructional manual for use by Owner's personnel.

- B. Format:

1. Size: 8-1/2 inch x 11 inch
2. Paper: 20 pound minimum, white, for typed pages
3. Text: Manufacturer's printed data or neatly typewritten

**4. Drawings:**

a. Provide reinforced punched binder tab, bind in with text.

b. Fold larger drawings to size of text pages.

**5. Provide fly-leaf for each separate product or each piece of operating equipment.**

a. Provide typed description of product and major component parts of equipment.

b. Provide indexed tabs.

**6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:**

a. Title of Project.

b. Identity of separate structures as applicable.

c. Identity of general subject matter covered in the manual.

**C. Binders:**

1. Commercial quality three-ring binders with durable and cleanable plastic covers.

2. Maximum ring size: 1 inch.

3. When multiple binders are used, correlate the data into related consistent groupings.

**1.04 MANUAL FOR EQUIPMENT AND SYSTEMS**

**A. Submit three copies of complete manual in final form.**

**B. Content for each unit of equipment and system, as appropriate:**

1. Description of unit and component parts.

a. Function, normal operating characteristics and limiting conditions.

- b. Performance curves, engineering data and tests.
  - c. Complete nomenclature and commercial number of replaceable parts.
- 2. Operating Procedures:
  - a. Start-up, break-in, routine and normal operating instructions.
  - b. Regulation, control, stopping, shut-down and emergency instructions.
  - c. Summer and winter operating instructions.
  - d. Special operating instructions.
- 3. Maintenance Procedures:
  - a. Routine operations.
  - b. Guide to "trouble-shooting".
  - c. Disassembly, repair and reassembly.
  - d. Alignment, adjusting and checking.
- 4. Servicing and lubrication schedule.
  - a. List of lubricants required.
- 5. Manufacturer's printed operating and maintenance instructions.
- 6. Description of sequence of operation by control manufacturer.
- 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
  - a. List of predicted parts subject to wear.
  - b. Items recommended to be stocked as spare parts.
- 8. As installed control diagrams by controls manufacturer.

9. Each contractor's coordination drawings.
    - a. As installed color coded piping diagrams.
  10. Charts of valve tag numbers, with location and function of each valve.
  11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
  12. Other data as required under pertinent sections of specifications.
- C. Content, for each electric and electronic system, as appropriate:
1. Description of system and component parts.
    - a. Function, normal operating characteristics and limiting conditions.
    - b. Performance curves, engineering data and tests.
    - c. Complete nomenclature and commercial number of replaceable parts.
  2. Circuit directories of panelboards.
    - a. Electrical service.
    - b. Controls.
    - c. Communications.
  3. As-installed color coded wiring diagrams.
  4. Operating procedures:
    - a. Routine and normal operating instructions.
    - b. Sequences required.
    - c. Special operating instructions.

5. Maintenance procedures:
    - a. Routine operations.
    - b. Guide to "trouble-shooting".
    - c. Disassembly, repair and reassembly.
    - d. Adjustment and checking.
  6. Manufacturer's printed operating and maintenance instructions.
  7. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
  8. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction on Owner's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

**1.05 SUBMITTAL SCHEDULE**

- A. Submit one copy of completed data in final form fifteen days prior to substantial completion.
  1. Copy will be returned after substantial completion, with comments (if any).
- B. Submit two copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

**1.06 INSTRUCTION OF OWNER'S PERSONNEL**

- A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
  - 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

**END OF SECTION**

**END OF DIVISION**



**SECTION 01740**  
**WARRANTIES AND BONDS**

**PART 1: GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to Engineer for review and transmittal to Owner.

**1.02 RELATED REQUIREMENTS**

- A. Instructions to Bidders: Bid or Proposal Bonds.
- B. Conditions of the Contract: Performance Bond and Labor and Material Payment Bond.
- C. Conditions of the Contract: General Warranty of Construction.
- D. Section 01700: Contract Closeout.
- E. Section 01730: Operating and Maintenance Data.

**1.03 SUBMITTAL REQUIREMENTS**

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
  - 1. Product or work item.
  - 2. Firm, with name of principal, address and telephone number.

3. Scope.
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service maintenance contract.
6. Provide information for Owner's personnel:
  - a. Proper procedure in case of failure.
  - b. Instances which might affect the validity of warranty or bond.
7. Contractor, name of responsible principal, address and telephone number.

**1.04 FORM OF SUBMITTALS**

- A. Prepare in duplicate packets.
- B. Format:
  1. Size 8- inch x 11 inch punch sheets for standard 3-ring binder.
    - a. Fold larger sheets to fit into binders.
  2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
    - a. Title of Project.
    - b. Name of Contractor.
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

**1.05 TIME OF SUBMITTALS**

- A. Make submittals within ten days after date of substantial completion, prior to final request for payment.
- B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

**1.06 SUBMITTALS REQUIRED**

- A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.

**END OF SECTION**

**END OF DIVISION**

## **SECTION 02100**

### **SITE PREPARATION**

#### **PART 1: GENERAL**

##### **1.01 SCOPE OF WORK**

- A. This Section covers clearing, grubbing and stripping at station sites or along pipeline routes.
- B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the Engineer prior to the beginning of any clearing.
- C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 02220: Excavation Backfill, Fill and Grading for Structures.
- B. Section 02221.1: Earth Excavation and Backfill in Trenches.

#### **PART 2: PRODUCTS (NOT USED)**

#### **PART 3: EXECUTION**

##### **3.01 CLEARING**

The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as to provide for the safety of employees and others.

**3.02 GRUBBING**

Grubbing shall consist of the complete removal of all stumps, roots larger than 1- inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

**3.03 STRIPPING**

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The Owner shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess top soil material to a remote site chosen by the Owner within a five mile radius of the construction site. Should Owner not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to Owner.

**3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL**

The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

**3.05 PRESERVATION OF TREES**

Those trees which are designated for preservation by the Engineer shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

**3.06****PRESERVATION OF DEVELOPED PRIVATE PROPERTY**

- A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to pump station sites along the proposed pipeline route. Trees, shrubbery, gardens, lawns and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the Engineer.

**3.07****PRESERVATION OF PUBLIC PROPERTY**

The appropriate paragraphs of Articles 3.05 and 3.06 of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas.

**END OF SECTION**

## **SECTION 02220**

### **EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES**

#### **PART 1: GENERAL**

##### **1.01 SCOPE OF WORK**

- A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.
- B. The Owner shall have the option to receive all excess excavated material. The Contractor shall pay all equipment and labor cost for delivering excess excavated material to a remote site, chosen by the Owner, within a five mile radius of the construction site. All cost associated with transferring the excess excavated material shall be included in the unit price bid for piping. Should Owner not choose to receive any or all excess excavated material, the Contractor shall dispose of said material at no additional cost to Owner.
- C. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the Engineer.
- D. Structural excavation and backfill shall include the furnishing of all materials and equipment and of other facilities which may be necessary to perform the excavations, place and compact the backfill and sheeting, bracing and necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Engineer.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 01410: Testing Laboratory Services.
- B. Section 02221: Trenching, Bedding and Backfill for Pipe
- C. Section 02223: Excavation below Normal Grade and Crushed Stone or Shell Refill.

D. Section 02355: Lumber Left in Place.

**1.03 QUALITY ASSURANCE**

A. Testing Agency:

1. In place soil compaction tests to be performed by testing laboratory employed by Owner.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):
  - a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

**1.04 JOB CONDITIONS**

- A. As specified in Section 02221, the Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, sanding or running water at all times throughout the period of construction.
- B. As specified in Section 02221 and Section 02355, the Contractor shall assume all responsibility for security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.
- C. Excavated areas shall be cleared of all debris, water, slush, muck, and soft or loose earth and shall be conditioned to the entire satisfaction of the Engineer.
- D. All excavated material unsuitable for use or which will not be used shall be disposed of as specified in Section 02221.
- E. All excavations encountering roots, logs, etc. at the designated bottom grade of the excavation shall be removed of such items by the Contractor and refilled with proper material as specified in Section 02223.



**PART 2: PRODUCTS**

**2.01 MATERIAL FOR CONTROLLED FILL**

- A. Composition: Only approved material shall be used for backfill, free from organic matter and lumps of clay. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.
- B. Crushed stone and shell shall be as specified in Section 02221.

**2.02 UNSUITABLE MATERIAL**

Unsuitable material is highly organic soil per ASTM D2487 Group PT; such as topsoil, roots, vegetable matter, trash and debris.

**PART 3: EXECUTION**

**3.01 INSPECTION**

- A. The Contractor shall verify that preceding work affecting work of this Section has been satisfactorily completed.
- B. Correct conditions adversely affecting work of this Section.

**3.02 REMOVAL OF UNSUITABLE MATERIALS**

- A. The Contractor shall remove unsuitable material from within the limits of the work specified in this Section.
- B. Materials meeting requirements for controlled fill shall be stocked piled as necessary and in such a manner satisfactory to the Engineer.
- C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

### **3.03 EXCAVATION**

- A. When footing concrete or shell subbase is to rest on an excavated surface, care shall be taken not to disturb the bottom of the excavation. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.
- B. When any structural excavation is completed, the Contractor shall notify the Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer.
- C. The elevation of the bottoms of footings and base slabs as shown on the Drawings, shall be considered as approximate only and the Engineer may order in writing, such changes in dimensions or elevation of footings as may be necessary to secure satisfactory foundations or elevation of footings as may be necessary to secure a satisfactory foundation.
- D. All excavation shall be made within an area bounded by lines five feet outside of and parallel to exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls will not be permitted.
- E. If the bottom of the excavation is carried below the level called for by the Drawings or made mucky or unstable due to the Contractor's operations or carelessness, the excavation shall be deepened to undisturbed soil just before concreting operations and the thickness of concrete or depth of fill material as determined by the Engineer, shall be increased accordingly without additional compensation to the Contractor.

### **3.04 STRUCTURAL BACKFILL**

- A. Structural backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling.
- B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings.

- C. Fill shall be placed in uniform layers not more than 12" thick and compacted to minimum of 95 percent maximum density determined by ASTM D1557-70T, Method A or C or as directed by the Engineer. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Engineer.
- D. Compaction of structural backfill by ponding and jetting will be permitted when, as determined by the Engineer, the backfill material is of such character that it will be self-draining when compacted and that foundation Materials will not soften or be otherwise damaged by the applied water and no damage from hydrostatic pressure will result to the structure. Ponding and jetting of the upper two feet below finished subgrade will not be permitted in roadway areas. When ponding and jetting is permitted, material for use in a structure backfill shall be placed and compacted in layers not exceeding four feet in thickness. The work shall be performed without damage to the structure and embankment and in such a manner that water will not be impounded.
- E. Surplus material resulting from the prosecution of the excavation and backfill shall be used in grading the site or removed from the site and disposed of as directed by the Engineer. In no case shall any surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted by suitable means to a density equal to that of the surrounding natural ground.

**3.05 FIELD QUALITY CONTROL**

- A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T method A or C.

**END OF SECTION**

## **SECTION 02221**

### **TRENCHING, BEDDING AND BACKFILL FOR PIPE**

#### **PART 1: GENERAL**

##### **1.01 SCOPE OF WORK**

- A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation, backfill, fill, grading and slope protection required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to: manholes, vaults, duct conduit, pipe and roadways and paving; all backfilling, fill and required borrow; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and water handling.
- B. The work of all sections in DIVISIONS II and IV of these specifications shall be performed concurrently with the work specified under this Section.
- C. The Contractor shall examine the site and review the available test borings or undertake his own subsurface investigations prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality conditions at locations other than places shown and at the time the investigation was made.

##### **1.02 RELATED WORK**

- A. Conditions of the Contract.
- B. Structural Excavation, Backfill and Compaction in Section 02220.

##### **1.03 PROTECTION**

- A. Sheeting and Bracing in Excavations:

- 1. In connection with construction of below grade structures, the Contractor shall construct, brace and maintain cofferdams consisting of sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary of proper construction and to

protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

2. For trench sheeting for pipes, no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, he may direct the Contractor in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.
3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specifications, all sheeting and bracing shall be removed after completion of the substructure, care being taken not to disturb or otherwise injure the finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as may be directed.
4. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or on the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

5. The Contractor shall construct the cofferdams and sheeting outside the neat lines of the foundation unless indicated otherwise to the extent he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the masonry enclosed. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.
6. Drawings of the cofferdams and design computations shall be submitted to the Engineer for approval and construction shall not be started until such drawings are approved. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the substructures.

**B. Dewatering, Drainage and Flotation**

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24-inches of excavation for this work in-the-dry and not until the water level is a minimum of six inches below proposed bottom of excavation.
2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for predrainage of the soils prior to final excavation for some of the deeper in-ground structures, or piping and for maintaining the lowered groundwater level until construction has been completed to such an extent that the structure, pipeline, or fill will not be floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
5. The Contractor shall furnish all materials and equipment and perform all work required to install and maintain the drainage systems he proposes for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.
6. If requested by the Engineer, the Contractor's proposed method of dewatering shall include a minimum of two operating groundwater observation wells at each structure to be used to determine the water level during construction of the structure. Locations of the observation wells shall be at structures and along pipelines as approved by the Engineer prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the Engineer for approval. However, such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance or natural bearing soils for damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

8. As part of his request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Engineer.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

**PART 2: PRODUCTS**

**2.01 MATERIALS**

**A. General:**

1. Materials for use as fill and backfill shall be described below. For each material, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.
2. Additional materials shall be furnished as required from off-site sources and hauled to the site.
3. Disposal of unsuitable material is specified in this Section, see Paragraph 3.06.

**B. Structural Fill:**

1. Structural fill shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.



2. Structural fill material shall be a minimum of 60 percent clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 95 percent of the maximum density as determined by ASSHTO T-180. Rock in excess of 2-1/2 inches in diameter shall not be used in the fill material. If the moisture content is improper for attaining the specified density, either water shall be added or material shall be permitted to dry until the proper moisture content for compaction is reached.

C. Crusher-Run Gravel:

1. The impervious aggregate base, crusher-run gravel, subbase, or shoulder course material shall be of uniform quality throughout. The material retained on the No. 10 sieve shall be composed of aggregate meeting the requirements for Class A or B coarse aggregate, except the percent of soft fragments allowed shall be as shown in the requirements below. To be used only if requested by Contractor and approved by the Engineer.
2. The impervious aggregate may be produced from an approved quarry source, or bank or pit deposit, which will yield a satisfactory mixture conforming to all requirements of these specifications after it has been crushed or processed as a part of the mining operations, or the material may be furnished in two sizes of such gradation that when combined in the central mix plant the resultant mixture shall conform to the required specifications. Impervious aggregate base, subbase or shoulder material shall conform to the following requirements:

a. Gradation, Percent by Weight Passing Each Sieve

12" Sieve	100
3/4" Sieve	60-100
No. 10 Sieve	30-55
No. 60 Sieve	8-35
No. 200 Sieve	5-20

Test on Materials Passing No. 10 Sieve  
Volume Change, Percent 0-18

**Test on Material Retained on 3/8 Sieve  
Soft Fragments, Percent 0-30**

Method of Tests shall be in accordance with the following:

Gradation	AASHTO:	T27
Volume Change	GHD:	6
Soft Fragments	AASHTO:	T189

**D. Limerock Base Course:**

1. Limerock shall be used as base course for bituminous paved roads and parking areas, riprap and at other locations indicated on the Drawings.
2. Limerock shall not contain cherty or other extremely hard pieces, or lumps, or balls or pockets of sand material in sufficient quantity as to be detrimental to the proper bonding, finishing or strength of the limerock base.
3. Gradation and Size Limits:

At least 97 percent (by weight) of the material shall pass a 3-1/2 inch sieve and the material shall be graded uniformly down to dust. The fine material shall consist of dust of fracture. All crushing or breaking up which might be necessary in order to meet such size requirements shall be done before the material is in place.

**E. Common Fill:**

1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2 inches in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials. Existing soil may be used to adjust grades over the site with the exception of the building area.
2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

**F. Bedding Rock:**

1. Crushed limerock shall be used for pipe bedding, manhole bases and at other locations indicated on the Drawings.
2. Bedding rock shall be 3/8" to 3/4" washed and graded limerock. This rock shall be graded so that 99% will pass a 3/4" screen and 80% will be retained on a No. 8 screen. This bedding shall consist of at least 6 inches of washed and graded limerock placed in the trench to the proposed elevation of the centerline of the pipe prior to any pipe laying. This bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

**PART 3: EXECUTION**

**3.01 FILL PLACEMENT**

**A. General:**

1. Material placed in fill areas under and around structures shall be deposited within the lines and to the grades shown on the Drawings or as directed by the Engineer, making due allowance for settlement of the material. Fill shall be placed only on properly prepared surfaces which have been inspected and approved by the Engineer. If sufficient common fill material is not available from excavation on site, the Contractor shall provide borrows as may be required.
2. Limerock base course material, structural fill and screened limerock, shall be provided as borrow.
3. Fill shall be brought up in substantially level lifts throughout the site, starting in the deepest portion of the fill. The entire surface of the work shall be maintained free from ruts and in such condition that construction equipment can readily travel over any section. Fill shall not be placed against concrete structures until they have attained sufficient strength.

4. Fill shall be dumped and spread in layers by a bulldozer or other approved method. During the process of dumping and spreading, all roots, debris and stones greater in size than specified under Materials, shall be removed from the fill areas and the Contractor shall assign a sufficient number of men to this work to insure satisfactory compliance with these requirements.
5. If the compacted surface of any layer of material is determined to be too smooth to bond properly with the succeeding layer, it shall be loosened by harrowing or by another approved method before the succeeding layer is placed.
6. All fill materials shall be placed and compacted "in-the-dry". The Contractor shall dewater excavated areas and is required to perform the work in such manner as to preserve the undisturbed state of the natural inorganic soil.

