NORTHEAST SERVICE AREA (NESA) BOOSTER PUMP STATION MODS AT ORANGE TREE

Supplemental Technical Specifications – 100% Bid Set

PREPARED BY

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COLLIER COUNTY SUPPLEMENTAL TECHNICAL SPECIFICATIONS
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SUPPLEMENTAL TECHNICAL SPECIFICATIONS

Note: The following technical specifications shall be incorporated into the Contract Documents for the Northeast Service Area (NESA) Booster Pump Station at Orange Tree Improvements project. In addition to these supplemental technical specifications, the Collier County Utility Standards Manual shall apply to this project.

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of Work

B. CONTRACTOR's Use of Site

C. Work Sequence

D. COUNTY Occupancy

1.2 DESCRIPTION OF WORK

A. General:

The Work covered under this contract includes but is not limited to the following:

1. Construction of a new above ground motor operated valve assembly from the existing discharge line to the existing suction line.

2. Construction of electrical improvements to provide power to the new motor operated valve.

B. The Work includes:

1. Furnishing of all labor, material, superintendence, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services and other means of construction necessary or proper for performing and completing the Work.

2. Sole responsibility for adequacy of plant and equipment.

3. Maintaining the Work area and site in a clean and acceptable manner.

4. Protection of finished and unfinished Work.

5. Repair and restoration of Work or existing facilities damaged during construction.

6. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.

C. Implied and Normally Required Work: It is the intent of these Specifications to provide the COUNTY with complete operable systems, subsystems and other items of Work. Any part or item of Work, which is reasonably implied or normally required to make each installation satisfactorily and completely operable, is deemed to be included in the Work and the Contract Amount. All miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.

D. Quality of Work: Regard the apparent silence of the Contract Documents 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 as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.

1.3 CONTRACTOR'S USE OF SITE

A. Limit use of site and premises for work and storage to allow for the following:

1. Coordination of the Work under this CONTRACT with the work of the other contractors where Work under this CONTRACT encroaches on the Work of other contractors.

2. COUNTY occupancy and access to operate existing facilities.

3. Coordination of site use with ENGINEER.

4. Responsibility for protection and safekeeping of products under this CONTRACT.

5. Providing additional off site storage at no additional cost to the COUNTY as needed.

1.4 WORK SEQUENCE

A. Construct Work in stages to accommodate the COUNTY’s use of premises during construction period and in accordance with the limitations on the sequence of construction specified. Coordinate construction schedules and operations with ENGINEER.

B. Coordinate Work of all subcontractors.

1.5 COUNTY OCCUPANCY

A. The COUNTY will occupy premises during entire period of construction in order to maintain normal operations. Cooperate with the COUNTY's Manager or designee in all construction operations to minimize conflict, and to facilitate COUNTY usage.

B. Conduct operations with the least inconvenience to the general public.

1.6 PROTECTION OF EXISTING UTILITIES

A. In case of damage to existing utilities caused by construction activities, contact the owner of the utility or appropriate COUNTY department (Water or Wastewater) immediately. Repair any damage to existing utilities caused by construction activities in coordination with or as directed by the owner of the utility.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

A. Starting Work: Start Work within 10 days following the date stated in the Notice to Proceed and execute with such progress as may be required to prevent delay to other contractors or to the general completion of the project. Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. At all times, schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion.

END OF SECTION

SECTION 01152

APPLICATION FOR PAYMENT

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Submit Applications for Payment to Engineer in accordance with the schedule established by Conditions of the Contract and herein.

1.02 RELATED REQUIREMENTS

A. Agreement between Owner and Contractor.

B. Conditions of the Contract: Progress Payments, Retainage and Final Payment.

C. Section 01153: Change Order Procedures.

D. Section 01370: Schedule of Values.

E. Section 01700: Contract Closeout.

1.03 FORMAT AND DATA REQUIRED

A. Submit applications in the form required by Owner, in accordance with the example which will be provided by the Engineer, with itemized data typed on 8-1/2-inch x 11-inch white paper continuation sheets.

B. Provide itemized data on continuation sheet:

1. Format, schedules, line items and values: Those of the Schedule of Values accepted by Engineer.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.

    a. Round off values to nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to date of submission at the end of the continuation sheets.

    a. List by Change Order Number, and description, as for an original component item of work.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:

1. Project

2. Application number and date.

3. Detailed list of enclosures.

4. For stored products:

    a. Item number and identification as shown on application.

    b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700-Contract Closeout.

1.07 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to Engineer at the times stipulated.

B. Number: 1 electronic copy of each Application.

C. When Engineer finds Application properly completed and correct, he will transmit certificate for payment to Owner (the Clerk of Courts), with copy to Contractor.

PART 2 – PRODUCTS (NOT USED)
PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01153

CHANGE ORDER PROCEDURES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Promptly implement change order procedures.

1. Provide full written data required to evaluate changes.

2. Maintain detailed records of work done on a time and material/force account basis.

3. Provide full documentation to Engineer on request.

B. Designate in writing the member of Contractor's organization:

1. Who is authorized to accept changes in the Work.

2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the Work.

C. Owner will designate in writing the person who is authorized to execute change Orders.

1.02 RELATED REQUIREMENTS

A. Section 01152: Application for Payment.

B. Section 01310: Construction Schedules.

C. Section 01370: Schedule of Values.

D. Section 01700: Contract Closeout.

1.03 DEFINITIONS

A. Change Order: See General Conditions.

B. Work Directive: A written order to the Contractor, signed by Owner and Engineer, which amends the Contract Documents as described, and authorizes Contractor to proceed with a change which affects the Contract Sum or the Contract Time, for inclusion in a subsequent Change Order.

C. Field Order: A written order, instructions, or interpretations, signed by Engineer making minor changes in the Work not involving a change in Contract Sum or Contract Time.

1.04 PRELIMINARY PROCEDURES

A. Owner or Engineer may initiate changes by submitting a Proposal Request to Contractor. Request will include:

1. Detailed description of the change, products, and location of the change in the Project.

2. Supplementary or revised Drawings and Specifications.

3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.

4. A specific period of time during which the requested price will be considered valid.

5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.

B. Contractor may initiate changes by submitting a written notice to Engineer, containing:

1. Description of the proposed changes.

2. Statement of the reason for making the changes.

3. Statement of the effect on the Contract Sum and the Contract Time.

4. Statement of the effect on the work of separate contractors.

5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.05 Work Directive

A. In lieu of Proposal Request, Engineer may issue a work directive for Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. Directive will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.

C. Owner and Engineer will sign and date the Work Directive as authorization for the Contractor to proceed with the changes.

1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for time and material price proposals, with sufficient substantiating data to allow Engineer to evaluate the quotation.

B. On request provide additional data to support time and cost computations:

1. Labor required.

2. Equipment required.

3. Products required.

    a. Recommended sources of purchase and unit cost.

    b. Quantities required.

4. Taxes, insurance and bonds.

5. Credit for work deleted from Contract, similarly documented.

6. Overhead and profit.

7. Justification for any change in Contract Time.

C. Support each claim for additional costs, and for work done on a time-and-material basis, with documentation as required, with additional information:

1. Name of Owner's authorized agent who ordered the work, and date of the order.

2. Dates and times work was performed, and by whom.

3. Time record, summary of hours worked, and hourly rates paid.

4. Receipts and invoices for:

    a. Equipment used, listing dates and times of use.

    b. Products used, listing of quantities.

    c. Subcontractors.

D. Document requests for substitutions for Products as specified in Section 01630.

1.07 PREPARATION OF CHANGE ORDERS

A. Engineer will prepare each Change Order.

B. Owner's Form, per example provided by the Engineer.

C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

D. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contact Time.

1.8 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

A. Engineer and Owner will issue a Construction Change Authorization directing Contractor to proceed with the changes.

B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.

C. Engineer will determine the allowable cost of such work, as provided in General Conditions.

D. Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.

E. Owner and Contractor will sign and date the Change Order to indicate their agreement therewith.

1.9 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time.

1. Revise subschedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01250

MEASUREMENT AND PAYMENT

PART 1- GENERAL

1.01 DESCRIPTION

A. This section describes the method used to determine quantities of Work performed or materials supplied for which a price is given in the Bid. It establishes the basis upon which payment will be made for Payment Items.

B. Subject to the provisions in General Conditions, all Work and payment for the Work is represented by Payment Items and associated unit prices.

1.02 PAYMENT

A. Subject to all other contract requirements, the Contractor shall be paid for "as-built" quantities of Work for which a price is given in the bid.

B. Quantities on the Bid Form are for comparison in competitive bidding only and do not constitute the basis for payment or measurement of quantities.

C. Quantities on the Bid Form are estimated and may be increased or decreased without limit.

D. No separate payment will be made for one Payment Item as Work incidentally required to complete the Work of another.

E. Payment for Work performed shall be made in accordance with the unit prices in the Bid. Retainage shall apply to all Contractor payments prior to final acceptance.

1.03 MEASUREMENT FOR PAYMENT

A. Methods of Measurement:

1. Measurements of lengths, widths, slope angles, and depths or elevations shall be made to determine "as-built" quantities of lengths, areas and volumes pertinent to Payment Items.

a. Unless otherwise specified, all lengths shall be horizontal distances.

b. Slope angles and elevations shall be measured using land surveying equipment.