### 3.02

#### COMPACTION

- A. Structural fill, limerock base course and screened limerock in open areas, shall be placed in layers not to exceed nine inches in depth as measured before compaction. Each layer shall be compacted by a minimum of six coverages (3 passes each way) with the equipment described below, to at least 98 percent of the maximum density, as determined by AASHTO T-180. Incidental compaction due to traffic by construction equipment will not be credited toward the required minimum six coverages.
- B. Common fill shall be placed and compacted in a manner similar to that described above for structural fill, with the following exceptions: layer thickness prior to compaction may be increased to 12-inches in open areas; and common fill except dike fill, required below water level in peat excavation areas may be placed as one lift, in-the-wet, to an elevation one foot above the water level at the time of filling.
- C. Compaction equipment in open areas shall consist of a medium-heavy vibrator roller (minimum static weight of 10 tons) operated at resonant frequency and at a speed of 2 fps or less or other compaction equipment approved by the Engineer.

- D. Areas adjacent to structures and other confined areas inaccessible to the vibrator roller shall be compacted with manually operated sled-type vibratory compactor. The Contractor shall also conform to additional backfill requirements at structures as specified in Paragraph 3.04. Compaction of the fill by such means shall be to the same degree of compaction as obtained by the rubber-tired equipment, and the Engineer may make the necessary tests to determine the amount of compactive effort necessary to obtain equal compaction. Unless such tests indicated that modifications may be made, the fill compacted by mechanical compactors shall be placed in 6-inch layers and thoroughly tamped over the entire surface. Compaction equipment is subject to approval by the Engineer.
- E. It is the intention that the fill materials with respect to moisture be used in the condition they are excavated insofar as this is practicable. Material which is too wet shall be spread on the fill area and permitted to dry, assisted by harrowing if necessary, until the moisture content is reduced to allowable limits.
- F. If the Engineer shall determine that added moisture is required, water shall be applied by sprinkler tanks or other sprinkler systems, which will insure uniform distribution of the water over the area to be treated and give complete and accurate control of the amount of water to be used. If too much water is added, the area shall be permitted to dry before compaction is continued.
- G. The Contractor shall supply all hose, piping, valves, sprinklers, pumps, sprinkler tanks, hauling equipment and all other materials and equipment necessary to place the water in the fill in the manner specified.

### 3.03 TRENCH EXCAVATION AND BACKFILLING

- A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings and in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches
- B. Rock shall be removed to a minimum 8-inch clearance around the bottom and sides of all the pipe or ducts being laid.

- C. Where pipes or ducts are to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated manually, shall be done in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be made as required.
- E. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.
- F. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- G. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.
- H. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2-inches and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe.
- I. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.
- J. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted by rolling, ramming, or puddling, as the Engineer may be direct, sufficiently to prevent subsequent settling.

### **3.04**

#### **BACKFILLING AROUND STRUCTURES**

- A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wet down as required. Where material can be suitably compacted by jetting or puddling, the Contractor shall use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.
- B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs if applicable have attained sufficient strength. Backfilling shall be subjected to approval of the Engineer.
- C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot above the bottom of the pipes:

  - 1. Place structural fill in such areas for a distance of not less than 3 feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
  - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.
  - 3. Structural fill shall be of the quality specified under Part 2 of this Section.
- D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan and no soft spots or uncompacted areas will be allowed in the work.

- E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

### 3.05 GRADING

- A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades and elevations shown or as directed by the Engineer and shall be made in such a manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.
- B. If at the time of excavation it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.
- C. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.
- D. Stones or rock fragments larger than 2-1/2 inches in their greatest dimensions will not be permitted in the top 6-inches of the subgrade line of all dikes, fills or embankments.
- E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.
- F. In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All and fill slopes shall be uniformly dressed to the slope, cross section and alignment shown on the Drawings or as directed by the Engineer.



- G. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.

### **3.06 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL**

- A. Unsuitable and surplus excavated materials and pavement shall become the property of the Contractor and removed and disposed of by him off the project site.
- B. Suitable excavated material may be used for fill or backfill if it meets the specifications for common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available that will not interfere with the operation of the plant nor inconvenience traffic or adjoining property owners.
- C. Surplus suitable excavated material shall be used to fill depressions as the Engineer may direct or be disposed as indicated in Section 02220.

### **3.07 DISPOSAL AND REPLACING OF ROCK**

- A. Rock may be used in fill only with the approval of the Engineer or as shown on the Drawings.

### **3.08 SPECIAL FOUNDATIONS**

- A. The Contractor shall furnish and install a special foundation for gravity sewer pipe and manholes as shown on the Drawings.
- B. All gravity sewer lines and laterals shall be installed on the special bedding foundation and the prices for laying gravity sewer lines shall include this cost. This bedding shall consist of at least 4" of 3/8" by 3/4" washed and graded lime rock placed in the trench to the proposed elevation of the center line of the pipe prior to any pipe laying. This bedding shall not be used under any circumstances as a drain for groundwater. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing or loosening of this bed.

**END OF SECTION**

**02221-14**

## **SECTION 02276**

### **TEMPORARY EROSION AND SEDIMENTATION CONTROL**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. The work specified in this Section consists of designing, providing, maintaining, and removing temporary erosion and sedimentation controls as necessary.
- B. Temporary erosion controls include, but are not limited to, grassing, mulching, netting, watering, and reseeding on-site surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner.
- C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner.
- D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

##### **1.02 REFERENCE DOCUMENTS**

- A. South Florida Building Code and Standard Building Code.

#### **PART 2 PRODUCTS**

##### **2.01 EROSION CONTROL**

- A. Seed and sod specified in Section 02485.
- B. Netting - fabricated of material acceptable to the Owner.

## **2.02 SEDIMENTATION CONTROL**

- A. Bales - clean, seedfree cereal hay type.
- B. Netting - fabricated of material acceptable to the Owner.
- C. Filter stone - crushed stone conforming to Florida Dept. of Transportation specifications.
- D. Concrete block - hollow, non-load-bearing type.
- E. Concrete - exterior grade not less than one inch thick.

## **PART 3 EXECUTION**

### **3.01 EROSION CONTROL**

- A. Minimum procedures for grassing are:
  - 1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
  - 2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
  - 3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2 inches.
  - 4. Apply netting over mulched areas on sloped surfaces.
  - 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

### **3.02 SEDIMENTATION CONTROL**

- A. Install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Hay bales which deteriorate and filter stone which is dislodged shall be replaced.

### **3.03 PERFORMANCE**

- A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results which comply with the requirements of the State of Florida, Contractor shall immediately take whatever steps are necessary to correct the deficiency at his own expense.

**END OF SECTION**

**02276-2**

## **SECTION 02355**

### **LUMBER LEFT IN PLACE**

#### **PART 1: GENERAL**

##### **1.01 SCOPE OF WORK**

The Contractor shall furnish and install shoring and sheeting as shown on the Contract Drawings, as required by these specifications and as necessary to provide adequate safety.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE**

Section 02221: Earth Excavation and Backfill in Trenches.

#### **PART 2: PRODUCTS**

##### **2.01 MATERIALS**

Wood for shoring and sheeting shall be green, rough cut hardwood planking.

#### **PART 3: EXECUTION**

##### **3.01 INSTALLATION**

- A. The Contractor shall furnish, install and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that which is necessary for proper construction and to protect adjacent structures from undermining or other damage. If the Engineer is of the opinion that sufficient or proper supports have not been provided, he may order additional supports installed at the expense of the Contractor. Compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
- B. The Contractor shall leave in place to be embedded in the backfill all sheeting, bracing and other related items as shown on the Contract Drawings. The Engineer may direct that timber used for sheeting and bracing be cut off at any specified elevation.

- C. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property.
- D. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
- E. The Contractor shall receive no payment other than that included in the price to be paid for pipe for any timber used for sheeting, bracing, or other related items.

**END OF SECTION**

## **SECTION 02485**

### **SEEDING AND SODDING**

#### **PART 1 GENERAL**

##### **1.01 SCOPE OF WORK**

- A. Furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.
- B. Work includes furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance.

##### **1.02 RELATED WORK NOT INCLUDED**

- A. Excavation, filling and grading required to establish elevation shown on the Drawings are included under other Sections of these Specifications.

##### **1.03 QUALITY ASSURANCE**

###### **A. Requirements**

It is the intent of this specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the Owner until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.

Where force mains and gravity sewers are laid in roadways, grassing shall be limited to eight (8) feet each side of the roadway in which the pipeline is installed. Sodding shall be limited to two (2) feet each side of the roadway in which pipelines are installed.

Where pipelines are laid cross country, grassing shall be limited to eight (8) feet each side of the centerline of the pipe. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the Engineer.

**PART 2: PRODUCTS**

**2.01 MATERIALS**

**A. Fertilizer**

The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 3 percent phosphorus, 6 percent potassium; 40 percent other available materials derived from organic sources. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.

**B. Grassing**

The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Section 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering; costs for mulching, fertilizing and watering shall be included in the contract bid price for grassing.

**C. Sodding**

Sod shall be provided as required on the construction drawings or at locations as directed by the Engineer in accordance with Florida Department of Transportation, Specifications Sections 575 and 981. The Contractor shall furnish bahia grass sod. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the contract price bid for sodding.

**D. Topsoil**

Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the Owner. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.

**E. Mulch**

Mulch shall be fresh cypress mulch. Rate of application specified herein shall correspond to depth not less than 1 inch or more than 3 inches according to texture and moisture content of mulch material.

**F. Water**

It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

**PART 3: EXECUTION**

**3.01 INSTALLATION**

**A.** When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the Engineer.

**B. Finish Grading**

Areas to be seeded or sodded shall be finished graded, raked and debris removed. Soft spots and uneven grades shall be eliminated. The Engineer shall approved the finish grade of all areas to be seeded or sodded prior to seed or sod application.



**C. Protection**

Seeded and sodded areas shall be protected against traffic or other use by placing warnings signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the owner shall be repaired by the Contractor as directed by the Engineer.

**3.02 CLEANUP**

Soil, mulch, or seed or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

**3.03 LANDSCAPE MAINTENANCE**

Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replace as directed by the Engineer.

Maintain landscape work for a period of 90 days immediately following complete installation of work or until Owner accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the Owner.

**3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATIONS**

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and reseeding, in accordance with these Specifications.

**END OF SECTION**

## SECTION 02575

### PAVEMENT REPAIR AND RESTORATION

#### PART 1: GENERAL

##### 1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required and remove and replace pavements over trenches excavated for installation of force mains and gravity sewer lines and appurtenances as shown of the Contract Drawings and/or specified herein.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01380: Construction Photographs.
- B. Section 02221: Earth Excavation and Backfill in Trenches.

##### 1.03 GENERAL

- A. Refer to Section 01380 relative to photographs required prior to construction.
- B. Force Mains: Pavement removal and restoration width shall be limited to the pipe O.D. plus 72 inches as shown or noted on the Contract Drawing. The Contractor shall be responsible for all repairs outside this limit at his own expense. Pavement removal and replacement costs within the O.D. plus 72 inch limit shall be included.

Gravity Sewers: Pavement removal and restoration width shall be limited to the trench width for the respective depth of cut as shown or noted in the gravity sewer road restoration detail of the Contract Drawings.

- C. All damage, as a result of work under this Project, done to existing structures, pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipe lines, conduits, drains, catch basin, flagstones, or stabilized areas or driveways and including all obstructions not specifically named herein, shall be repaired in a manner satisfactory to the Engineer. Bid prices for

pipes shall include the furnishing of all labor, materials, equipment and incidentals necessary for the cutting, repair and restoration of the damaged areas unless pay items for specific types of repair are included in the Proposal.

- D. The Contractor shall keep the surface of the backfilled area of excavation in a safe condition and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. The repair shall conform to applicable requirements of Manatee County Highway Department requirements for pavement repair and as described herein, including all shell base and subbase replacement. All costs for shell base and subbase replacement shall be included in the unit price bid for pavement restoration.
- E. All materials and workmanship shall be first class and nothing herein shall be construed as to relieve the Contractor from this responsibility. The Owner reserves the right to require soil bearing or loading tests or materials tests, should the adequacy of the foundation or the quality of materials used be questionable. Costs of these tests shall be borne by the Owner.
- F. All street, road and highway repair shall be made in accordance with the details indicated on the Drawings and in accordance with the applicable requirements of these Specifications and meeting the approval of affected County and State agencies.

## **PART 2: PRODUCTS**

### **2.01 PAVEMENT SECTION**

- A. Asphaltic concrete shall consist of asphalt cement, coarse aggregate, fine aggregate and mineral filler conforming to F.D.O.T. Type III Asphalt. Pavement replacement thickness shall match that removed but in no case shall be less than 1-1/2 inches compacted thickness. All asphalt concrete pavement shall be furnished, installed and tested in accordance with FDOT Road and Bridge Construction.

- B. Base shall be furnished and installed under all pavement sections restored under this contract. Base shall be either soil cement or sand asphalt and have a minimum 6" compacted thickness. The Specifications for soil cement base are as follows:

I. Design Mix:

- a) 300 psi (7 days) lab design.
- b) Cement content by weight must be a minimum of 5% and a maximum of 8%.

II. Project Test Samples:

- a) The pills cast from project operations must break at 200 psi or higher at 7 days.
- b) Cores may be taken at 14 days to provide additional information regarding soil cement section.
- c) Core breaks below 150 psi will not be acceptable.
- d) The location and number of cores taken will be at the discretion of County Engineer or his authorized representative.
- e) All cores shall be 6" in diameter.
- f) Subgrade and further specifications are outlined in Section 270 or the FDOT State Specifications for Road and Bridge Construction Current Edition.

C. Stabilized Subbase

Force Mains:

Where force mains are installed within asphalt pavement, no stabilized base will be required. In lieu of stabilized base, the top twelve (12) inches of the suitable excavated backfill material shall be compacted to 98% density in accordance with AASHTO T-180 and shall have an LBR of at least 40.

Gravity Sewers:

Where gravity sewers are installed within asphalt pavement, a minimum of six (6) inches of stabilized sub-base shall be required. Stabilized sub-base shall be compacted to 98% density in accordance with AASHTO T-180 and shall have an LBR of at least 40.

- D. Prime and tack will be required and applied in accordance with Section 300 - FDOT Book: Prime and Tack Coat for Base Courses.

E. Overlay

After all road restoration in accordance with paragraph A, B and C above has been completed, a tack coat and asphalt overlay applied as directed by the Engineer will be required on all roads in which force mains have been installed. No overlay shall be required where gravity sewers are installed within roadways. The extent of overlay of Type III asphalt will be as shown on the Contract Drawings and/or as directed by the Engineer. All asphalt requirements shall be in accordance with applicable DOT Standards.

PART 3: EXECUTION

3.01 CUTTING PAVEMENT

- A. The Contractor shall cut and remove pavement as necessary for installing the new pipelines and appurtenances and for making connections to existing pipelines.
- B. Before removing pavement, the pavement shall be marked for cuts nearly paralleling pipe lines and existing street lines. Asphalt pavement shall be cut along the markings with a jackhammer, rotary saw or other suitable tool. Concrete pavement shall be scored to a depth of approximately two (2) inches below the surface of the concrete along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring with a jackhammer or other suitable equipment.
- C. No pavement shall be machine pulled until completely broken and separated along the marked cuts.
- D. The pavement adjacent to pipe line trenches as stipulated in Paragraph 1.03-B of this Section shall neither be disturbed nor damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the Contractor shall remove the damaged pavement and shall replace it at his own expense. In addition, the base and sub-base shall be restored in accordance with these Specifications Florida Dept. of Transportation Standard Specifications and as directed by the Engineer.

### **3.02 PAVEMENT REPAIR AND REPLACEMENT**

- A. All existing pavement cut or damaged by construction under this Contract shall be repaired to match the original surface material and original grade unless otherwise specified or shown on the Drawings. Materials and construction procedures for base course and pavement repair shall conform to those of the Florida Department of Transportation.
- B. The repair shall include the preparation of the sub-base and base, the placing and maintaining of the roadway surface and any special requirements, all as specified herein. Stabilized roads and drives shall be finished to match the existing grade. Dirt roads and drives shall have the required depth of backfill material as shown on the Contract Drawings. All existing shell roads in which gravity sewers are scheduled for installation shall be restored with 6" stabilized base and 6" fossilized shell base before installation of the 1-1/2" asphaltic surface course as shown or noted on the Contract Documents. Costs for this restoration shall be broken down into the respective sub-base, base and asphaltic pavement bid items of the Bid Form.
- C. The width of all asphaltic concrete repairs shall extend the full width and length of the excavation or to the limits of any damaged section. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonable uniform with no unnecessary irregularities.

### **3.03 MISCELLANEOUS RESTORATION**

Sidewalks cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of four inches. Concrete curb or curb gutter shall be restored to the existing height and cross section in full sections or lengths between joints. RCP shall be repaired or installed in accordance with Section 04530 of these Specifications. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass sod of a type matching the existing grass in accord with these Specifications.

**3.04 SPECIAL REQUIREMENTS**

The restoration of all surfaces, as described herein, disturbed by the installation of pipelines shall be completed as soon as is reasonable and practical and when directed by the Engineer. All restoration and replacement or repairs shall be the responsibility of the Contractor and shall be performed without additional compensation unless provided for in the Bid Proposal section.

**3.05 CLEANUP**

After all repair and restoration or paving has been completed, all excess asphalt, dirt and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

**3.06 MAINTENANCE OF REPAIR**

All wearing surfaces shall be maintained by the Contractor in good order suitable for traffic prior to completion and acceptance of the work.

**END OF SECTION**

Revision  
12/7/89

**SECTION 02622**

**POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS  
(AWWA SPECIFICATIONS C-900 & C-905)**

**PART 1 GENERAL**

**1.01 SCOPE OF WORK**

Furnish all labor, materials, equipment and incidentals required and install in the locations as shown on the Drawings, the plastic piping, fittings and appurtenances as specified herein.

**1.02 DESCRIPTION OF SYSTEM**

Piping shall be installed in the locations as shown on the Drawings.

**1.03 QUALIFICATIONS**

All plastic pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.

**1.04 SUBMITTALS**

- A. Shop drawings shall be submitted to the Engineer and shall include dimensions and technical specifications for all piping.
- B. Submit to the Engineer, samples of all materials specified herein.
- C. The Contractor shall submit and shall comply with pipe manufacturer's recommendation for handling, storing and installing pipe and fittings.
- D. The Contractor shall submit pipe manufacturer's certification of compliance with these Specifications.

**1.05 TOOLS**

Special tools, solvents, lubricants, and caulking compounds required for normal installation shall be furnished with the pipe.



## PART 2 PRODUCTS

### 2.01 MATERIALS

#### A. Class-Rated Polyvinyl Chloride (PVC) Pipe:

1. Class-rated PVC pipe and accessories four to twelve inches (4"-12") in diameter, where shown or as specified on the Drawings, shall meet the requirements of AWWA Specification C-900 "Polyvinyl Chloride (PVC) Pressure Pipe". Pipe shall be Class 150, meeting requirements of Dimension Ratio (DR) 18, unless otherwise designated on the Drawings or bid form as Class 100 or 200 and shall be designed with cast iron outside diameters. Each length of pipe shall be hydrotested to four (4) times its class pressure by the manufacturer in accordance with AWWA C-900. PVC pipe 14 through 36 inches shall meet the requirements of AWWA Standard C-905, Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 inches through 36 inches. Pipe shall have a working pressure rating (WPR) of 176 meeting the requirements of dimension ratio (DR) 21. Each length of pipe shall be tested at twice the pressure rating (PR 200 psi) for a minimum dwell of 5 seconds in accordance with AWWA C-905. Pipe shall be listed by Underwriters Laboratories. Provisions shall be made for expansion and contraction at each joint with an elastomeric ring, and shall have an integral thickened bell as part of each joint. PVC Class pipe shall be installed as recommended by the manufacturer. Pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise directed by the Engineer. Pipe and accessories shall bear the NSF mark indicating pipe size, manufacturer's names, AWWA and/or ASTM Specification number, working pressure, and production code. Pipe shall be blue for potable water service, green for sewage force main service and brown for recycled water mains.

#### B. Joints:

1. The PVC joints for pipe shall be of the push-on type unless otherwise directed by the Engineer so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be a single rubber gasket joint designed to be assembled by the positioning of a continuous,

molded rubber ring gasket in annular recess in the pipe or fitting socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and annular recess shall be designed and shaped so that the gasket is locked in place against displacement as the joint is assembled. The rubber ring joint shall be designed for thermal expansion or contraction with a total temperature change of at least 750 degrees F in each joint per length of pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric ring which shall meet requirements of ASTM F-477. The thickened bell section shall be designed to be at least as strong as the pipe wall. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water.

2. PVC joints for pipe less than two inches (2") in diameter shall be threaded or solvent welded joint Schedule 80 PVC pipe where called for on the Drawings, unless otherwise directed by the Engineer. Teflon thread tape or liquid teflon thread lubricant shall be used on all threaded joints to serve as both a sealer and lubricant. Threaded joints should be made hand tight (hard). When the joint is hand tight, a strap wrench should be used to make up one to two (1-2) additional full turns past the hand right point. Do not use pipe wrenches or pump pliers on plastic pipe or fittings.

C. Fittings:

All fittings for class-rated PVC pipe shall be cast iron/ductile iron with mechanical joints and shall conform to the specifications for cast iron/ductile iron fittings, unless otherwise directed. PVC C-900 fittings are allowable upon approval by the Engineer.

1. Fittings for Schedule 80 PVC pipe less than two inches (2") in diameter shall be threaded and be PVC as shown on the Drawings, or as directed by the Engineer. Threaded PVC fittings shall conform to ASTM Specification D2464-69).
2. The manufacturer of the pipe shall supply all polyvinyl chloride accessories as well as any adaptors and/or specials required to perform the work as shown on the drawings and specified herein. Standard double bell couplings will not be accepted where the pipe will slip completely through the coupling.

**PART 3      EXECUTION**

**3.01      INSTALLATION**

The installation of plastic pipe shall be strictly in accordance with manufacturer's technical data and printed instruction.

**3.02      FIELD PAINTING**

Pipe normally exposed to view shall not be painted unless so indicated on the Drawings. Engineer will assist in identifying pipe contents direction of flow and all else required for proper marking of pipe.

**3.03      INSPECTION AND TESTING**

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure test for four (4) hours at full working pressure, but not less than 150 psi. All leaks shall be repaired and stress retested as approved by the Engineer. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

**3.04      DISINFECTING POTABLE WATER PIPELINES**

- A. Before being placed in service, all potable water pipelines shall be chlorinated in accordance with AWWA 651, "Standard Procedure for Disinfecting Water Mains". The procedure shall be approved by the Engineer. The location of the chlorination and sampling points will be determined by the Engineer in the field. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.
- B. The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipeline for about 24 hours.
- C. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by the Engineer in

full accordance with the AWWA Manual C651. The Contractor will be required to rechlorinate, if necessary. The line shall not be placed in service until the requirements of the State and County Public Health Department are met.

- D. Special disinfecting procedures shall be used in connections to existing mains and where the method outlined above is not practical.

### **3.04 DISINFECTING POTABLE WATER PIPELINES**

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- D. Special disinfecting procedures shall be used in connections to existing mains and where the method outlined above is not practical.

**END OF SECTION**

## SECTION 02625

### LEACHATE COLLECTION SYSTEM

#### THE UNDERDRAIN SYSTEM

The underdrain system includes the trench, underdrain, filter aggregate and backfill. The trench should be at least 20 inches wide. The underdrain pipes should meet ASTM F-667 specifications for corrugated polyethylene tubing and fittings. The invert of the underdrain shall be at the elevations as shown on the plans. The filter aggregate that surrounds the slotted pipe should be a clean, non-calcareous, washed gravelly sand that is not susceptible to attack from acids and alkalies with a pH of 3 to 11 and must be sized to prevent the backfill above the filter aggregate from entering the perforated pipe. The following are the specifications for various elements of the underdrain system.

#### MATERIALS

##### Pipe and Fittings

The pipes used shall meet ASTM F-667 specifications for corrugated polyethylene tubing and fittings. The resin used in the pipes and fittings shall be High Density Polyethylene (HDPE) with properties equivalent to ASTM D-1248 Classification P34. The resin must not contain less than 2 percent carbon black as specified in ASTM D-1248, Section 3.1.2.3, Class C to impart maximum weather resistance. The corrugated underdrain pipes should have an inside diameter of 8 inches. The pipe shall have slots not exceeding 2.5 mm in width evenly cut and spaced in the valley of the corrugation around the circumference with a total slotted area no less than 3.5 square inches per foot of pipe. The wall thickness and stiffness of the drain pipes shall be sufficiently adequate to withstand the overburden pressure. All fittings shall be of the same materials as the pipes unless otherwise approved by the Owner.

### Filter Aggregate

The filter aggregate that surrounds the slotted pipe shall be clean, non-calcareous, washed gravelly sand that is not susceptible to clogging from acids and alkalies within a pH of 3 to 11. The filter aggregate shall conform to the following requirements.

<u>U.S. Standard Sieve Size</u>	<u>Percent Passing by Dry Weight</u>
3/4 Inch	100
3/8 Inch	90 to 100
No. 4	70 to 90
No. 10	20 to 50
No. 20	5 to 10
No. 40	0 to 2

The backfill soils directly above the aggregate shall be SP or SP-SM soils. These soils can be onsite sands or offsite sands, such as 60/90 sand, with a carbonate content of less than 5 percent, not susceptible to clogging from acids or alkalines within a pH range from 3 to 11 and with the following gradation requirements.

<u>U.S. Standard Sieve Size</u>	<u>Percent Passing by Dry Weight</u>
No. 10	100
No. 20	90 to 100
No. 40	70 to 90
No. 60	30 to 75
No. 100	5 to 40
No. 200	0 to 5

### UNDERDRAIN SYSTEM INSTALLATION

The underdrain system shall be installed at the locations and along the lines and grades shown on the plans and drawings. The gravel filter material should be carefully placed around the pipe. Clean granular materials shall be placed over the gravel filter to the depth and grades shown on the drawings.

The trench for the underdrain pipe shall be excavated along the specified alignment and to the required elevation and width shown on the plans and drawings. Trench excavation shall proceed ahead of pipe installation only as far as necessary to allow efficient pipe installation. The width of the trench shall be as specified on the drawings.

When the subgrade is found to consist of organic material, or any other unsuitable material, such material shall be removed to a minimum depth of at least 6 inches into the underlying natural sand, or to the depth specified by the Owner and replaced under the direction of the Owner's Representative with clean, suitable backfill material without additional compensation.

Proper tools and facilities shall be provided and used for the safe and efficient performance of the work.

Extreme care shall be exercised in handling and installing the drain pipe to avoid damaging the slots of the pipe. Under no circumstances shall pipeline materials be dropped or dumped into the trench. The trench shall be dewatered where necessary prior to installation of the pipe. The construction method must be approved in advance by the Owner.

All pipe, fittings, and other appurtenances shall be examined carefully for damage and other defects prior to installation. Defective materials shall be rejected and replaced.

As each section of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.

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 Owner's Representative.

To prevent crushing of the pipe, sufficient backfill shall be placed above the pipe according to manufacturer's specifications and subsequent to performance of actual field trial tests to confirm that the cover is adequate before equipment is allowed to pass over the pipes. Any pipe which is broke, cracked, or otherwise unsuitable, as determine by the Owner, shall be removed and replaced.

Field pipe joints and connections to wet wells or manholes shall be made using the manufacture's recommendation subject to approval by the Owner.

Cutting pipe for the insertion of fittings or closure pieces shall be done in a neat, workmanlike manner without causing damage to the pipe. Ends shall be cut square and perpendicular to the pipe axis. Burrs shall be removed and ends shall be smoothly beveled. Field cut ends shall be marked for proper depth of joint assembly.

## TESTING

The Contractor shall perform testing of all underdrain system pipe as set forth in this section and shall conduct such tests in the presence of the Engineer or Owner with three days advance written notice provided.

All underdrain pipes shall be aligned. Any pipe section that is misaligned shall be replaced to the satisfaction of the Engineer.

Underdrain system piping shall be tested within sections as previously approved by the Engineer. Testing shall not proceed until all facilities are complete in place. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter.

Should the inspection show failure, the necessary repairs shall be accomplished by the Contractor and the inspection repeated until approved by the Owner. The Contractor shall furnish the necessary labor, water and all other items required to conduct the required testing and shall perform the necessary system repairs required to comply with the specified test.

## QUALITY CONTROL

The Owner shall perform quality control testing to confirm compliance of the underdrain system with the above specifications. Quality control testing shall include monitoring the location of the system and confirming a safe handling and installation of the drain pipes. All materials including pipes, fittings, and filter aggregate shall be subject to the examination of the Owner, Engineer or Inspector to check their compliance with the specifications. As soon as the materials are examined and tested, the Contractor shall immediately be notified of and shall remove all rejected material from the work to a point as designated by the Owner.

END OF SECTION



## **SECTION 02640**

### **VALVES AND APPURTENANCES**

#### **PART 1 GENERAL**

##### **1.01 SCOPE OF WORK**

- A. Furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. All valves and appurtenances shall be of the size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.
- C. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- D. All valves and appurtenances furnished downstream on the discharge lines of the high service pumps shall be Class 250, whether specified hereinafter or not.
- E. The equipment shall include, but not be limited to, the following:
  - 1. Gate valves
  - 2. Resilient seated gate valves
  - 3. Pressure sustaining and check valves
  - 4. Ball valves for PVC pipe
  - 5. Butterfly valves
  - 6. Eccentric plug valves
  - 7. Air Release Valves
  - 8. Valve boxes
  - 9. Corporation Cocks
  - 10. Expansion joints
  - 11. Solenoid valves
  - 12. Flange adapter coupling
  - 13. Flexible couplings
  - 14. Unions
  - 15. Hose bibbs
  - 16. Slow closing air and vacuum valves
  - 17. Pressure Gauges
  - 18. Surge anticipator valve
  - 19. Slanting disc check valves

- 20. Check Valves
- 21. Quick connect couplings
- 22. Air cushioned check valves
- 23. Hydrants
- 24. Restraining Clamps
- 25. Tapping Sleeves

**1.02 DESCRIPTION OF SYSTEMS**

All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, already connected water, chemicals, wastewater, etc., depending on the applications.

**1.03 QUALIFICATIONS**

All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

**1.04 SUBMITTALS**

- A. Submit to the Engineer within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. Complete shop drawings of all valves and appurtenances shall be submitted to the Engineer for approval in accordance with the requirements of Section 01340 and the General Conditions.

**1.05 TOOLS**

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

**PART 2 PRODUCTS**

**2.01 GATE VALVES**

- A. Gate valves for water shall be in conformance with AWWA C500. All gate valves, unless otherwise specified or approved, shall be iron body, bronze mounted. Gate

valves shall be solid wedge except gate valves for yard piping shall be double disc and parallel seat. All gate valves shall be rated for 150 psi working pressure. Valves shall be equal to those as manufactured by American, Mueller, M&H, Clow, Kennedy or approved equal.

- B. Exposed valves shall be outside screw and yoke type and buried valve shall be nonrising stem fitted with O-ring seals.
- C. All buried valves shall have cast or ductile iron three (3) piece valve boxes. Four (4) tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.
- D. Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.
- E. Handwheels or chain wheels shall be turned left or counterclockwise to open the valves. Handwheels shall be of ample size and shall have an arrow and the word OPEN cast thereon to indicate the direction of opening.
- F. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.
- G. The design of the valves shall be such as to permit packing the valves without undue leakage while they are wide open and in service. Stuffing boxes shall be the O-ring type.
- H. Valves 16 inches or larger shall be provided with bevel or spur gears depending on the position of the main valve as indicated on the Drawings. The gear cases shall be of the extended type to permit repacking the stuffing box of the valve without disassembly. Solid wedge valves 16 inches or larger designed to lie horizontally shall be equipped with rollers or shoes to carry the weight of the wedge throughout its travel.
- I. Where indicated on the Drawings or necessary due to location, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they are supplied and to provide for easy operation of the valve. Chains for valve operators shall be galvanized.

- J. Where required, gate valves shall be provided with a box cast in the slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Orange, Massachusetts, Clow, DeZurik or equal.
- K. Gate valves 2-1/2-in. in diameter and smaller in size, shall have flanged or screwed ends as required; and shall be bronze, solid wedge, rising-stem-type gate valves such as Fig. 47 and 48 as manufactured by Jenkins Bros. or equal products as manufactured by Crane, Fairbanks, or Kennedy Valve Mfg. Co. or equal.

## **2.02 RESILIENT SEATED GATE VALVES**

- A. Gate valves with 4"-12" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- B. The valves are to be non-rising stem with the stem made of cast, forged, or rolled bronze shown in AWWA C509. Two stem seals shall be provided and shall be of the O-ring type, one above and one below the thrust collar.
- C. The sealing mechanism shall consist of a cast iron gate having a vulcanized synthetic rubber coating, or natural rubber seat ring. The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.
- D. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surface inside and outside shall have a fusion-bonded epoxy coating. A handwheel or wrench nut shall be provided for operating the valve. All valves are to be tested in strict accordance with AWWA C509.
- E. Valves shall be equal to those as manufactured by American, M&H, Mueller, Kennedy, Clow or approved equal.

## **2.03**

### **PRESSURE SUSTAINING AND CHECK VALVE**

- A. Valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. The stainless steel stem shall be fully guided at both ends by a bearing in the valve cover, and an integral bearing in the valve seat. It shall be sleeved at both ends with delrin. No external packing glands are permitted, and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation cocks to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with seat cut to 5 degrees taper.
- B. Valve shall maintain a minimum (adjustable) upstream pressure to a preset (adjustable) maximum. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.
- C. Valve shall be cast iron (ASTM A48) with main valve trim of brass (QQB-B-626) and bronze (ASTM B61). The pilot control valves shall be cast brass (ASTM B62) with 303 stainless steel trim. Valve shall be similar in all respects to CLA-VAL Company, Model 692G-01ABKG, as manufactured by CLA-VAL Company, Winter Park, Florida, or similar pressure sustaining and check valve as manufactured by Golden Alderson; or equal.

## **2.04**

### **BALL VALVES FOR PVC PIPE**

- A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction, 150 psi rated with teflon seat seals and T-handles. PVC ball valves shall be as manufactured by Celanese Piping Systems, Inc., Wallace and Tiernan, Inc., Plastiline, Inc., or equal.
- B. All valves shall be mounted in such a position that valve position indicators are plainly visible when standing on the floor.

**2.05****BUTTERFLY VALVES**

- A. Butterfly valves shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B, except to valves furnished downstream of the high service pumps shall be Class 250 and equal to those manufactured by Henry Pratt Company, DeZurik, American, Kennedy, Mueller, or equal. The valve discs shall be constructed of cast iron conforming to ASTM A-48, Class 40, ASTM A-126, Class B or ductile iron conforming ASTM A536, Grade 65-45-12 for Class 150 or less. Ductile iron conforming to ASTM A536, Grade 65-45-12 shall be provided for all class 250 valves.
- B. The face-to-face dimensions of flanged end valves shall be in accordance with Table 2 of above mentioned AWWA Specification for short-body valve. Adequate two-way thrust bearings shall be provided. Flange drilling shall be in accordance with ANSI B16.1.
- C. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material with stainless Nylock screws and be capable of a 1/8-inch adjustment. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C 504. Where rubber seat is mounted on the valve body, the mating edge of the valve disc shall be 18-8 stainless steel or Nickel-Chrome, 80-20%. Where rubber seat is mounted on the valve disc, the valve body shall be fitted with an 18-8 stainless steel seat offset from the shaft, mechanically restrained and covering 360 degrees of the peripheral opening or seating surface.
- D. The valve body shall be constructed of ductile iron or close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Butterfly valves of the "wafer" or "spool" type will not be accepted.

- E. The valve shaft shall be turned, ground, and polished constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.
- F. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve for a period of five minutes. During the hydrostatic test there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 230 psi and against both sides of the valve. No adjustment of the valve disc will be necessary after pressure test for normal operation of valve. The Class 150 valves shall be tested in conformance with AWWA C-504.
- G. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.
- H. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.
- I. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.
- J. All valve operators shall conform to Section 3.8 of the AWWA Standard Specification and shall be manual unless otherwise shown or specified and shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Operators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the

disc in the open and closed positions. They shall turn counterclockwise to open valves. Manual operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Operators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Operator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme operator position without damage. Valves located above grade shall have handwheel operators, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve operators shall conform to AWWA C504, latest revision.