2. Graphic representations of measured quantities shall be drafted to scale using the Drawings where convenient and appropriate. Additional drawings shall be drafted if required.

a. Irregular shapes representing areas and volumes shall be measured using a compensating polar planimeter or a computer digitizer.

b. Regular shapes shall be scaled.

3. Use of Drawings:

a. Unless otherwise agreed upon between the Contractor and Owner, the Drawings shall be used as the basis to establish existing grades and other existing topographic features.

B. Payment limits where Payment Lines are not shown on the Drawings:

1. Pipe Length: Measurement of pipe shall be made along the top of pipe, excluding fittings, valves and manholes, in place, taken as the laying length.

2. Except as specified otherwise, measurements of Payment Item quantities of weights, lengths, areas and volumes shall be made:

a. On "as-built" and in-place completed Work, during construction or at the time of Substantial Completion.

b. If no other feasible and practical methods of measurements are available, by delivery slips delivered to the Engineer.

3. Adjustments shall be made to eliminate overlaps in area and volume measurements.

1.04 PAYMENT ITEMS

A. Separate payment will be made for the Unit Price and Lump Sum items listed on the Bid Form. Related work not specifically listed or identified below in 1.04 B and C, but evidently necessary for satisfactory completion of the Item shall be considered to be included.

B. No separate payment will be made for the following Work, and its cost shall be included in the Bid Price of the Payment Item to which it is associated:

1. Trench excavation, sheeting, shoring and bracing.
2. De-watering, erosion and sedimentation control, and turbidity screening.
3. Removal, replacement and restoration of culverts and storm sewer pipe crossings of driveways and roads.

4. Cleanup.
5. Testing, including all materials and equipment.
6. Maintenance of utility service.
7. Appurtenant work.
8. Record Drawings.
9. Field Office.
10. Saw cutting.
11. Coordination with other contractors.
12. Layout of the work.
13. Notifications to property owners of construction schedule and service interruptions.
14. Restoration and Sodding

C. Measurement and Payment Items as listed in the Bid Schedule:

1. Mobilization/Demobilization (Bid Item No. 1)

Preparatory Work and operations in mobilizing for beginning work on the Project and demobilizing for ending work on the Project. The establishment of field offices, buildings, safety equipment, first aid supplies, sanitary and other facilities, as required by these Specifications, State and local laws and any other preconstruction expense necessary for the state of the Work; the cost of field engineering, including permits and fees, construction schedules, shop drawings, temporary facilities, lay down storage area, construction aids, reviews and inspection, re-inspection and any rework resulting from same, cleaning, contractor red-lined drawings, operating and maintenance data. The Contractor shall submit invoices substantiating the cost of mobilization with each pay request. Payment for mobilization / demobilization shall be as follows: 75% shall be paid at the time of first invoice after the Contractor has mobilized to the site and established field operations. The remaining 25% shall be paid at the completion of the project when the contractor has properly demobilized, cleaned the site, and completed all restoration.

2. General Requirements (Bid Item No. 2)

a. Measurement of various items for General Requirements will not be made for payment and all items shall be included in the appropriate lump sum prices throughout the bid schedule.

b. Payment for General Requirements shall include Insurance requirements costs, the costs of all bonds, and all administrative costs associated with acquiring and maintaining the necessary coverage as described in the Contract Documents.

3. Yard Piping (Bid Item No. 3)

a. Measurement for various items covered under Yard Piping will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for Yard Piping will be made at the Contract lump sum price for the item, which price and payment shall be full compensation for all labor, materials, equipment services, testing, backfill, compaction, site restoration, cleaning, and transportation and appropriate disposal of all items not retained by the County. This includes but is not limited to: cutting the wye into the existing discharge line, all underground 12-inch pipe up to and including the 90-degree bends beneath the above ground assembly, removing and replacing the gate valve on the suction line, cutting the tee into the suction line, coordinating the shutdown and draining of the ground storage tank, pressure testing, and disinfection. Payment will be based on percentage of work complete during the pay period at time of pay application to the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item amount.

4. MOV Assembly (Bid Item No. 4)

a. Measurement for various items covered under MOV Assembly will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for MOV Assembly shall be made at the Contract lump sum price, which price and payment shall be full compensation for all labor, materials, tools, and equipment services required. This includes but is not limited to: all the 12-inch pipe between the below ground 90-degree bends, gate valves, actuator, pressure gauge, fittings, pipe supports, formwork, cast-in-place concrete, paints and coatings, and disinfection and pressure testing. Payment will be based on percentage of work complete during the pay period at time of pay application to the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item amount.