- K. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of the specification and the AWWA standard.
- L. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

## **2.06 PLUG VALVES**

- A. All valves shall be eccentric plug valves unless otherwise specified. Valves shall be as manufactured by DeZurik, Homestead or approved equal.
- B. Plug valves shall be tested in accordance with AWWA C504-80, Section 5. Each valve shall be performance tested in accordance with paragraph 5.2 of the above reference and shall be given a leakage test and hydrostatic test as described in paragraphs 5.3 and 5.4 of the above reference. The leakage test shall be applied to the face of the plug tending to unseat the valve. The manufacturer shall furnish certified copies of reports covering proof of design testing as described in Section 5.5 of the above reference.
- C. Valves shall be of the non-lubricated eccentric type with resilient faced plugs and shall be furnished with end connections as shown on the plans. Flanged valves shall be faced and drilled to the ANSI 125/150 lb. standard. Mechanical joint ends shall be to the AWWA Standard C111-72. Bell ends shall be to the AWWA Standard C100-55 Class B. Screwed ends shall be to the NPT standard.



- D. Valve bodies shall be of ASTM A126 Class B Semi-steel, 31,000 psi tensile strength minimum in compliance with AWWA Standard C507-73, Section 5.1 and AWWA Standard C504-70 Section 6.4. Port areas for valves 20-inches and smaller shall be 80 percent of full pipe area. Valves 24 inch and larger shall have a minimum port area of 100 percent of full nominal pipe area. All exposed nuts, bolts, springs, washers, etc. shall be zinc or cadmium plated. Resilient plug facings shall be of Hycar or Neoprene.
- E. Valves shall be furnished with permanently lubricated stainless steel or oil-impregnated bronze upper and lower plug stem bushings. These bearings shall comply with AWWA Standard C507-73 Section 8, paragraphs 8.1, 8.3 and 8.5 and with AWWA Standard C504-70 Section 10.

## 2.07 VALVE ACTUATORS

### A. General

1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor operated.
2. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.
3. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.

### B. Manual Actuators

1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and

designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Actuator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

C. Motor Actuators (Modulating)

1. The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and keywayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque at stall which is twice the maximum required output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of generated helical gears of heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbled teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.

4. The speed of the actuator shall be the responsibility of the system supplier with regards to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch will have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
7. All units shall have strip heaters in both the motor and limit switch compartments.
8. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch and indicating lights all mounted on the actuator or on a separate locally mounted power control station.
9. The electronics for the electric operator shall be protected against temporary submergence.
10. Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.
  - (a) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
  - (b) The motor shall be prelubricated and all bearings shall be of the anti-friction type.
3. The power gearing shall consist of generated helical gears of heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.

4. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves required additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the loop diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.
5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation at all times except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching level which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
6. Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer three-phase thermal overload relays

and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.

7. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
8. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a 120 volt power supply. Provide fuse protection on control circuit.
9. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or equal.

## **2.08**

### **AIR RELEASE VALVES**

The air release valves for use in water mains shall be installed as shown on the drawings. The valves shall have a cast iron body cover and baffle, stainless steel float, bronze water diffuser Buna-N or Viton seat and stainless steel trim. The fittings shall be threaded. The air release valves shall be Model 200A as manufactured by APCO Valve and Primer Corporation, Schaumburg, Illinois; Model 45VC by Val-Matic Valve and Manufacturing Corporation, Lyons, Illinois or equal.

## **2.09**

### **VALVE BOXES**

All buried valves shall have cast-iron three piece valve boxes. Valve boxes shall be provided with suitable heavy bonnets and to extend to such elevation at or slightly above the finished grade surface as directed by the Engineer. The barrel shall be two-piece, sliding type, having 5 1/4-inch shaft. The upper section shall have a flange at the bottom having sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have "WATER" cast into the top. All valves shall have actuating nuts extended to top of valve boxes. Valve boxes shall be provided with concrete base and valve nameplate engraved with lettering 1/8-inch deep as shown on the Drawings.

## **2.10 CORPORATION COCKS**

Corporation cocks for connections to cast-iron, ductile iron or steel piping shall be all brass or bronze suitable for 150 psi operating pressure and similar to Mueller Co. H-10046 or equal by Clow Corp., and shall be of sizes required and/or noted on the Drawings.

## **2.11 EXPANSION JOINTS**

- A. Expansion joints shall be manufactured of molded neoprene with filled triple arches. Joints shall be reinforced with galvanized 3/8-inch split steel retaining rings placed directly against the inside of the flange to prevent damage to the rubber surface when the bolts are tightened. Expansion joints shall be suitable for buried service or above ground service. Flanges shall be drilled to ANSI 125#. Working pressures as follows:

<u>Size</u>	<u>Pressure</u>
1"-4"	165#
5"-12"	140#
14"	85#
16"-24"	65#
26"-66"	55#

- B. Maximum temperature shall be 180 degrees F and shall be capable of a maximum 1 1/2-inch lateral movement. Expansion joints shall be Model J-1 as manufactured by the Red Valve Company, or equal product by Metraflex, Holtz Rubber Company or equal.

## **2.12 SOLENOID VALVES**

- A. Solenoid valves shall be suitable for operation on a 120 volt, 60 Hertz, +10 percent power supply and shall be arranged for normally closed operation.
- B. The valves shall be of PVC construction, as manufactured by Automatic Switch Co., Plast O-Matic Valves, Inc. or equal.

## **2.13 FLANGE ADAPTER COUPLINGS**

Flange adapter couplings shall be of the size and pressure rating required for each installation and shall be suitable for use on either cast iron or

ductile iron pipe. They shall be similar or equal to Dresser Company, Style 128. All couplings shall have a sufficient number of factory installed anchor studs to meet or exceed the test pressure rating for this project, 230 psi minimum.

2.14

**FLEXIBLE COUPLINGS**

Flexible couplings shall be either the split type or the sleeve type as shown on the Drawings.

1. Split type coupling shall be used with all interior piping and with exterior pipings noted on the drawings. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contraction and expansion.
2. Couplings shall consist of malleable iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A183 and A194 to assemble the housing clamps. Bolts and nuts shall be hot dipped galvanized after fabrication.
3. Victaulic type couplings and fittings may be used in lieu of flanged joints. Pipes shall be radius grooved as specified for use with the Victaulic couplings. Flanged adapter connections at fittings, valves, and equipment shall be Victaulic Vic Flange Style 741, equal by Gustin-Bacon Group, Division of Certain-Teed Products, Kansas City, Kansas, or equal.
4. Sleeve type couplings shall be used with all buried piping. The couplings shall be of steel and shall be Dresser Style 38 or 40, as shown on the Drawings, or equal. The coupling shall be provided with hot dipped galvanized steel bolts and nuts unless indicated otherwise.
5. All couplings shall be furnished with the pipe stop removed.
6. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
7. If the Contractor decides to use victaulic couplings in lieu of flanged joints, he shall be responsible for supplying supports for the joints.



**2.15 UNIONS**

Unions on ferrous pipe 2 inches in diameter and smaller shall be 150 pounds malleable iron, zinc-coated. Unions on water pipe 2-1/2 inches in diameter and larger shall be flange pattern, 125-pound class, zinc-coated. Gaskets for flanged unions shall be of the best quality fiber, plastic, or leather. Unions shall not be concealed in walls, ceilings, or partitions.

**2.16 HOSE BIBBS**

Hose bibbs shall be brass, polished chromium plated, as manufactured by Chicago Faucet Company or equal. Potable water bibbs shall be No. 952, 3/4-inch or 1-inch, with vacuum breaker as noted on the Drawings. Equal by NIBCO, Pur-tector Sill Cocks Model 763VB with built-in vacuum breaker.

**2.17 SLOW CLOSING AIR AND VACUUM VALVES**

- A. The Contractor shall furnish and install slow closing air and vacuum valves as shown on the drawing which shall have two (2) independent valves bolted together. The air and vacuum valve shall have all stainless steel float, guided on both ends with stainless shafts. The air and vacuum valve seat shall be Buna-N to insure drop tight closure. The Buna-N seat shall be fastened to the cover stainless shoulder screws in a manner to prevent distortion of the seat. The float shall be guided at both ends with stainless steel bushings.
- B. The valve cover shall have a male lip designed to fit into the body register for accurate alignment of the float into the Buna-N seat. The valve cover shall have 125-pound/250-pound class flanged outlet connection wherever applicable.
- C. The surge check valve shall be bolted to the inlet of the air and vacuum valve and consist of a body, seat, disc, and compression spring. A surge check unit shall operate on the interphase between the kinetic energy and relative velocity flows of air and water, so that after air passes through, and water rushes into the surge check, the disc starts to close, reducing the rate of flow of water into the air valve by means of throttling orifices in the disc to prevent water hammer in the air valves. The surge check orifices must be adjustable type for regulation in the field to suit operating conditions. Valve shall be rated for 125-pound/250-pound class working pressure minimum wherever applicable.

- D. The complete slow closing air and vacuum valve with air release valve shall have been flow tested in the field, substantiated with test data to show reduction of surge pressure in the valve. Flow test data shall be submitted with initial shop drawings for approval.
- E. Valve exterior to be painted Red Oxide, Phenolic TT-P86, Primer or equal for high resistance to corrosion.
- F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:

Air Valve Cover, Body, and Surge Check Body	Cast Iron	ASTM A48, Class 30
Float	Stainless Steel	ASTM A240
Surge Check Seat and Disc	Stainless Steel	ASTM A582
Air Valve Seat	Buna-N	
Spring	Stainless Steel	T302

- G. Valve to be APCO, Series 1900, Model No. 1604/152, Class 250 slow closing air and vacuum valve, for high service pumps and Model No. 1606/153, Class 150, for backwash transfer pumps, as manufactured by Valve & Primer Corporation, Schaumburg, Illinois, or equal.

## 2.18 PRESSURE GAUGES

- A. All pumps furnished under this contract shall have pressure gauges installed in the suction and discharge.
- B. Each pressure gauge shall be direct mounted, cast aluminum case, with a 4-1/2 inch diameter dial and furnished with a clear glass crystal window, 1/4-inch shut-off valve, and a bronze pressure snubber (unless otherwise specified). Provide diaphragm seals between shut-off valve and pressure gauge on all sludge and lines with nonclear matter in suspension of solution. All gauges shall be weatherproofed. The face dial shall be white finished aluminum with jet black graduations and figures. The face dial shall indicate the units of pressure being measured (e.g., feet, inches, etc.) or be dual scale.

- C. Pressure gauges shall be equal to Model 500 as manufactured by H. O. Trerice Co., Detroit, Michigan; Marshalltown Instruments, Marshalltown, Iowa; or equal.

## 2.19 SURGE ANTICIPATOR VALVES

- A. Surge anticipator valves shall be furnished for the pumping systems as shown on the Drawings. The valve shall be hydraulically operated, pilot controlled, and diaphragm or piston actuated. The main valve shall be cast iron conforming to ASTM A48 with bronze trim conforming to ASTM B61 and flanged ends conforming to ANSI B161.1. The main valve shall be globe type with a single removable seat and a resilient disc.
- B. The diaphragm actuated valve shall have a stainless steel stem guided at both ends by a bearing in the valve cover and an integral bearing surface in the seat. No external packing glands shall be permitted. The valve shall be fully serviceable without removing it from the line. The pilot system shall be of noncorrosive construction and provided with isolation cocks.
- C. The piston actuated valve shall operate on the differential piston principle. The valve piston shall be guided on its outside diameter. The valve shall be able to operate in any position and shall be fully serviceable without removing it from the line. The pilot system shall be provided with isolation cocks, and be of noncorrosive materials of construction.
- D. The valve shall be designed specifically to minimize the effects of water hammer, resulting from power failure at the pumping station, or from normal stopping and starting of pumping operators. The valve shall open hydraulically on a down surge, or low pressure wave created when the pump stops, remain open during the low pressure cycle in order to be open when the high pressure wave returns. The high pressure pilot shall be adjustable over a 20 to 200 psi range and the low pressure pilot shall be adjustable over a 15 to 75 psi range. The valve shall be the 250 Class Model 52-03 surge anticipator valve as manufactured by CLA-VAL Company, Winter Park, Florida; G.A. Industries Figure 500-A-ABCDE, Mars, PA; Ross, or equal.

## 2.20

**SLANTING DISC CHECK VALVES**

- A. The Contractor shall furnish and install slanting disc check valves with stainless steel trim, top mounted oil dashpots as shown on the drawings. The valves with top mounted oil dashpot shall be 250-pound Class and the valves with bottom mounted buffer shall be 125-pound Class.

The body shall be heavy two (2) piece cast iron construction and not fabricated steel. The two (2) body halves shall be O-ring sealed and bolted together, in a manner to capture the seat on a 55 degree angle. Each body half must have an access covered hole for internal inspection. The seat ring and disc ring must be of the design that permits replaceability in the field without need for special tools or machining. The pivot pins in the body and bushings in the disc lugs must be stainless steel of different hardnesses to prevent galling. The area throughout the valve body must be equal to full pipe area. The area through the seat section shall be 40 percent larger than the inlet and outlet of the valve to achieve lowest head loss.

- B. All materials of construction to be certified in writing to conform to ASTM specifications as follows:

Body & Cover	Cast Iron	ASTM A126, Grade B
Disc	Ductile Iron	ASTM A536
Seat Ring & Disc Ring	Bronze	ASTM B271, C92200
Pivot Pins	Stainless Steel	ASTM A582, T303
Pivot Pin Bushings	Stainless Steel	ASTM A269, T304
Exterior Paint	Phenolic Primer	FDA Approved
	Red Oxide	for Potable
		Water Contact

**For Top Mounted**

**Oil Dashpot:**

Connecting Rod	Stainless Steel	17-4 PH
Dashpot Cylinder	Steel	Commercial

**For Bottom Mounted**

**Buffer:**

Buffer Rod	Stainless Steel	ASTM A582, T303
Buffer Cylinder	Steel	Commercial

- C. All valves shall be warranted by the manufacturer to be free from defects in materials and/or workmanship for a period of five (5) years from date of final acceptance.

- D. Valves shall be provided with a valve disc position indicator and a SPDT limit switch to interface with the instrumentation system as specified in Section 13615 herein.
- E. Valves shall be Apco Series 800T, Model 824, and Series 800B, Model 830 as manufactured by Valve & Primer Corporation, Schaumburg, Illinois; Val-Matic Valve and Manufacturing Corp., Elmhurst, Illinois; or equal.

#### **2.21 CHECK VALVES**

- A. Check valves for cast iron and ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Specification C508. The valves shall be iron body, bronze mounted, single disc, 150 psi working water pressure and nonshock. Ends shall be 125 pound ANSI B16.1 flanges or 125 pound ANSI B2.1 threaded fittings depending upon location. Valves shall be as manufactured by Mueller, Clow, American, Kennedy, M&H, or equal.
- B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- C. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.
- D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight. Weights provided and approved by the Engineer, shall be installed.

#### **2.22 QUICK CONNECT COUPLINGS**

- A. Quick connect couplings shall be Model 633-E hose shank adapter and Model 633-C hose shank coupler as manufactured by Dover Corporation OPW Division, Cincinnati, Ohio, equal by Ever-Tite Coupling, Co., Inc., New York, New York, or equal.

## 2.23

### AIR CUSHIONED CHECK VALVES

- A. Air Cushioned Swing Check Valves shall be constructed of heavy cast iron body, having integral flanges (not Wafer) and a centrifugally cast stainless steel ring, suitable for a working pressure of 125 psi. The seat ring shall be locked in place with stainless steel lock screws and be field replaceable, without use of special tools. The shaft shall be single and continuous stainless steel, extending both sides of the body with a lever and weight and cushion cylinder mounted on the side.
- B. The cushion cylinder assembly shall be externally attached to either or both sides of the valve body and will permit adjustability to cushion the closure of the valve. The cushioning shall be by air and the cushion cylinder shall be fitted with a one way control check for adjustable air compression to prevent slamming.
- C. This valve shall prevent backflow of the media on normal pump shut-off or power failure, at zero velocity and be watertight.
- D. The disc shall be cast iron, utilizing a double clevice hinge connected to a cast bronze, malleable iron, or ductile iron disc arm. The disc arm assembly shall be suspended from a stainless steel shaft which passes thru a stuffing box on both sides of the valve body.
- E. Valve exterior to be painted for high resistance to corrosion.
- F. All materials of construction shall be certified in writing to conform to ASTM specifications as follows:
 

Body, Cover, Disc	Cast Iron	ASTM A126, Class B
Disc Arm	Ductile Iron	ASTM A536
Seat	Aluminum, Bronze	ASTM B148
	or stainless steel	ASTM A276
Disc Seat	Buna-N or Metal	To suit
Cushion Cylinder	Cast Bronze or Steel	Commercial
- G. Valve to be APCO Series 6000 Air Cushioned Swing Check Valve, as manufactured by APCO Valve & Primer Corporation, Schaumburg, Illinois, or Golden Anderson Valve Specialty Company, Pittsburgh, Pennsylvania, Figure 25-D or equal.

**HYDRANTS**

Hydrants shall be equal to either Kennedy Type K-11 or Darling B50B "Quick-Fix" type or Mueller Modern Improved or Dresser "500" and shall conform to the "Standard Specification for Fire Hydrants for Ordinary Water Works Service", AWWA C502, Class 150, and shall in addition meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern and of standard size, and shall have one 4-1/2 inch pumper nozzle and two 2-1/2 inch hose nozzels.
2. Hydrant inlet connections shall have mechanical joints for 6-inch ductile-iron pipe.
3. Hydrant valve opening shall have an area at least equal to that area of a 5-1/4 inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gallons minimum through its two 2-1/2 inch hose nozzels when opened together with a loss of not more than 2 psi in the hydrants.
4. Each hydrant shall be designed for installation in a trench that will provide 5-ft. cover.
5. Hydrants shall be hydrostatically tested as specified in AWWA C502.
6. All nozzle threads shall be American National Standard.
7. Each nozzle cap shall be provided with a Buna N rubber washer.
8. Hydrants shall be so arranged that the direction of outlets may be turned 90 degrees without interference with the drip mechanism and without the mechanism obstructing the discharge from any outlet.
9. Hydrants must be capable of being extended without removing any operating parts.
10. A bronze nut and check nut shall be provided to hold the main hydrant valve on its stem.
11. Hydrants must open by turning operating nut to left (counterclockwise) and must be marked with an Arrow and marked "Open" to indicate the direction to turn stem to open hydrant.
12. All iron work to be set below ground, after being thoroughly cleaned, shall be painted with two coats of asphalt varnish specified in AWWA C502 and iron work to be left above ground shall be shop painted with two coats of paint of quality and color to correspond to the present standard of the Owner.

## **2.25        RESTRAINING CLAMPS**

Restraining clamp assemblies as detailed in the drawings for use at hydrant connections to water mains, or at fittings where shown on the drawings, shall be as manufactured by Steller Corporation, Columbus, Ohio; or equal.

## **2.26        TAPPING SLEEVES AND GATE VALVES**

- A. Tapping valves shall meet the requirements of AWWA C500. The valves shall be flanged by mechanical joint outlet with nonrising stem, designed for vertical burial and shall open left or counterclockwise. Stuffing boxes shall be the "O-Ring" type. Operating nut shall be AWWA Standard 2 inches square. The valve shall be provided with an overload seat to permit the use of full size cutters. Gaskets shall cover the entire area of flange surfaces.
- B. Tapping sleeves shall be 150 psi minimum working pressure with cadmium plated cast iron nuts and bolts. Sleeves shall be caulked type for ductile iron pipe. Sleeve flanges shall be fitted with combination lead and rubber gaskets covering the entire surface area of each flange.

## **PART 3       EXECUTION**

### **3.01        INSTALLATION**

- A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.
- B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected



and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

- D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections in Division 15.
- E. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.
- F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8 inches. Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6 inches from the end, and the middle ring shall be placed on the substantial completion date unless otherwise requested by the Owner.
- H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

### **3.02**

#### **HYDRANTS**

- A. Hydrants shall be set at the locations designated by the Engineer and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6 inches over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified in Section 03300.
- B. If directed, the hydrant shall be tied to the pipe with suitable rods or clamps, galvanized, painted, or otherwise rustproof treated. Hydrants shall be touched up with paint as required after installation.

### **3.03**

#### **RESTRAINING CLAMPS AND TIE RODS ON PIPE RUN**

Restraining clamps and tie rods shall be used on all pipe runs, as directed by the Engineer and/or shown on the Drawings.

### **3.04**

#### **TAPPING SLEEVES AND GATE VALVES**

- A. The tapping sleeves shall be poured with pure lead containing 5 percent tin. Before backfilling, all exposed portions of any bolts used to hold the two halves of the sleeve together shall be heavily coated with two coats of bituminous paint comparable to Bitumastic No. 50, by Koppers Co., Inc.
- B. Installations shall be made under pressure and the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 1/4-inch less than the inside diameter of the branch line.
- C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor.

- D. The Contractor shall determine the location of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 3 feet from a pipe joint.
- E. Tapping valves shall be set in vertical position and be supplied with a 2-inch square operating nut. The valve shall be provided with an oversized seat to permit the use of full sized cutters.
- F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Lead joints on sleeves shall be poured, but not caulked until the tap is made. Sleeves shall be no closer than three (3) ft. from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve will be flushed to ensure that the valve seat is clean.

### **3.05 SHOP PAINTING**

Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer as specified in Section 09865. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

### **3.06 FIELD PAINTING**

All metal valves and appurtenances specified herein and exposed to view will be painted as part of work in Section 09900.

### **3.07 INSPECTION AND TESTING**

Completed pipe shall be subjected to hydrostatic pressure test for four hours at full working pressure. All leaks shall be repaired and lines retested as approved by the Engineer. Prior to testing, the gravity pipelines shall be supported in an approved manner to prevent movement during tests.

**END OF SECTION**

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## **SECTION 02999**

### **MISCELLANEOUS WORK AND CLEANUP**

#### **PART 1: GENERAL**

##### **1.01 SCOPE OF WORK**

- A. This Section includes items and operations which are not specified in detail as separate items, but can be sufficiently described as to the kind and extent of work involved. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to complete all work under this Section.
- B. The work of this Section includes, but is not limited to the following:
  - 1. Restoring of roads, sidewalks, driveways, curbing and gutters, fences, guard rails, lawns, shrubbery and any other existing items damaged or destroyed.
  - 2. Crossing utilities.
  - 3. Relocation of existing water lines less than 4-inches diameter, low pressure gas lines, telephone lines, electric lines, cable TV lines as shown on the Contract Drawings.
  - 4. Restoring easements (servitudes) and rights-of-way.
  - 5. Cleaning up.
  - 6. Incidental work (project photographs, testing, shop drawings, traffic control, record drawings, etc.).
  - 7. Section 04200: Excavation and Embankment - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (edition of 1986 or latest revision).

##### **1.02 SUBMITTAL OF LUMP SUM BREAKDOWN**

Within 10 days after date of Notice to Proceed, the Contractor shall submit to the Engineer a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Proposal as required in Section 01370.

**1.03 WORK SPECIFIED UNDER OTHER SECTIONS**

All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of these Specifications.

**PART 2: PRODUCTS**

**2.01 MATERIALS**

Materials required for this Section shall be of at least the same type and quality as materials that are to be restored. Where possible, the Contractor shall reuse existing materials that are removed and then replaced, with the exception of paving.

**PART 3: EXECUTION**

**3.01 RESTORING OF ROADS, CURBING, FENCES AND GUARD RAILS**

- A. Existing curbing shall be protected. If necessary, curbing shall be removed from joint to joint and replaced after backfilling. Curbing which is damaged during construction shall be replaced with curbing of equal quality and dimension.
- B. At several locations, it may be necessary for the Contractor to remove, store and replace existing fences and guard rails during construction. Only the sections directed by the Engineer shall be removed. If any section of fence is damaged due to the Contractor's negligence, it shall be replaced with fencing equal to or better than that damaged and the work shall be satisfactory to the Engineer.
- C. Guard rails in the vicinity of the work shall be protected from damage. If damaged, guard rails shall be replaced in condition equal to that existing before construction began.
- D. Road crossings shall be restored in accordance with the respective sections of the Contract Specifications except that all costs for road restoration shall be included in the Miscellaneous Item in the Bid Proposal section.

**3.02 CROSSING UTILITIES**

This item shall include any extra work required in crossing culverts, water courses, drains, water mains and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the Drawings.

**3.03 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES, AND CABLE TV LINES**

The Contractor shall notify the proper authority of the utility involved when relocation of these lines is required. The Contractor shall coordinate all work by the utility so that the progress of construction will not be hampered.

**3.04 RESTORING THE EASEMENTS AND RIGHTS-OF-WAY**

The Contractor shall be responsible for all damage to private property due to his operations. He shall protect from injury all walls, fences, cultivated shrubbery, pavement, underground facilities, such as water pipe or other utilities which may be encountered along the easement. If removal and replacement are required, it shall be done in a workmanlike manner so that the replacement is equivalent to that which existed prior to construction.

**END OF SECTION  
END OF DIVISION**

## **SECTION 03179**

### **PLASTIC SHEET LINER**

#### **PART 1 GENERAL**

##### **1.01 SCOPE OF WORK**

- A. Furnish and install all labor, materials, equipment, and incidentals required to supply and install a white polyvinyl chloride (PVC) sheet lining in pre-cast concrete manhole and wet well as shown on the Drawings.
- B. Perform required Spark Test to the satisfaction of the Engineer to insure watertightness of PVC liner.
- C. PVC liner shall be designed and installed to protect concrete surfaces from corrosion.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Section 03300: Cast-in-Place Concrete.
- B. Section 03410: Precast Concrete Structures.

##### **1.03 SUBMITTALS**

- A. The Contractor shall submit for review complete detailed shop drawings for all materials furnished under this section.
- B. The manufacturer of the lining shall furnish an affidavit attesting to the successful use of its material as a lining for concrete structures for a minimum period of 5 years in wastewater conditions recognized as corrosive or otherwise detrimental to concrete.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

###### **A. Composition**

- 1. The material used in the liner and in all joint, corner, and welding strips shall be a combination of polyvinyl chloride resin, pigments, and plasticizers, specially compounded to remain flexible. Polyvinyl chloride resin shall constitute not less than 99 percent, by weight, of the resin used in the formulation. Copolymer resins will not be allowed.

## B. Physical Properties

1. Liner plate placing extensions embedded in concrete shall withstand a test pull of at least 100 pounds per linear inch, applied perpendicularly to the concrete surface for a period of one minute, without rupture to the locking extensions or withdrawal from embedment. This test shall be made at a temperature of 70-80 degrees F inclusive.
2. All plastic liner plate sheets, including lock extensions, all joint, corner, and welding strips shall be free of cracks, cleavages, or other defects adversely affecting the protective characteristics of the material. The Engineer may authorize the repair of such defects by approved methods.
3. The lining shall have good impact resistance, shall be flexible, and shall have an elongation sufficient to bridge up to 1/4 inch settling cracks, which may occur in the pipe or in the joint after installation, without damage to the lining.
4. The lining shall be repairable at any time during the life of the structure.

## C. Details and Dimensions

1. Liner sheets shall be a minimum of 0.065 inches in thickness. Locking extensions (T-shaped) of the same material as that of the liner shall be integrally extruded with the sheet. Locking extensions shall be approximately 2.5 inches apart and shall be at least 0.375 inches high.
2. Sheets shall have a nominal width of 48 inches and a length of not more than 24 feet, except that longer lengths may be supplied on special order. Lengths specified shall include a tolerance at a ratio of  $\pm 1/4$  inch for each 100 inches.
3. Sheets which will not be used for shop fabrication into larger sheets shall be shop tested for pinholes using an electric spark tester set at 20,000 volts minimum. Any holes shall be repaired and retested.



#### **D. Pipe-Size Sheets**

1. Pipe linings shall be supplied as pipe-size sheets, fabricated by shop-welding basic-size sheets together. Shop welds shall be made by lapping sheets a minimum of 1/2 inch and applying heat and pressure to the lap to produce a continuous welded joint. Tensile strength measured across shop-welded joints measured in accordance with ASTM D412 shall be at least 2000 psi.
2. Sheets shall have transverse strap channels cut in the locking extensions so that the strap can be placed into and perpendicular to the locking extensions.
3. The channels shall not be less than 3/4 inch wide and not more than 1-1/4 inch wide and shall be cut so that a maximum 3/16 inch of the base of the locking extension remains in the base of the strap channel. Strap channels shall be provided at intervals of not less than 15 inches nor more than 20 inches center-to-center.
4. Transverse flaps shall be provided at the ends of sheets for pipe. Locking extensions shall be removed from flaps so that a maximum of 1/64 inch of the base of the locking extension is left on the sheet.
5. Weld strips shall be approximately 1 inch wide with a minimum width of 7/8 inch. The edges of weld strips shall be beveled in the manufacturing process. Thickness of weld strip shall be a nominal 1/8 inch.
6. Joint strips for pipe shall be 4 inches wide with a minimum width of 3.75 inches. Thickness of joint strips shall be equivalent to that of the liner.
7. Prior to preparing the sheets for shipment, they shall be tested for pinholes using an electrical spark tester set at 20,000 volts minimum. Any holes shall be repaired and retested.

#### **E. Material**

1. Liner shall be Ameron T-Lock as manufactured by Ameron Protective Coatings Division, Brea, California or equal.

**PART 3      EXECUTION**

**3.01      INSTALLATION**

**A.      General**

1.    Installation of the lining, including preheating of sheets in cold weather and the welding of all joints, shall be done in accordance with the recommendations of the manufacturer.
2.    Coverage of the lining shall not be less than the minimum shown on the plans.
3.    The lining shall be installed with the locking extensions running parallel with the longitudinal axis of the pipe.
4.    The lining shall be held snugly in place against inner forms by means of steel banding straps or other means recommended by the manufacturer. Banding straps must be located in the precut strap channels to prevent crushing or tilting of the locking extensions.
5.    If banding strips are used, a steel channel, angle, or bar may be inserted along the edge locking extensions of each liner sheet for concrete pipe or cast-in-place structures. Steel channel, angle, or bar shall be of sufficient stiffness to hold the longitudinal edges of the lining snugly against the form. These may be removed after the concrete is vibrated into place.
6.    Locking extensions shall terminate not more than 1-1/2 inches from the end of the inside surface of the pipe section. Joint flaps, when used, shall extend approximately 4 inches beyond the end of the inside surface.
7.    Concrete poured against lining shall be vibrated, spaded, or compacted in a careful manner so as to protect the lining and produce a dense, homogenous concrete, securely anchoring the locking extensions into the concrete.

8. In removing forms, care should be taken to protect the lining from damage. Sharp instruments shall not be used to pry forms from lined surfaces. When forms are removed, any nails that remain in the lining shall be pulled, without tearing the lining, and the resulting holes clearly marked. Form tie holes shall be marked before ties are broken off and all areas of serious abrasion or damage shall be marked.
9. All nail and tie holes and all cut, torn and seriously abraded areas in the lining shall be patched. Patches made entirely with welding strip shall be fused to the liner over the entire patch area. Larger patches may consist of smooth liner sheet applied over the damaged area with adhesive. All edges must be covered with welding strips fused to the patch and the sound lining adjoining the damaged area.
10. Hot joint compounds, such as coal tar, shall not be poured or applied to the lining.
11. The Contractor shall take all necessary measures to prevent damage in installed lining from equipment and materials used in or taken through the work.
12. Perform required spark test with 20,000 volt spark tester. Note any holes in PVC sheet liner and repair. Retest as required by Engineer.

**B. Application to Cast-in-Place Concrete**

1. Liner sheets shall be closely fitted and properly secured to the inner forms. Sheets shall be cut to fit curved and warped surfaces using a minimum number of separate pieces. If liner joints are to be Type C-3 joints, as described below, the adjacent sheets shall be butted with not more than 1/8 inch opening between the sheets. A welding strip fusion welded on the back of butt joints or other means approved by the Engineer shall be used to prevent wet concrete from flowing around edges.
2. Unless otherwise shown on the plans, the lining shall be returned 4 inches at the surfaces to contact between the concrete structure and items not of concrete (including manhole frames, gate guides, clay pipe or brick manholes, and clay or

cast iron pipes). The same procedure shall be followed at joints where the type of protective lining is changed or the new work is built to join existing unlined concrete. At each return, the returner liner shall be sealed to the item in contact with the plastic-lined concrete using Amer-Plate 19Y adhesive system. If the liner cannot be sealed with this adhesive because of the joint at the return being too wide or rough because of safety regulations, the joint space shall be densely caulked with lead wool or other approved caulking material to a depth of 2 inches.

C. Joints in Lining for Cast-In-Place Concrete Structures

1. Lining at joints shall be free of all mortar and other foreign material and shall be clean and dry before joints are made.
2. Field joints in the lining shall be of the following described types, used as prescribed.

Type C-1: The joint shall be made with a separate 4 inch joint strip and two welding strips. The 4 inch joint strip shall be centered over the joint, tack-welded to the liner, then welded along each edge to adjacent sheets with 1 inch weld strip. The width of the space between adjacent sheets shall not exceed 2 inches. The 4 inch strip shall lap over each sheet a minimum of 1 inch. It may be used at any transverse or longitudinal joint.

Type C-2: The joint shall be made by lapping sheets not less than 1 inch. One welding strip is required. The upstream sheet shall overlap the one downstream. The lap shall be tack-welded into place prior to welding.

Type C-3: The joint shall be made by applying one welding strip on the back of the butt joint or by some other method approved by the Engineer to prevent wet concrete from getting under the sheet.

After the forms have been stripped, a second welding strip shall be applied over the butt joint on the face of the sheet.

3. All welding is to be in strict conformance with the specifications of the lining manufacturer. All welding to be done by approved applicators.

**D. Testing and Repairing Damaged Surfaces**

1. All welds shall be physically tested by a nondestructive probing method. Perform required spark test as directed by Engineer in accordance with paragraph 3.01.A.12. All patches over holes, or repairs to the liner wherever damage has occurred, shall be accomplished in accordance with Paragraph 3.01.A.9.

**END OF SECTION**

**SECTION 03200**  
**CONCRETE REINFORCEMENT**

**PART 1: GENERAL**

**1.01 WORK INCLUDED**

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

**1.02 RELATED WORK**

- A. Section 03300: Cast-in-place concrete.
- B. Section 03410: Reinforcement for precast structural concrete.

**1.03 QUALITY ASSURANCE**

Perform concrete reinforcing work in accordance with CRSI 63 and 65 unless specified otherwise in this Section.

**1.04 SOURCE QUALITY CONTROL**

Submit two (2) certified copies of mill test report of supplied concrete reinforcing, indicating physical and chemical analysis.

**1.05 REFERENCES**

- A. ACI 318 - Building Code Requirements for Reinforced Concrete.
- B. CRSI 63 - Recommended Practice for Placing Reinforcing Bars.

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- C. CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.
- D. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- E. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

**1.06 SHOP DRAWINGS**

- A. Submit shop drawings in accordance with Section 01340.
- B. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.
- C. Prepare shop drawings under seal of Professional Structural Engineer registered in the State of Florida.

**PART 2: PRODUCTS**

**2.01 REINFORCING**

<u>Grade</u>	<u>Minimum Yield Strength</u>
60	60,000 psi

- A. Reinforcing steel: 60 ksi yield grade deformed billet steel bars, ASTM A615, plain finish.
- B. Welded steel wire fabric: Deformed type, ASTM A497; in flat sheets; plain finish.

**2.20 ACCESSORY MATERIALS**

- A. Tie wire: Minimum 16 gauge annealed type, or patented system accepted by Engineer.
- B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type: sized and shaped as required.

**2.03 FABRICATION**

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by Engineer.
- C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.

**PART 3: EXECUTION**

**3.01 PLACEMENT**

- A. Place reinforcing supported and secured against displacement. Do not deviate from true alignment.
- B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

**END OF SECTION**



**SECTION 03210**

**STEEL BAR AND WELDED WIRE FABRIC REINFORCING**

**PART 1: GENERAL**

**1.01 RELATED WORK SPECIFIED ELSEWHERE**

- A. Concrete: Section 03300.
- B. Concrete Reinforcement: Section 03200.