5. Electrical Improvements (Bid Item No. 5)

a. Measurement for various items covered under Electrical Improvements will not be made for payment, and all items shall be included in the lump sum price.

b. Payment for Miscellaneous Electrical Improvements will be made at the Contract lump sum price for this items, which price and payment shall be full compensation for all labor, materials, tools, and equipment. This

includes but is not limited to: trenching, conduit, conductors, grounding rods, final connection to existing panel and actuator. Payment will be based on percentage of work completed during the pay period at time of pay application the nearest 10% complete. The cumulative total shall not exceed the Lump Sum Bid Pay Item amount.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Promptly after award of the Contract, prepare and submit to Engineer estimated construction progress schedules for the Work, with subschedules of related activities which are essential to it progress.

B. Submit revised progress schedules to maintain proposed schedule within 30 days of work in place.

1.02 RELATED REQUIREMENTS

A. Section 01010: Summary of Work.

B. Section 01041: Project Coordination.

C. Section 01200: Project Meetings.

D. Section 01340: Shop Drawings, Product Data and Samples.

1.03 FORM OF SCHEDULES

A. Prepare schedules in the form of:

1. Gant Chart.

2. Network Analysis System.

3. Other Method Accepted by Engineer.

B. Format of Listings: The chronological order of the start of each item of work.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning, and completion of each major element of construction. Specifically list:

    a. Site work.

    b. Site utilities.

    c. Subcontractor work.

    d. Equipment installations.

    e. Operating and Maintenance Data.

    f. Start-up.

B. Submittals, Schedule for Shop Drawings, Product Data and Samples. Show:

    1. The dates for Contractor's submittals.

    2. The dates reviewed submittals will be required from the Engineer.

    3. Provide subschedules to define critical portions of prime schedules.

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

    1. Major change in scope.

    2. Activities modified since previous submission.

    3. Revised projections of progress and completion.

    4. Other identifiable changes.

C. Provide a narrative report as needed to define:

    1. Problem areas, anticipated delays, and the impact on the schedule.

    2. Corrective action recommended, and its effect.

    3. The effect of changes on schedules of other prime contractors.

1.06 SUBMISSIONS

A. Submit initial schedules within 10 days after the effective date of the Agreement.

1. Engineer will review schedules and return review copy within 10 days after receipt.

2. If required, resubmit within seven days after return of review copy.

B. With each application for payment, submit progress schedule if revised since last payment request.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Engineer – Two (2) copies

2. Owner – Two (2) copies

3. Job site file.

4. Subcontractors.

5. Other concerned parties.

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Contractor shall submit to the Engineer for review and approval, such Shop Drawings, Test Reports and Product Data on materials and equipment (hereinafter in this Section called Data), and material samples (hereinafter in this Section called Samples) as are required for the proper control of work, including but not limited to those Shop Drawings, Data and Samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.

2. Within fourteen (14) calendar days after the Notice to Proceed date, 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. Review of this list by the Engineer shall in no way expressed or implied 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 Drawings. The Contractor shall include Shop Drawing review time on the Project schedule (see section 01310).

3. 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:

a. Submittal-Description and Number assigned.

b. Date to Engineer.

c. Date returned to Contractor.

d. Status of Submittal (Approved as Noted, Rejected/Re-submit).

e. Date of Resubmittal and Return (as applicable).

f. Date material release for fabrication.

g. Projected date of fabrication.

h. Projected date of delivery to site.

i. Status of O&M manuals submittal.

j. Specification Section.

k. Drawings Sheet Number.

B. Related Requirements Described Elsewhere:

1. General Conditions.

2. Progress Schedules: Section 01310.

3. Material and Equipment: Section 01600.

4. Project Record Documents: Section 01720.

1.02 CONTRACTOR'S RESPONSIBILITY

A. The Contractor shall furnish the Engineer a schedule of Shop Drawings submittals fixing the respective dates for the submission of Shop 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.

B. The Contractor shall not begin any of the work covered by a Shop 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 approval.

C. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for checking and appropriate action from the time the Engineer receives them.

D. All submittals shall be accompanied with a transmittal letter prepared in duplicate containing the following information:

1. Date.

2. Project Title and Number.

3. Contractor's name and address.

4. The number of each Shop Drawings, Project Data, and Sample submitted.

5. Notification of Deviations from Contract Documents.

    a. The Contractor shall indicate in **bold type** at the top of the cover sheet of submittal of Shop Drawing if there is a deviation from Contract Drawings, Project Specifications and referenced specifications or codes.

    b. The Contractor shall also list any deviations from Contract Drawings, Project Specifications and referenced specifications or codes and identify in "green" ink prominently on the drawings.

6. Submittal Log Number conforming to Specification Log Number.

E. The Contractor shall submit all shop drawings in electronic format. Shop drawings which require the signature and seal of a registered professional shall be submitted in hard copy format. In addition to electronic submittals, the contractor may be required to submit additional hard copies of all submittals upon request from the Owner or the Engineer.

F. The Contractor shall be responsible for and bear all costs 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 the Engineer of the necessary Shop Drawings.

G. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping equipment, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposed to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of drawings and specifications.

H. The Contractor shall not use Shop Drawings as means of proposing alternate items to demonstrate compliance to Contract requirements. **Alternate items must be submitted during the bidding process.**

I. Each submittal will bear a stamp indicating that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractors review and approval of that submittal.

J. Drawings and schedules shall be checked and coordinated with the work of all trades and sub-contractors 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.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of Shop Drawings, Data and Samples as submitted by the Contractor, will be to determine if the items(s) conform to the information in the Contract Documents and are compatible with the design concept. The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.

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 and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. "Approved As Noted" - Contractor shall incorporate Engineer's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the Engineer acknowledging the comments and their incorporation into the Shop Drawing.

E. "Amend And Resubmit" - Contractor shall resubmit the Shop Drawing to the Engineer. The resubmittal shall incorporate the Engineer's comments highlighted on the Shop Drawing.

F. "Rejected" - Contractor shall resubmit Shop Drawing for review by Engineer.

G. 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.

H. 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.

I. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items for:

1. Systems.

2. Processes.

3. As indicated in specific Specifications Sections.

All drawings, schematics, manufacturer's product Data, certifications and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface checking.

K. Only the Engineer shall utilize the color "red" in marking Shop Drawing submittals.

1.04 SHOP DRAWINGS

A. Shop Drawings shall be complete and detailed and 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 information. As used herein, the term "manufactured" applies to standard units usually mass-produced; and "fabricated" means items specifically assembled or made out of selected materials to meet individual design requirements.

B. Manufacturer's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data shall be clearly marked to identify pertinent materials, product or models. Delete information which is not applicable to the Work by striking or cross-hatching.

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. Project Title and Number.

2. Name of Project building or structure.

3. Number and title of the Shop Drawing.

4. Date of Shop Drawing or revision.

5. Name of contractor and subcontractor submitting drawing.

6. Supplier/manufacturer.

7. Separate details when pertinent.

8. Specification title and number.

9. Specification section.

10. Application Contract Drawing Number.

D. 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.

E. 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.

1.05 WORKING DRAWINGS

A. When used in the Contract Documents, the term "Working Drawings" shall be considered to mean the Contractor's plan for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water 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. Working Drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida.

1.06 SAMPLES

A. The Contractor shall furnish, for the approval 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 approved 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 (2) samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of Project.

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 marking 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 Paragraph 1.06B. above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

E. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the Work. Approved 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 approved Samples. Samples which failed testing or were not approved 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 01370

SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. As the first shop drawing submittal, submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within ten days after award of contract.

B. Upon the request of the Engineer, support the values with data which will substantiate their correctness.

C. The Schedule of Values, unless objected to by the Engineer, shall be exclusively used as the basis for the Contractor's Applications for Payment.

1.02 RELATED REQUIREMENTS

A. Section 01152: Application for Payment.

B. Section 01600: Material and Equipment.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11-inch white paper; Contractor's standard forms and automated printout will be considered for approval by Engineer upon Contractors request. Identify schedule with:

1. Title of Project, location and (City, County, Owner) Project Number.

2. Engineer and Engineer's Project Number.

3. Name and Address of Contractor.

4. Date of Submission.

B. Schedule shall list the installed value of the component parts of the Work, in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Follow the table of contents of these Specifications as the format for listing component items.

1. Identify each line item with the number and title of the respective major section of the specifications.

D. For each major line item list sub-values of:

1. Major products or operations under the item.

2. Contract conditions, such as: bonds, insurance premiums, job mobilization, construction facilities and temporary controls.

E. For the various portions of the Work:

1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:

a. The cost of the materials, delivered and unloaded, with taxes paid.

b. The total installed value.

F. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a subschedule of unit costs and quantities for:

1. Products specified under a unit cost.

2. Products on which progress payments will be requested for stored products.

B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.

C. The unit quantity for bulk materials shall include an allowance for normal waste.

D. The unit values for the materials shall be broken down into:

1. Cost of the material, delivered and unloaded at the site, with taxes paid.

2. Installation costs, including Contractor's overhead and profit.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the schedule of Values.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01505

MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

A. Mobilization shall include the obtaining of all permits; moving onto the site of all necessary equipment; furnishing and erecting temporary buildings and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the Work. Mobilization shall include the following principal items:

1. Mobilize to the site of all Contractor's equipment, personnel, supplies, and incidentals required for first month's operations.