**1.02 QUALITY ASSURANCE**

- A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.
- B. Installer Qualifications:
  - 1. Three years experience in installation of steel bar and welded wire fabric reinforcing.
- C. Allowable Tolerances:
  - 1. Fabrication:
    - a. Sheared length: + 1 in.
    - b. Depth of truss bars: + 0, - in.
    - c. Stirrups, ties and spirals: + in.
    - d. All other bends: + 1 in.
  - 2. Placement:
    - a. Concrete cover to form surfaces: + in.
    - b. Minimum spacing between bars: in.
    - c. Top bars in slabs and beams:
      - (1) Members 8 in. deep or less: + in.
      - (2) Members more than 8 in. but not over 2 ft. deep: + in.
      - (3) Members more than 2 ft. deep: + 1 in.
    - d. Crosswise of members: Spaced evenly within 2 in. of stated separation.
    - e. Lengthwise of members: Plus or minus 2 in.
  - 3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

**1.03 SUBMITTALS**

**A. Shop Drawing**

1. Show sizes and dimensions for fabrication and placing of reinforcing steel and bar supports.
2. Indicate bar schedules, stirrup spacing and diagrams of bend bars.

- B. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.**

**1.04 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.**
- B. Handle and store materials to prevent contamination.**

**PART 2: PRODUCTS**

**2.01 MATERIALS**

- A. Bars:**
1. Deformed billet steel: ASTM A 615, Grade 60.
- B. Wire:**
1. Cold drawn steel: ASTM A 82.
- C. Wire Fabric:**
1. Welded deformed steel: ASTM A 497.
- D. Tie Wire: FS QQ-W-461, annealed steel, black, 16 ga. minimum.**

**2.02 FABRICATION: In accord with CRSI Manual of Standard Practice.**

**PART 3: EXECUTION**

**3.01 INSTALLATION**

- A. Placement:**
1. Bar Supports: CRSI 65.
  2. Reinforcing bars: CRSI 63.

- B. Steel Adjustment:
1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
  2. Do not move bars beyond allowable tolerances without concurrence of Engineer.
  3. Do not heat, bend, or cut bars without concurrence of Engineer.
- C. Splices:
1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
  2. Splice devices: Install in accordance with manufacturer's written instructions.
  3. Do not splice bars except at locations shown on drawings without concurrently of Engineer.
- D. Wire Fabric:
1. Install in longest practicable length.
  2. Lap adjoining pieces one full mesh minimum, and lay splices with 16 gauge wire.
  3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
  4. Offset end laps in adjacent widths to prevent continuous laps.
- E. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.
- F. Protection During Concreting: Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

**SECTION 03300**  
**CAST-IN-PLACE CONCRETE**

**PART 1: GENERAL**

**1.01 WORK INCLUDED**

- A. Poured-in-place concrete building frame members, floors, foundation walls, slabs on fill and supported slabs.
- B. Floors and slabs on grade.
- C. Surface finish of walls and beams.
- D. Valve pits.

**1.02 RELATED WORK**

- A. Section 01410: Testing and Testing Laboratory Services
- B. Section 03350: Concrete Finishes
- C. Section 04510: Reinforcing Steel.

**1.03 QUALITY ASSURANCE**

Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

**1.04 TESTING LABORATORY SERVICES**

- A. Inspection and testing will be performed by firm in accordance with Section 01410.
- B. Provide free access to work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.
- D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

- E. Three concrete test cylinders will be taken for every 100 or less cu. yds. of each class of concrete placed.
- F. One slump test will be taken for each set of test cylinders taken.

**1.05 REFERENCES**

- A. ASTM C33 - Concrete Aggregates
- B. ASTM C150 - Portland Cement
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ASTM C260 - Air Entraining Admixtures for Concrete
- E. ASTM C94 - Ready-Mixed Concrete
- F. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- G. ACI 305 - Recommended Practice for Hot Weather Concreting

**PART 2: PRODUCTS**

**2.01 CONCRETE MATERIALS**

- A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

**2.02 ADMIXTURES**

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A - water reducing admixture.

**2.03 ACCEPTABLE MANUFACTURERS**

- A. Acceptable Products:
  - 1. Pozzolith
  - 2. WRDA

## **2.04 ACCESSORIES**

- A. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

## **2.05 CONCRETE MIXES**

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of following strength:
  - 1. Compressive strength: 4000 psi at 28 days.
  - 2. Compressive strength: 2500 psi at 28 days.
  - 3. Select proportions for normal weight concrete in accordance with ACI 301 3.8 by Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301 Table 3.4.1.
- C. Use set-retarding admixtures during hot weather only when accepted by Engineer.
- D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

## **2.06 FORMS**

- A. Forms shall be used for all concrete masonry, including footings. Form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.
- B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for exposed surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.
- C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.

- D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcements above the fresh concrete.
- E. Molding or bevels shall be placed to produce a 1-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.
- F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.
- H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.
- I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

**PART 3: EXECUTION**

**3.01 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304.
- B. Notify Engineer minimum 24 hours prior to commencement of concreting operations.
- C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.
- G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- K. Conform to ACI 305 when concreting during hot weather.

**3.02 SCREEDING**

- A. Screed floors slabs-on-fill and level, maintaining surface flatness of maximum 1/4 inch in 10 feet.

**3.03 PATCHING**

Allow Engineer to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed.



### **3.04 DEFECTIVE CONCRETE**

- A. Modify or replace concrete not conforming to required lines, details and elevations.
- B. Repair or replace concrete not properly placed resulting in excessive honeycombing and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of Engineer for each individual area.

### **3.05 CONCRETE FINISHING**

Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

### **3.06 CURING AND PROTECTION**

Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

**END OF SECTION**

**SECTION 03350**  
**CONCRETE FINISHES**

**PART 1: GENERAL**

**1.01 SCOPE OF WORK**

Furnish all labor, materials, equipment and incidentals required to finish cast-in-place concrete surfaces as specified herein.

**1.02 RELATED WORK**

- A. Patching and repair of defective and honeycombed concrete is included in Section 03300.
- B. Waterproofing and damp proofing are included in Section 00700.
- C. Concrete Structures: Section 04500 - As defined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (Edition of 1986 or latest revision).

**1.03 SUBMITTALS**

Submit to the Engineer as provided in the General Conditions and Section 01340, the proposed chemical hardener manufacturer's surface preparation and application procedures.

**1.04 SCHEDULE OF FINISHES**

- A. Concrete for the project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.
- B. The base concrete for the following conditions shall be finished as noted and as further specified herein:
  - 1. Exterior, exposed concrete slabs and stairs - broomed finish.
  - 2. Interior, exposed concrete slabs - steel trowel finish.

3. Concrete on which process liquids flow or in contact with sludge - steel trowel finish.
4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - off-form finish.
5. Provide concrete surfaces to be left exposed such as walls, columns, beams and joists with smooth rubbed finish.

**1.05 RESPONSIBILITY FOR CHANGING FINISHES**

- A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other Sections. Where different products are approved for use, it shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.
- B. Changes in finishes made to accommodate product different from those specified shall be performed at no additional cost to the Owner. Submit the proposed new finishes and their construction methods to the Engineer for approval.

**PART 2: PRODUCTS**

**2.01 MATERIALS**

- A. Portland cement and component materials required for finishing the concrete surfaces shall be as specified in Section 03300.
- B. Hardener shall be Lapidolith as manufactured by Sonneborn Building Products or approved equal. Hardener shall be used on all floors, stair treads and platforms.

**PART 3: EXECUTION**

**3.01 FORMED SURFACES**

- A. Forms shall not be stripped before the concrete has attained a strength of at least 30 percent of the ultimate design strength. This is equivalent to approximately "100 day-degrees", i.e., 1 day at 100 degrees, of moist curing.

- B. Care shall be exercised to prevent damaging edges of obliterating the lines of chamfers, rustications, or corners when removing the forms or doing any work or work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Engineer.
- D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall be filled under Section 03300.

### 3.02 FLOORS AND SLABS

- A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/4-inch when checked with a 10 foot straight edge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as approved by the Engineer.
- B. Following screeding as specified above, power steel trowel as follows:
  - 1. Immediately after final screeding, a dry cement/sand shake in the proportion of 2-sacks of portland cement to 350-pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat, dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20-inch disc is used or 300 pounds if a 24-inch disc is used (such as a "Kelly Float" as manufactured by the Weisner-Rapp Corporation of Buffalo, New York). A mechanical blade-type float or trowel is not acceptable for this work.

NOTE: This operation (application of the cement/sand shake) may be eliminated at the discretion of the Engineer if the base slab concrete exhibiting adequate fattiness and homogeneity and the need is not indicated.

- 2. In lieu of power steel troweling, small areas as defined by the Engineer shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.

3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straight edge to detect high and low spots which shall be eliminated.
  4. Compaction shall be continued only until thorough densification is attained and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.
- C. After Paragraph 3.02A and B procedures are accomplished, floors and slabs for particular conditions shall be completed as scheduled in one of the following finishes:
1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, nonslip finish as approved.
  2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a nonslip finish as approved.
  3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.
- D. Floors, stair treads and platforms shall be given a floor hardener. Application shall be according to manufacturer's instructions.

### **3.03 APPROVAL OF FINISHES**

- A. All concrete surfaces will be inspected during the finishing process by the Engineer.
- B. Surfaces which, in the opinion of the Engineer, are unsatisfactory shall be refinished or reworked until approved by the Engineer.

**END OF SECTION**

## SECTION 03410

## PRECAST CONCRETE STRUCTURES

## PART 1: GENERAL

## 1.01 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor and equipment and construct wet wells, valve vaults, meter vaults and accessory items, consisting of precast sections as shown on the Drawings and as specified herein.
- B. The forms, dimensions, concrete and construction methods shall be approved by the Engineer in advance of construction.
- C. These specifications are intended to give a general description of what is required, but do not purport to cover all of the structural design details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these specifications or not.
- D. The supplier of the precast wet wells, valve vaults, meter vaults and accessory items shall coordinate his work with that of the Contractor to insure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.
- E. The Contractor will ensure coordination of the precast structures fabrication with the equipment supplied to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures shall be capable of supporting a minimum live load of 200 pounds per square foot.

- F. A PVC Liner shall be installed in each precast wet well as shown on the Drawings. All interior exposed areas not covered with PVC liner shall be painted with two coats of coal tar epoxy paint, dry film thickness of 8 mils, as approved by the Engineer, unless otherwise noted.
- G. All interior surfaces of valve vaults and meter vaults shall be painted with two coats of coal tar epoxy paint dry film thickness of 8 mils each coat, as approved by the Engineer.

**1.02 RELATED WORK NOT INCLUDED**

- A. Excavation for structures is included in Section 04210.
- B. Excavation and backfill in trenches is included in Section 02221.
- C. Crushed stone or washed shell is included in Section 02223.
- D. Lumber left in place is included in Section 02355.
- E. PVC liner is included in Section 03179.
- F. Reinforcing steel is included in Section 04510.
- G. Concrete is included in Section 03300.
- H. Precast Concrete Manholes are included in Section 03455.

**1.03 SUBMITTALS**

- A. Submit to the Engineer in accordance with Section 01340, shop drawings showing details of construction, reinforcing and joints.
- B. Shop Drawings
  - 1. Content
    - a. Dimensions and finishes.
    - b. Estimated camber.
    - c. Reinforcing and connection details.
    - e. Lifting and erection inserts.
    - f. Other items cast into members.

2. Show location of unit by same identification mark placed on member.
3. Include design calculations.
- C. Manufacturer's Literature: Manufacturer's recommended installation instructions.
- D. Manufacturer's certificates of material conformance with specifications.
- E. Test Reports: Reports of tests on concrete. A minimum of three compression test cylinders will be required for each pour.

#### 1.04 INSPECTION

- A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Engineer, or other representatives of the Owner. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site at once. All sections which have been damaged after delivery will be rejected and if already installed, shall be acceptably repaired, if permitted, or removed and replaced entirely at the Contractor's expense.
- B. At the time of inspection, the sections will be carefully examined for compliance with the ASTM designation specified below and these Specifications and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.



- C. Imperfections may be repaired, subject to the approval of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Engineer.

**PART 2: PRODUCTS**

**2.01 PRECAST CONCRETE SECTIONS**

- A. Precast submersible pump stations shall consist of precast base, precast wet well sections, top cover slab, valve pit and valve pit cover slabs. All concrete and reinforcing steel shall comply with Section 03200 and 03300. Concrete shall be air entrained at the time of delivery and shall have a minimum compressive strength of 5,000 psi at the end of 28 days.
- B. The wet wells may be manufactured as one complete precast section as shown on the Drawings.
- C. Joints between precast concrete sections shall be set by plastic shims and fitted with non-metallic non-shrink grout as specified in Section 03300 and shown on the Drawings. RAM-NEK Sealer may be used in addition to grout on the outside seams.
- D. The top slab sections shall be fitted with water tight hatches as specified in the construction drawings. The frames and covers will be sized for the openings shown on the Contract Drawings.
- E. The various precast sections should have the inside dimensions and minimum thickness of concrete as indicated on the Drawings. All precast and cast-in-place concrete members shall conform to the Building Code Requirements for Reinforced Concrete ACI 318.
- F. Fillets shall be provided and installed in the wet wells as shown on the Drawings. They shall be constructed using concrete fill and shall conform to Section 03300.
- G. Precast structures shall be constructed to the dimensions as shown on the Drawings and as specified in these Specifications.

- H. Type II cement shall be used except as otherwise approved.
- I. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.
- J. Sections shall be cured by an approved method and shall not be shipped until at least seven (7) days after having been fabricated.
- K. Each precast section manufactured in accordance with the drawings shall be clearly marked to indicate the intended pump station installation location. The Contractor shall be responsible for the installation of the correct precast sections in their designated pump station locations.

**PART 3: EXECUTION**

**3.01 INSTALLATION**

- A. The Contractor shall be responsible for handling ground water to provide firm, dry subgrade for the structure, shall prevent water rising on new poured in place concrete or grouted joint sections within 24 hours after placing and shall guard against flotation or other damage resulting from ground water or flooding.
- B. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the wet well base slabs and valve pits.
- C. Backfill materials around the wet well and above the pipe bedding shall be select material as specified in Section 04210 and 02221.
- D. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.
- E. The station shall not be set into the excavation until the installation procedure and excavation have been approved by the Engineer.
- F. The base may be cast-in-place concrete, as specified in Division 3, placed on a thoroughly compacted crushed rock subbase. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section and shall be adjusted in grade so that the top slab section is at the approximately correct elevation.

- G. Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The outside and inside joint shall be filled with a non-shrink grout and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.
- H. Holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.
- I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.
- J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting.

END OF SECTION

## Section 11312

### Leachate Pump Station

#### GENERAL EQUIPMENT REQUIREMENTS

Work under this division shall be coordinated with the requirements of all Contract Documents. The Specification divisions and Drawings are an integrated part of the Contract Documents and as such will not stand alone if used independently as individual divisions or Drawings sheets.

#### 11300. Leachate Pumping Station

##### PART I - GENERAL

###### Description

Work Included. Construct leachate pumping station utilizing reinforced concrete wet-well structure with submersible pumps.

###### Related Work Described Elsewhere

Site Work	Division 2
Concrete	Division 3
Mechanical	Division 15
Electrical	Division 16

##### PART II - PRODUCTS

###### General

The Contractor shall furnish and install one submersible sewage lift station pumping system as shown and specified, including all necessary components and equipment to provide a complete and functional facility.

The equipment system shall be as manufactured by the Hydromatic Pump Division, Ashland, Ohio, AB5 or approved equal. The equipment system shall include two submersible pumps with hydraulic sealing flanges, pump rail guides, pump mounting plates with discharge elbow and rail supports, access frame with covers and guide rail supports, pump lifting chains with hooks, stainless steel cable holder, NEMA-4X weatherproof control panel, mercury switch level controls and miscellaneous related items of equipment.

### Operation Conditions

Each pump shall have an initial capacity of 610 GPM at a total dynamic head of 151 feet when operating at 58% efficiency. Pump motor shall be 75 horsepower, 1750 RPM, 3 phase, 230/460 volts, 60Hz. Impeller diameter shall be 322mm.

### Submersible Pump Construction

Each shall be of the sealed submersible type AB5 Model AF 550-4.w1 or equivalent. The pumps shall be capable of handling raw, unscreened sewage and shall utilize two port nonclog type stainless steel impellers. The pump casing shall be fitted with stainless steel wear rings. Each pump shall have mechanical seals with an oil chamber between the seals. Rotating seal faces shall be carbon and stationary seal faces are to be ceramic. Each pump shall be equipped with seal failure probes and heat sensors.

All metal parts of the seal, including the spring, shall be 303 stainless steel. All pump fasteners shall be 303 stainless steel. All surfaces other than stainless steel coming in contact with leachate shall be protected by an approved leachate resistant coating.

Each pump motor shall be of the sealed submersible type with Class F insulation for operation in high-dielectric oil or housed in a air filled, water-tight chamber to give better heat dissipation and longer bearing life. Each motor stator shall be held in place with a removable end ring so that it can be removed for repair without heating outer shell or using a press. Pump motor-shaft shall be of 303 stainless steel. Pump shall be a standard production pump with attached rail discharge elbow. Rail guides shall be fastened to the pump so all lifting will be applied to the guide supports. A lifting chain or cable of stainless steel, with a stainless steel hook shall be supplied for each pump. An electronic moisture detection system shall be installed so that water leakage into the seal oil chamber, cable connection chamber and/or motor housing is detected. Leakage shall activate a warning light in the control panel. Leakage into the motor housing or connection chamber shall cause pump shut down.

The discharge of each pump shall be fitted with a diaphragm type hydraulically operated sealing flange. When pump is in operation, pressure shall force diaphragm against discharge elbow flange providing a leakproof seal. When pump is idle, pressure shall be removed from diaphragm so that pump can be removed from sump with no mechanical contact of sealing flanges. The complete weight of the pump is to rest on the bottom support plate; no weight is to be supported on the guide rails or discharge elbow. The sealing diaphragm is to be removable and mounted on the pump discharge flange. Diaphragm material is to be Buna N rubber.

A separate steel mounting plate shall be furnished for each pump. These plates shall include adjustable guide rail supports and discharge elbow with flange to align with pump hydraulic sealing flange. Discharge elbow shall have 125 pound standard flange 4" pipe size. Plates and fittings shall be coated with tar base epoxy paint. Guide rails are to be stainless steel schedule 40 pipe. All fasteners, hardware, etc., are to be stainless steel.