2. Project sign in accordance with Section 01580, if required.

3. On-site sanitary facilities, safety equipment, and first aid supplies.

4. Arrange for Work and storage yard in accordance with Section 01550.

5. Mobilize full-time superintendent to the job site.

6. Detailed approved schedule in accordance with Section 01310.

7. Required submittals which allow the Contractor to commence Work.

8. All required permits, insurance, bonds and licenses to commence Work.

8. Post all OSHA, MSDS, SRF and NPDES required notices.

9. Safety Plan.

PART 2 -- PRODUCTS (Not Used)

PART 3 -- EXECUTION (Not Used)

END OF SECTION

SECTION 01540

HURRICANE PREPAREDNESS

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The Contractor is responsible for having plans for protection of the WORK site during hurricanes, and shall prepare and submit a Hurricane Preparedness Plan prior to any construction activity and mobilization.

B. The Hurricane Preparedness Plan shall be submitted to the Owner at the Preconstruction Meeting for approval and shall include the following:

1. Items and equipment that must be removed from the WORK site.

2. Methods and materials that will be utilized to secure the materials and WORK site.

3. Methods and materials that will be utilized to protect uncompleted WORK items.

4. Plan for maximizing traffic lanes for evacuation.

5. Items that must commence at the time of hurricane watch in order to be completed prior to evacuation.

C. When the National Weather Service issues a Hurricane Watch for Lee, Charlotte, or Collier County, the Contractor shall immediately implement the Hurricane Preparedness Plan.

D. The cost of preparing and implementing the Hurricane Preparedness Plan shall be the responsibility of the Contractor. Hurricane watch and warning will be grounds for contract time extensions.

E. When the National Weather Service issues a Hurricane Warning for Lee, Charlotte, or Collier County, the Contractor shall immediately take down and securely store all project signs. Signs shall be restored to the site prior to commencing construction activities.

F. The Contractor shall notify the Owner upon activation of the hurricane preparedness plan, when preparations are complete, when the job site is secure, and when the job site is shut down.

1.2 CONTRACTOR SUBMITTALS

A. Submittals of the Hurricane Preparedness Plan shall be in accordance with Section 01300 Contractor Submittals.

PART 2 –- PRODUCTS (NOT USED)

PART 3 –- EXECUTION (NOT USED)

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Products.

B. Workmanship.

C. Manufacturer's Instructions.

D. Transportation and Handling.

E. Storage and Protection.

1.02 RELATED REQUIREMENTS

A. Section 01010: Summary of Work.

B. Section 01090: Reference Standards.

C. Section 01340: Shop Drawings, Product Data and Samples.

D. Section 01700: Contract Closeout.

1.03 PRODUCTS

A. Products include material, equipment, and systems.

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

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

1.04 WORKMANSHIP

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

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

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

1.05 MANUFACTURER'S INSTRUCTIONS

A. When work is specified to comply with manufacturer's instructions, submit copies as specified in Section 01340, and distribute copies to persons involved, and maintain one set in field.

B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between Specifications and instructions, consult with the Engineer.

1.06 TRANSPORTATION AND HANDLING

A. Provide equipment and personnel necessary to handle products, including those provided by Owner, by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

1.07 STORAGE AND PROTECTION

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

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

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

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

E. After installation, provide coverings to protect Products from damage from traffic and construction operations. Remove when no longer needed.

F. During such periods of time that are designated by the United States Weather Bureau as being a hurricane warning or alert, construction materials or equipment shall be secured against displacement by wind and storm surge forces.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Comply with requirement stated in Conditions of the Contract and in specifications for administrative procedures in closing out the Work.

B. Related Requirements Described Elsewhere:

1. Cleaning: Section 01710

2. Project Record Documents: Section 01720

3. Warranties and Bonds: Section 01740.

1.02 SUBSTANTIAL COMPLETION

A. The Work will not be substantially complete, and Contractor may not request substantial completion inspection unless the following submittals and work is completed:

1. All Operation and Maintenance manuals have been submitted and approved.

2. All start-up and demonstration testing completed and Certificates of Completed Demonstration submitted.

3. Project Record Documents have been submitted and reviewed to the requirements of Section 01720.

4. All training of Owner's personnel completed.

5. All areas to be used and occupied are safe, operable in automatic and complete.

6. All deficiencies noted on inspection reports or nonconformances are corrected or the correction plan approved.

B. When the conditions of paragraph 1.02 A. are met the Contractor shall submit to the Engineer:

1. A written notice that he considers the Work, or portion thereof, is substantially complete, and requests an inspection.