#### Access Covers

Two double door access frame assemblies shall be furnished. Access frames and covers shall be fabricated of aluminum. Frame shall support guide rails and stainless steel cable holder. A separate hinged cover shall be provided for each pump. Covers shall be provided with lifting handles and safety latches to hold covers in the open position. Locking hasps shall be furnished for each cover. The covers shall be designed for a live load of 150 PSF.

#### Control Panel

The sewage pump control panel shall be a self-contained complete pump control unit containing the features described herein, to be installed at the site on a suitable mounting stand to facilitate easy access by maintenance personnel and adequate line of sight for the alarm light.

The duplex pump control panel shall be a standard duty type. The complete unit shall be housed in a Nema-4X stainless steel enclosure with provisions for padlocking the door and with a dead front inner door for mounting controls. All exterior hardware and hinges shall be stainless steel. Wire shall be minimum #14 gauge, fully marked in wire ducts and not behind any electrical component. The panel shall be fully tested prior to shipment by the manufacturer.

Items to be mounted on ore in the panel include the following:

1. Audible alarm
2. Flashing red, high level alarm light with red lexan globe
3. Plug-in type phase monitor relay with automatic reset
4. Relays with bases and spring retaining clips
5. Emergency circuit breaker with mechanical interlock
6. Main circuit breaker
7. Pump circuit breakers
8. Motor starters
9. Control circuit breaker
10. Convenience receptacle circuit breaker
11. 24 volt control transformer
12. Hand-off-automatic switches
13. Run pilot lights
14. Lightning arrestor
15. Pump alternator
16. Terminal strips shall be provided for all connections
17. Overload reset buttons
18. Elapsed time meters
19. Ground fault protected duplex 120 volt receptacle
20. Generator receptacle
21. Seal failure lights
22. Liquid level indicator lights and test switches

#### Float Switches

Sealed float type mercury switches shall be supplied to control wet well levels and alarm signal. The mercury tube switches shall be sealed in a solid polyurethane float for corrosion and shock resistance. The support wire shall have a heavy neoprene jacket and a weight shall be attached to the cord above the float to hold switch in place in the wet well. The weight shall be above the float to prevent sharp bends in the cord when the float operates under water. The float switches shall hang in the wet well supported only by the cord that is held to the stainless steel cable holder. Four float switches shall be used to control level; two for pump turn-on, one for pump turn-off and one for high water alarm. Float switches shall be Hydromatic Model No. 3900 or approved equal.

#### Spare Parts

One complete set of mechanical seals shall be supplied for each pump being furnished. The spare parts shall also include one spare alternator, one complete spare relay with base and spring retaining clip and one spare phase monitor relay with base, silent switch, and one emergency generator receptical of the appropriate type listed below (Sec.2.E) with a safety catch between the main and emergency disconnects to prevent backfeed. All test switches will be of the momentary contact type. All neutral wiring shall be connected via a neutral assembly (Sq. D. #SN12-125 or equal).

### Protective Lining for Wet Wells

The interior of all wet wells shall have a plastic type lining composed of high molecular weight vinyl chloride resins combined with chemical resistant pigments and plasticizers covering all of the surface. The lining shall withstand severe physical abuse and be unaffected by fungus or bacterial action and shall be resistant to hydrogen sulfide and other sewer gases, acids, alkalis and salts. The lining shall be T-lock Amer-Plate as produced by the Ameron Corporation of South Gate, California; or equal.

The plastic lining shall be applied to the inside surface of the walls and ceiling by placing it on the inner forms of the concrete. When the concrete is poured, anchors on the back side of the lining shall be embedded into the concrete forming a mechanical bond between the lining and the concrete.

Field joints shall be made in strict accordance with the manufacturer's instructions and with personnel trained by or under the direction of factory personnel.

After the concrete is installed and the liner joints completed, the lining shall be tested with an approved electrical holiday or flaw detector. All joints shall be tested by a destructive probing method, and all repairs of whatever damage is found shall be made; all in strict conformity with the instructions and recommendations of the lining manufacturer.

The lining shall be installed prior to the placement of the fillet concrete.

### Electrical

#### A. Service and Metering

The Contractor shall be responsible and shall pay for any permits, fees, and inspections required by the local power company for service installations. Three phase power should be used whenever possible. (No phase converters will be accepted.) All lift stations shall be equipped with a knife-type non-fused safety switch (Sq. "D" D324NRB or comparable), lockable in the ON and OFF position, between the service meter and the control panel to permit servicing of the main breaker without removing the service meter.



## **B. Conductors**

All power conductors shall be single conductor, 600 volt, type THW or THHN stranded copper. Minimum conductor size shall be #12 AWG. NO ALUMINUM WIRE PERMITTED. All control wiring shall be single conductor #14 AWG, 600 volt, type THHN stranded copper. All terminations and interconnections of control wiring shall be by means of compression-type lugs of the nylon self insulated type with an inner bronze insulation grip sleeve on identified terminal strips. All control wiring shall be color coded.

## **C. Conduit**

All power conductors from the utility source to the service meter shall be enclosed in PVC Sch80 conduit below ground and galvanized rigid conduit above ground. All lift stations shall be equipped with one conduit to the wetwell for pump power cables and separate conduit to the wetwell for the control (floatball) cables. In lift stations where the pump power cords are size 8/4 or larger, separate conduits shall also be required for each pump power cable. All conduit to the lift station wetwell shall be 2" Sch. 80 PVC and shall be run by the shortest route possible. All conduit to the wetwell shall be equipped with a seal-off. Seal-offs should be left UN-POURED to be sealed by MCPWD personnel upon acceptance for maintenance. All terminations shall be made inside the electrical control panel, no junction boxes mounted under control panel for pump and float cables will be accepted.

#### D. Control Panel

all lift stations shall have one duplex automatic control panel. The enclosure shall be NEMA 4X constructed of fiberglass, aluminum, or stainless steel and mounted on a concrete "T" post with Unistrut or Kindorf channel painted for corrosion resistance. (NO PLYWOOD MOUNTING PERMITTED.) The concrete "T" post shall be anchored in concrete adjacent to the lift station wetwell. No fittings entering side of panel shall be sealing locknuts or Myers Hubs. The minimum panel size shall be 30" x 30" x 8". All power conductors from the main breaker to the emergency and pump breakers shall be connected via a power distribution block. Controls shall be rated for 230 volts, 3-phase, 60hz, equipped with individual disconnects of the adjustable magnetic type, across-the-line magnetic starters, 3-phase overload protection, lightening arrestor on incoming power source mounted on the EXTERIOR of the safety switch, Furnas type 47AB10AF alternator, overload reset, HAND-OFF-AUTO pump operation selector switches, 24 volt control circuit transformer, 24 volt KP-12 relays with level alarm. Also, furnish and install four liquid level switches equipped with a continuous length of flexible 600 volt, type S.O cable to make all connections inside the control panel. No splices shall be permitted. Each station shall have one flashing type red alarm light mounted on top of control panel, one adjustable audible alarm light mounted on top of control panel, one adjustable audible alarm with silent switch, and one emergency generator receptical of the appropriate type listed below (Sec.2.E.) with a safety catch between the main and emergency disconnects to prevent backfeed. All test switches will be of the monetary contact type. All neutral wiring shall be connected via a neutral assembly (Sq. D. #SN12-125 or equal).

#### 2.E GENERATOR RECEPTICALS:

0-100 amp., 230 volt	Russell Sthool1 JR SB1044FR
100-200 amp., 230 volt	Russell Sthool1 JR SB2044FR
0-200 amp., 460 volt	Russell Sthool1 JR SB2034HR

## **2.F MOTOR STARTERS**

Motor starters shall be sized as called for on the plans. No starter smaller than NEMA size 1 shall be used. Starters shall be Sq. "D" class 8536 or equivalent and shall have three overload relays of the melting alloy type. (Sq. "D" or ITE preferred).

## **2.G GROUND RESISTANCE**

Tests shall be made on the entire grounding system for the continuity of connections and for resistance to the flow or current through ground connections. The ground resistance of conduits, equipment cases, and supporting frames shall not vary appreciably from that of the system as a whole. The ground resistance of the system shall not exceed 25 ohms.

## **PART III - EXECUTION**

Construct wet-well in accordance with details shown. Install pumps in accordance with manufacturer's instructions.

**END OF SECTION**

## **SECTION 16050**

### **ELECTRICAL SPECIFICATIONS**

#### **A. SCOPE**

1. This specification covers the furnishing and installation of the entire electrical systems including power, motor control, lighting, status reporting, instrumentation, conduit and wiring as specified hereinafter and shown on the Electrical Drawings.
2. It shall be the Contractor's responsibility to physically visit the job site in order that he may be personally acquainted with both the existing facilities with which he must interface and the areas intended for the construction covered under this Specification. The failure to comply with this requirement of the Specifications will NOT be grounds for the Contractor to request the approval of change orders and/or additional monetary compensation.

#### **B. SUBMITTALS**

1. The submittals for approval of all items specified herein shall meet the requirements as set forth elsewhere in other sections of the Specifications.

#### **C. CODES, INSPECTIONS AND FEES**

1. All material and installations shall be in accordance with the National Electrical Code (1990 Edition) and the latest editions of all applicable national, state, county and local codes.
2. To the extent that any item is routinely tested and rated by the Underwriters Laboratories, Inc., that item shall bear the U.L. label.
3. The Contractor shall make the necessary arrangements for obtaining all requisite permits and inspections and pay any applicable fees.

#### **D. GUARANTEES AND WARRANTIES**

1. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship for a period of one (1) year from date of final acceptance.

## **E. OVERVIEW**

### **1. 480 Volt Power Distribution:**

- a. Furnish and install the requisite motor starter and circuit breakers in the existing Motor Control Centers E-1 and E-2.
- b. Furnish and install a fiberglass pullbox, 12" x 12" x 6" deep, without knockouts.
- c. Furnish and install the heavy duty safety switches.
- d. Furnish and install the appropriate wiring and conduit from the load side of the safety switches to the respective associated device(s) and/or equipment.
- e. Furnish and install the interconnecting 480 Volt conduit system.
- f. Furnish and install the interconnecting 480 Volt wiring system.

### **2. 120 Volt Power and Lighting System:**

- a. Furnish and install a 60 Ampere, 3-Pole, 480 Volt Circuit Breaker in the existing MCC E-2 (circuit breaker to match existing breakers).
- b. Furnish and install a 30 KVA, 480-120/208 Volt, 3-Phase, 60 Hz Transformer.
- c. Furnish and install a 60 Ampere, 3-Pole, 600 Volt Heavy Duty Safety Switch.
- d. Furnish and install a 40-circuit lighting panel with a 150 Ampere Main Breaker. The lighting panel shall be rated 120/208 Volt, 3-Phase, 4-Wire, 60 Hz.
- e. Furnish and install a fiberglass pullbox, 12" x 12" x 6" deep, without knockouts.
- f. Furnish and install the lighting poles and fixtures.

- g. Furnish and install the interconnecting 120 Volt power and lighting conduit system.
  - h. Furnish and install the interconnecting 120 Volt power and lighting wiring system.
3. DC Power System:
- a. Install the two (2) SCR Controllers (the SCR Controllers will be furnished by the supplier of the Flocculators).
  - b. Furnish and install two (2) fiberglass pullboxes, 12" x 12" x 6" deep, without knockouts.
  - c. Furnish and install two (2) 30 Ampere, 4-Pole, 250 Volt DC, Heavy Duty Safety Switches.
  - d. Furnish and install the interconnecting DC power conduit system.
  - e. Furnish and install the interconnecting DC wiring system.
4. 120 Volt Status Reporting System:
- a. Furnish and install a fiberglass pullbox, 12" x 12" x 6" deep, without knockouts.
  - b. Furnish and install the interconnecting 120 Volt Status Reporting conduit system.
  - c. Furnish and install the interconnecting 120 Volt Status Reporting wiring system.
5. Process Instrumentation System:
- a. Furnish and install a fiberglass pullbox, 12" x 12" x 6" deep, without knockouts.
  - b. Furnish and install the interconnecting Process Instrumentation conduit system.
  - c. Furnish and install the interconnecting Process Instrumentation wiring system.
6. Interface for Festoon Systems:
- a. Furnish and install three (3) fiberglass pullboxes, 12" x 12" x 6" deep, without knockouts.

- b. These three (3) festoon interface boxes will serve as interface points for both the 480V Power Distribution System and the 120V Status Reporting System.

**7. Routing for Conduit Systems:**

- a. Except for the aboveground connections to the various pullboxes, disconnect switches, festoon interface boxes and the motor conduit boxes all conduits for the basin wiring systems shall be imbedded in the walls and/or slabs of the basins as shown on the Electrical Drawings.
- b. From the respective devices in the electrical room (MCC's, terminal boxes, lighting panel, SCR controllers, etc.) the conduits shall be routed above the false ceiling at the roof level through the electrical room and the adjoining hallway, through the Deep Well Pump Control Room (originally called Effluent Pump Control Room), through the North wall, down the outside of the North wall, and then underground to the respective fiberglass pullboxes as indicated on the Electrical Drawings.
- c. To the extent possible, the wiring between the units in the Electrical Room and the PIC (located in the Main Control Room) shall utilize existing conduits and wires. Where this is not possible, new conduit and wiring shall be provided. This determination shall be made at the time of the Contractor's visit to the job site prior to submitting his bid.

**F. EQUIPMENT AND MATERIAL SPECIFICATIONS**

**1. Motor Starter:**

- a. The motor starter shall be for the starting and control of a 10 HP Flash Mixer.
- b. The motor starter shall be a NEMA Size 1, 2-Speed, 480 Volt, 3-Phase, 60 Hz unit.
- c. The motor starter shall be of the same type and manufacture as the existing MCC E-2 into which it is to be mounted.
- d. The motor starter shall have the same indicating lights, selector switches, wiring arrangement, etc., as the existing Flash Mixer in MCC E-1.

**2. MCC Circuit Breakers:**

- a. The circuit breakers shall be 3-Pole, 600 Volt, 60 Hz with current ratings as shown on the MCC one-lined diagrams.
- b. The circuit breakers shall be of the same type and manufacture as the existing MCC's E-1 and E-2 into which they are to be mounted.

**3. Safety Switches:**

- a. All safety switches shall be of the Heavy Duty Type as manufactured by The Square D Company, Allen-Bradley or approved equal.
- b. The safety switches for use with the two (2) Flocculator Drives shall be rated 30 Ampere, 4-Pole, 250 Volts DC.
- c. The AC safety switches shall be 3-Pole, 600 VAC, with current ratings required by their respective application except that the safety switch mounted at the Flash Mixer shall be 6-Pole.

**4. Transformer:**

- a. The transformer shall be of the indoor, floor mounted, dry type as manufactured by The Square D Company (Sorgel), Westinghouse or approved equal.
- b. The transformer shall be rated 30 KVA, 480 Volt Primary, 120/208 Volt Secondary, 3-Phase, 60 Hz, with 2-2 1/2 percent taps above and below rated voltage.

**5. Lighting Panel:**

- a. The lighting panel shall be of the indoor, surface mounted type and shall be of the same style, same color and the same manufacturer as the existing lighting panels.
- b. The lighting panel shall be rated 120/208 Volts, 3-Phase, 4-Wire, 60 Hz.
- c. The lighting panel shall have a 150 Ampere main circuit breaker.



- d. The lighting panel shall have twenty (20) single pole branch breakers rated 20 Amperes. The remaining room in the lighting panel shall be blank spaces.

6. Meter Vault No. 2 - Power and Lighting:

- a. Furnish and install a fiberglass pullbox, 12" x 12" x 6" deep, without knockouts.
- b. The lighting fixture shall be as manufactured by Appleton Electric Company, Stonco or approved equal.
- c. The lamp shall be of the 150-watt incandescent type.
- d. The fixture shall be the weatherproof type and shall be furnished complete with lamp, clear globe and globe guard.
- e. A 120 Volt AC, 15 Ampere single-pole toggle switch with a weatherproof enclosure and a weatherproof cover shall be provided for the light fixture.
- f. A 120 Volt AC, 20 Ampere duplex receptacle with a weatherproof enclosure and a weatherproof cover shall be provided.
- g. A 120 Volt AC, 20 Ampere simplex receptacle with a weatherproof enclosure and a weatherproof cover shall be provided to power the sump pump.

7. Basin Lighting:

- a. The lighting fixtures and poles shall be Hi-Tek as manufactured by Lithonia Lighting or approved equal.
- b. The lamps shall be 100 watt, diffused, medium base, ANSI No. S54, bulb type B17, High Pressure Sodium.
- c. The fixtures shall be made from heavy-gauge aluminum continuously seam-welded and shall have a fully gasketed aluminum door frame with lens and stainless steel external hardware. The fixtures shall be equivalent to Lithonia KAB Series with clear prismatic acrylic lens and high power factor ballast. The electrical components shall be isolated from the optical chamber. The fixtures shall have a standard dark bronze polyester powder finish.

- d. The poles shall be the 4" square straight aluminum, anchor base type. The poles shall have a fixture mounting height of 10 feet and shall have a natural aluminum finish. The poles shall be equipped with single spoke or twin spoke mounting brackets as determined by the specific application shown on the Electrical Drawings. The poles shall also be furnished with a duplex receptacle and a weatherproof receptacle cover.

8. Conduit Systems:

a. General:

1. Upon the completion of the installation of the conduit systems and prior to pulling any wire, all conduit systems shall be cleaned and certified free of all burrs and/or other obstructions which might be detrimental to the wire insulation.
2. All requisite conduit fittings, conduit supports, expansion joints, mounting hardware, etc., shall be supplied in the quantities necessary to make a complete installation. These appurtenances shall be considered as required by this Specification whether or not they are specifically called out herein or shown on the Electrical Drawings.

b. Rigid Metallic Conduit:

1. Rigid metallic conduit shall be hot-dipped galvanized steel as manufactured by the Youngstown Sheet and Tube Co., Wheeling-Pittsburgh Steel Corp., or approved equal.
2. Rigid metallic conduit shall be used ONLY in outdoor, above-ground exposed locations.
3. Rigid metallic conduit shall be furnished in the appropriate sizes as indicated on the Electrical Drawings.

c. Rigid PVC Conduit:

1. Rigid PVC conduit shall be Schedule 80 polyvinylchloride as manufactured by Carlon, Phillips Petroleum Co., or approved equal.