2. A punchlist of items to be corrected with a completion schedule.

C. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.

D. Should the Engineer determine that the Work is not substantially complete:

1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefor.

2. Contractor shall remedy the deficiencies in the Work and send another written notice of substantial completion to the Engineer.

E. When the Engineer finds that the Work is substantially complete, he will:

1. Schedule a walk-through of the facility to include the Owner, Engineer to determine the completeness of the punchlist and readiness of the facility for occupancy.

2. Prepare and deliver to Owner a tentative Certificate of Substantial Completion with the tentative punchlist of items to be completed or corrected before final inspection.

3. After consideration of any objections made by the Owner, and when the Engineer considers the Work substantially complete, he will execute and deliver to the Owner and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected. Any incomplete work allowed on a punchlist must be reinspected upon completion and any deficiencies found will be added to the punchlist.

1.03 FINAL INSPECTION

A. Prior to Contractors request for a final inspection the following submittals and work must be complete:

1. Project Record Documents must be approved.

2. All spare parts must be suitably delivered.

3. Contractor to submit evidence of compliance with requirements of governing authorities.

B. After satisfying the requirements of paragraph 1.03 A. and when Contractor considers the Work complete, he shall submit written certification that:

1. Contract Documents have been reviewed.

2. Work has been inspected for compliance with Contract Documents.

3. Equipment and systems have been tested in the presence of the Owner's representative and are operational.

4. All punchlist items have been corrected.

C. The Engineer will, within reasonable time, make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

D. Should the Engineer consider that the Work is incomplete or defective:

1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.

2. Contractor shall take immediate steps to remedy the stated deficiencies, and send another written certification to the Engineer that the Work is complete.

3. The Engineer will, within a reasonable amount of time, reinspect the Work and the Contractor shall be liable for reinspection fees as described in paragraph 1.04, herein.

E. When the Engineer finds that the Work is acceptable under the Contract Documents, the Contractor may make closeout submittals.

1.04 REINSPECTION FEES

A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:

1. Contractor will compensate the Owner for such additional services.

2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS

A. Warranties and Bonds: To requirements of Section 01740.

B. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

C. Certificate of Insurance for Products and Completed Operations.

1.06 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous change orders or written amendment.

b. Allowances.

c. Unit prices.

d. Deductions for uncorrected work.

e. Deductions for liquidated damages.

f. Other adjustments.

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Engineer will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Execute cleaning, during progress of the Work and at completion of the Work.

1.02 DISPOSAL REQUIREMENTS

A. 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 daily cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations or personal activities.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site as needed 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 paint 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. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior and exterior surfaces.

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 DESCRIPTION

A. Scope of Work: Maintain, for the Engineer, one (l) record copy of:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications of 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.

B. Related Requirements Described Elsewhere:

1. Shop Drawings, Working Drawings and Samples: Section 01340.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples 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 with section numbers as provided herein.

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.

E. As a prerequisite for monthly Progress payments, the Contractor is to exhibit the currently updated “Record Documents” for review by the Engineer.

1.03 MARKING DEVICES

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

1.02 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 of 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): Provide five (5) sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

1.04 SUBMITTAL

A. At Contract closeout, deliver Record Documents to the Engineer for the Owner.

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.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Compile specified warranties and bonds as specified in these Specifications.

B. Related Work Described Elsewhere:

1. Contract Closeout: Section 01700.

1.02 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 (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product of 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 or warranty or bond.

7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8 1/2 inches by 11 inches, punched sheets for standard three (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 (3) D-ring type binders with durable and cleanable white plastic covers and maximum D-ring width of two (2) inches. Binders shall be presentation type with clear vinyl covers on front, back, and spine. Binders shall include two sheet lifters and two horizontal inside pockets.

1.04 WARRANTY SUBMITTALS REQUIREMENTS

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Divisions 11: Equipment; 13: Special Construction; 15: Mechanical; and 16: Electrical and which has at least a 1 hp motor or which lists for more than $1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide a one (1) year warranty commencing at the start of the Correction Period, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two (2) year warranty from the manufacturer shall not relieve the Contractor of the one (1) year warranty, starting at the time of Owner's acceptance of the equipment.

D. The Owner shall incur no labor or equipment cost during the guarantee period.

E. Guarantee shall cover all necessary labor, equipment, materials, and replacement parts resulting from faulty or inadequate equipment design, improper assembly or erection,

defective workmanship and materials, leakage, breakage or other failure of all equipment and components furnished by the manufacturer or the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02140

DEWATERING

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide all labor, materials, and equipment necessary to dewater trench and structure excavations, in accordance with the requirements of the contract Documents. The Contractor shall secure all necessary permits to complete the requirements of this Section of the Specifications.