2. Rigid PVC conduit shall be used underground, in concrete slabs/walls and indoors.
3. Rigid PVC conduit shall be furnished in the appropriate sizes as indicated on the Electrical Drawings.

d. Flexible Metal Conduit:

1. Flexible metal conduit shall be of the liquidated type as manufactured by Anaconda (Sealtite) or approved equal.
2. Flexible metal conduit shall be used to make connections to motors and/or to other equipment where vibration is present.
3. Flexible metal conduit shall be furnished in the appropriate sizes as indicated on the Electrical Drawings.
4. Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts or approved equal.

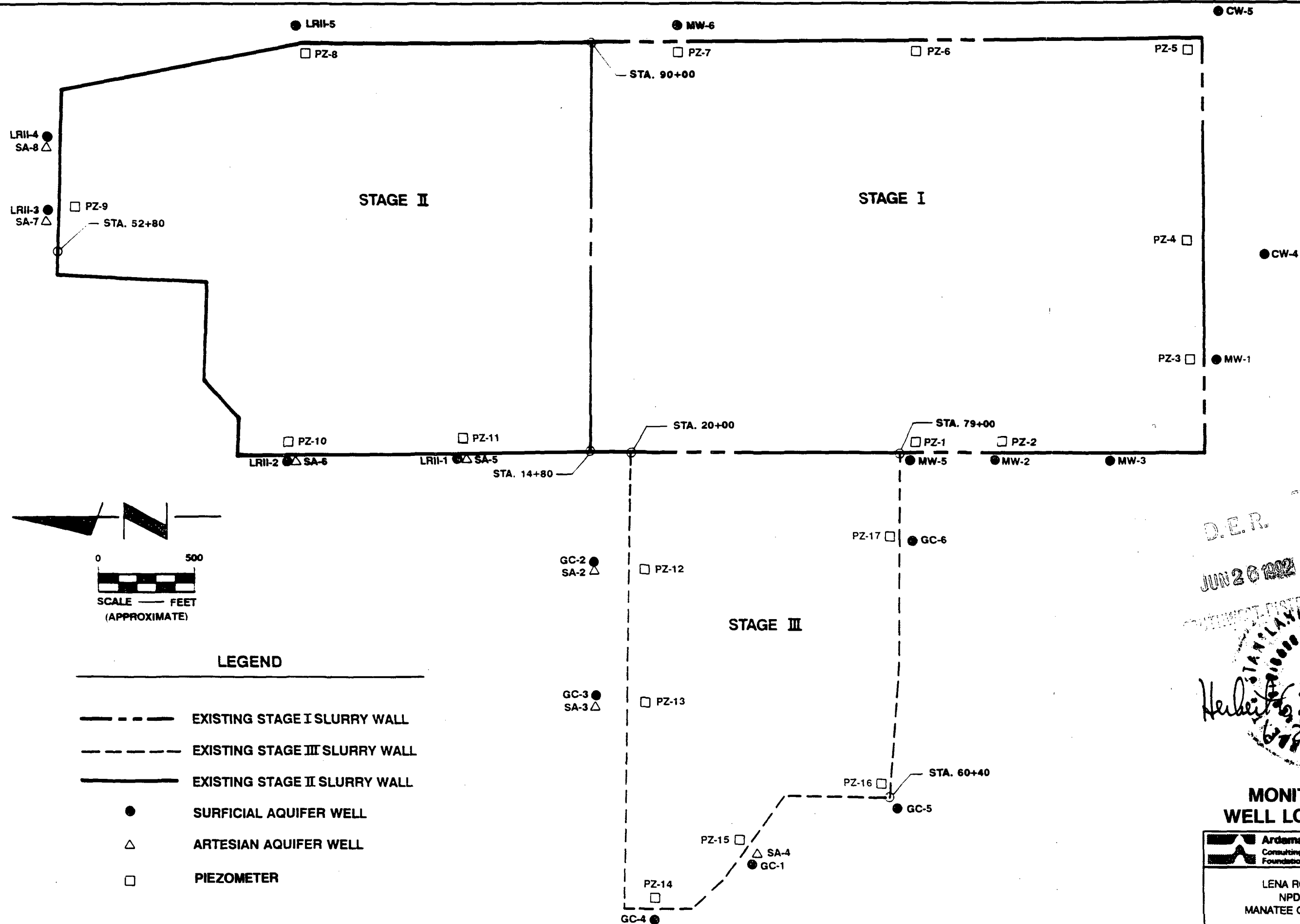
9. Wiring Systems:

a. General:

1. The wiring as hereinafter described shall be installed in the conduit systems described in Item F.8 above.
2. The wiring systems shall be installed complete including all connections, terminations, etc.
3. Upon completion of the installation of the wiring systems, each wiring system shall be individually checked and tested for system integrity prior to energizing any of the associated equipment.
4. The type of wire to be used in each wiring system shall be as described hereinafter.

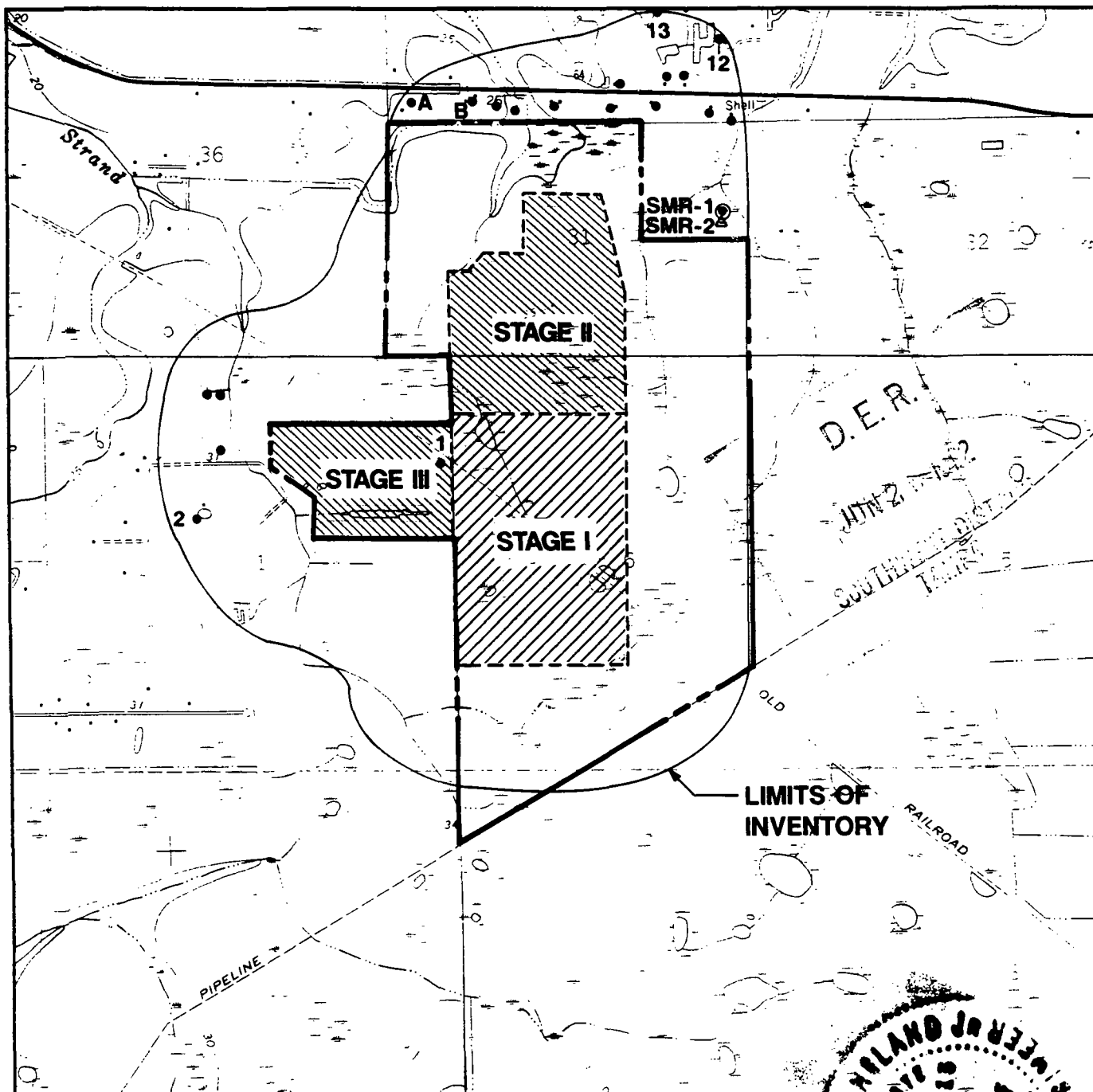
b. 600 Volt Wiring:

1. The wiring used in all of the systems except for the instrumentation wiring shall be as manufactured by Anixter, Anaconda, Collyer or approved equal.



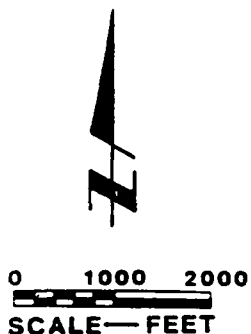
REVISED 01/14/91

FIGURE 3



## WATER SUPPLY WELL INVENTORY

SECTION 1, TOWNSHIP 35 S, RANGE 18 E  
 SECTION 6 AND 7, TOWNSHIP 35 S, RANGE 19 E  
 SECTION 31, TOWNSHIP 34 S, RANGE 19 E



### LEGEND

- SURFICIAL AQUIFER MONITOR WELL
- △ ARTESIAN AQUIFER MONITOR WELL
- MONITOR WELLS WITHIN PROPERTY SHOWN ON ANOTHER MAP
- 1 ● WELL LOCATION & INVENTORY NUMBER

SOURCE: U.S.G.S. QUAD MAP, LORRAINE FL. 1973

<b>Ardaman &amp; Associates, Inc.</b> Consulting Engineers in Soil Mechanics, Foundations, and Materials Testing		
<b>LENA ROAD LANDFILL</b> <b>NPDES PERMIT</b> <b>MANATEE COUNTY, FLORIDA</b>		
DRAWN BY: <b>SEF</b> FILE NO: <b>86-115B</b>	CHECKED BY: <b>46S</b> APPROVED BY: <i>[Signature]</i>	DATE: <b>02/11/91</b>

# LENA ROAD WATER SUPPLY WELL INVENTORY

ID NO.	SECTION LOCATION	NAME ADDRESS	USE	TOTAL DEPTH	CASING DEPTH	CASING DIAMETER
1	S6, T35S, R19E	Manatee County Landfill 3333 Lena Road	Irrigation	160'	46'	3"
2	S1, T35S, R18E	C.T. Adams 2508 Lena Road	Household	239'	84'	3"
3	S1, T35S, R18E	Kenneth M. Watts Lena Road	Water horses	95'	35'	3"
4	S1, T35S, R18E	Bernard Mitchell 2808 41st Avenue E.		167'	37'	3"
5	S1, T35S, R18E	John Sanville	Cattle Watering	126'	50'	3"
6	S29, T34S, R19E	Tom & Evelyn Charis Hwy. 64	Irrigation	638'	85'	8"
7	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation		86'	8"
8	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64		658'	84'	8"
9	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64		654'	81'	8"
10	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64	Irrigation	640'	84'	8"
11	S29, T34S, R19E	Tom & Evelyn Charies Hwy. 64		681'	83'	8"
A	S29, T34S, R19E	Hwy. 64		495'	61'	6"
B	S29, T34S, R19E	Hwy. 64	Unused	600'	?	10"
12	S29, T34S, R19E	Joe Warner Upper Man. River Road		160'	63'	3"
13	S29, T34S, R19E	Manatee Dairies Rt.2 Box 3271	Dairy	490'	61'	6"

LENA ROAD MONITORING NETWORK

WELL NAME	AQUIFER MONITORED	WELL TYPE	DATE INSTALLED	LAT./LONG.	TOC ELEVATION FT. NGVD	GROUND ELEVATION FT. NGVD	TOP OF SCREEN ELEVATION FT. NGVD	BOTTOM OF SCREEN ELEVATION FT. NGVD	DRILLING METHOD
SMR-1	SURFICIAL	B	10/06/88	27/28/37 82/26/03	36.48	33.4	23.4	13.9	HOLLOW STEM
SMR-2	ARTESIAN	B	11/03/88	27/28/37 82/26/03	36.10	33.4	-63.9	-113.9	HYDRAULIC ROTARY
MW-5	SURFICIAL	C	10/22/88	27/28/06 82/26/48	39.91?	37.1	29.1	19.6	HOLLOW STEM
PZ-1	SURFICIAL		11/26/90	27/28/06 82/26/46			12.0*	16.5*	HOLLOW STEM
MW-2	SURFICIAL	C		27/28/02 82/26/49	39.77	37.8	30.8	25.8	HOLLOW STEM
PZ-2	SURFICIAL		11/27/90	27/27/57 82/26/46			10.0*	14.5*	HOLLOW STEM
MW-3	SURFICIAL	C		27/27/56 82/26/49	40.07	39.7	31.7	26.7	HOLLOW STEM
MW-1	SURFICIAL	C		27/27/53 82/26/43	38.93	35.9	29.8	24.8	HOLLOW STEM
PZ-3	SURFICIAL		11/27/90	27/27/54 82/26/41			12.0*	16.5*	HOLLOW STEM
CW-4	SURFICIAL	C		27/27/50 82/26/36	37.54	34.6		19.6	HOLLOW STEM
PZ-4	SURFICIAL		11/28/90	27/27/54 82/26/35			10.0*	14.5*	HOLLOW STEM
CW-5	SURFICIAL	C		27/27/53 82/26/20	42.00	38.9		23.6	HOLLOW STEM
PZ-5	SURFICIAL		11/28/90	27/27/54 82/26/22			10.0*	14.5*	HOLLOW STEM
PZ-6	SURFICIAL		11/29/90	27/28/08 82/26/22			15.0*	19.5*	HOLLOW STEM
MW-6	SURFICIAL	C	10/17/88	27/28/21 82/26/21	39.32	36.1	28.1	18.6	HOLLOW STEM
PZ-7	SURFICIAL		11/29/90	27/28/20 82/26/22			15.0*	19.5*	HOLLOW STEM
LR11-5	SURFICIAL	C	10/23/88	27/28/41 82/26/21	36.78	33.5	23.5	14.0	HOLLOW STEM
PZ-8	TO BE INSTALLED LATER								
LR11-4	SURFICIAL	C	10/23/88	27/28/50 82/26/28	33.90	30.9	20.9	11.4	HOLLOW STEM
SA-8	ARTESIAN	C	11/01/88	27/28/50 82/26/28	34.48	31.1	-68.9	-118.9	HYDRAULIC ROTARY
PZ-9	TO BE INSTALLED LATER								
LR11-3	SURFICIAL	C	10/23/88	27/28/50 82/26/36	33.51	30.4	20.4	10.9	HOLLOW STEM

\* DEPTH BELOW LAND SURFACE IN FEET

LENA ROAD MONITORING NETWORK

WELL NAME	AQUIFER MONITORED	WELL TYPE	DATE INSTALLED	LAT./LONG.	TOC ELEVATION FT. NGVD	GROUND ELEVATION FT. NGVD	TOP OF SCREEN ELEVATION FT. NGVD	BOTTOM OF SCREEN ELEVATION FT. NGVD	DRILLING METHOD
SA-7	ARTESIAN	C	10/28/88	27/28/50 82/26/36	33.27	30.3	-69.7	-119.7	HYDRAULIC ROTARY
LR11-2	SURFICIAL	C	10/14/88	27/28/44 82/26/48	36.53	33.2	23.2	13.7	HOLLOW STEM
SA-6	ARTESIAN	C	10/25/88	27/28/44 82/26/48	36.04	33.0	-67.0	-117.0	HYDRAULIC ROTARY
PZ-10	TO BE INSTALLED LATER								
LR11-1	SURFICIAL	C	10/15/88	27/28/32 82/26/48	38.02	34.9	26.4	16.9	HOLLOW STEM
SA-5	ARTESIAN	C	10/19/88	27/28/32 82/26/48	37.92	34.9	-65.1	-115.1	HYDRAULIC ROTARY
PZ-11	TO BE INSTALLED LATER								
GC-2	SURFICIAL	C	10/21/88	27/28/25 82/26/56	38.23	35.2	29.7	20.2	HOLLOW STEM
SA-2	ARTESIAN	C	07/10/85	27/28/25 82/26/56	37.97	35.0	-15.0	-115.0	HYDRAULIC ROTARY
PZ-12	SURFICIAL		12/03/90	27/28/19 82/26/54			8.0*	12.5*	HOLLOW STEM
GC-3	SURFICIAL	C	10/20/88	27/28/25 82/27/02	35.08	32.0	22.0	12.5	HOLLOW STEM
SA-3	ARTESIAN	C	02/11/85	27/28/25 82/27/02	35.12	32.1	-17.9	-127.9	HYDRAULIC ROTARY
PZ-13	SURFICIAL		12/03/90	27/28/19 82/27/07			10.0*	14.5*	HOLLOW STEM
GC-4	SURFICIAL	C	10/20/88	27/28/23 82/27/14	33.98	30.3	21.3	11.8	HOLLOW STEM
PZ-14	SURFICIAL		12/03/90	27/28/18 82/27/11			10.0*	14.5*	HOLLOW STEM
GC-1	SURFICIAL	C	10/25/88	27/28/15 82/27/13	31.36	27.1	17.1	7.6	HOLLOW STEM
SA-4	ARTESIAN	C	11/05/88	27/28/15 82/27/13	31.28	27.5	-72.5	-112.5	HYDRAULIC ROTARY
PZ-15	SURFICIAL		12/04/90	27/28/14 82/27/09			10.0*	14.5*	HOLLOW STEM
GC-5	SURFICIAL	C	10/22/88	27/28/05 82/27/09	36.52	32.5	24.0	14.5	HOLLOW STEM
PZ-16	SURFICIAL		12/04/90	27/28/07 82/27/05			9.0*	13.5*	HOLLOW STEM
GC-6	SURFICIAL	C	10/21/88	27/28/05 82/26/53	39.10	35.2	26.2	16.7	HOLLOW STEM
PZ-17	SURFICIAL		12/04/90	27/28/07 82/26/51			10.0*	14.5*	HOLLOW STEM

\* DEPTH BELOW LAND SURFACE IN FEET