1.2 QUALITY CONTROL

A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

C. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement, which may develop. The responsibility for conducting the dewatering operation in a manner, which will protect adjacent structures and facilities, rests solely with the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor.

D. All dewatering shall comply with the regulations of the South Florida Water Management District and any other agency with jurisdiction.

PART 2 -- PRODUCTS

2.1 EQUIPMENT

A. Dewatering may include the use of well points, deep wells, and temporary pipelines for water disposal. The temporary pipelines shall not be used as permanent piping for the WORK. Standby pumping equipment shall be maintained on the jobsite.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Contractor shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment.

Adequate standby equipment shall be kept available at all times to assure efficient dewatering and maintenance of dewatering operation during power and or mechanical failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with crushed rock meeting FDOT Specification No.57 gradation requirements.

F. The Contractor shall maintain the water level one-foot below the bottom of excavation in all work areas where groundwater occurs during excavation, construction, backfilling, and testing.

G. The Contractor shall prevent flotation by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible and liable for all damages, which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation. IMMEDIATELY UPON WITHDRAWAL OF WELL POINTS, THE Contractor SHALL BACKFILL THE HOLE WITH CLEAN SAND, BEDDING ROCK MEETING FDOT No. 89 GRADATION REQUIREMENTS OR EQUAL.

I. The Contractor shall dispose of water from the WORK in a suitable manner without damage to adjacent property. The Contractor shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction unless hydraulic compaction is employed as their means of compaction and with prior approval of the Owner. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system.

J. The reestablishment of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Contractor shall provide sound attenuating structures for the above ground pumps as required and directed by the Owner.

- END OF SECTION -

SECTION 02150

TRENCH SAFETY

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide Trench Safety in accordance with the Florida Trench Safety Act to ensure worker safety at the construction site. The Contractor shall be responsible for the implementation and maintenance of trench safety standards.

1.2 SUBMITTALS

A. The Contractor shall prepare and submit a trench safety plan which shall include the means to be utilized and the conditions determining which type of trench safety standard(s) will be used during construction.

B. The trench safety plan shall include the names, positions, experience, and training information of “Competent Persons”, who shall assure the implementation of the measures and standards for complying with the Florida Trench Safety Act.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1. The Contractor shall provide Trench Safety measures as required and shall maintain the necessary supervision on site at all times to assure the Trench Safety requirements are being implemented on their project. The Contractor shall monitor his Subcontractors to assure they comply also with the Florida State Trench Safety Act.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall perform all earthwork indicated and required for construction of the work, complete and in place, in accordance with the Contract Documents. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform the work.

B. The Contractor shall examine the site, and review the results of subsurface investigations provided including soil borings, prior to commencing the work. In particular, the Contractor shall make a thorough investigation of the surface and subsurface conditions of the site and any special construction problems which may arise as a result of nearby water courses and flood plains, especially in areas where construction activities may encounter water bearing sands and gravels. The Contractor shall make his own investigations necessary to determine ground conditions at the project site.

C. Any damage caused by the Contractor's excavation, backfill, or compaction efforts will be the sole responsibility of the Contractor to repair, at no expense to the Owner.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. General: Materials for use as bedding and backfill, whether insitu or borrow, shall be as described herein. Fill, backfill, and embankment materials shall be suitable materials selected from the onsite operations or processed clean, fine earth, rock, or sand, free from grass, roots, brush, or other organic material.

B. Common Fill: Common fill material shall be non-cohesive and shall consist of mineral soil, substantially free of clay, organic material, loam, wood, trash and other objectionable material which may be compressible or which cannot be properly compacted. Common fill shall not contain stones larger than 6 inches in any dimension, asphalt, broken concrete, masonry, rubble or other similar materials. It shall have physical properties such that it can be readily spread and compacted during filling. Additionally, common fill shall be no more than 12 percent by weight finer than the No. 200 mesh sieve unless finer material is approved for use in a specific location by the Owner.

C. Select Common Fill: Select common fill material shall be as specified above from common fill, with the exception that the material shall contain no stones more than 1-1/2 inches in largest dimension, and shall be no more than 5 percent by weight finer than the No. 200 mesh sieve.

D. Bedding Rock: Bedding rock material used in pipe trench within pipe zone, under abutments, and under concrete structures shall be crushed stone or gravel meeting the gradation and durability requirements of FDOT No. 89 and FDOT No.57 stone, as indicated on the Contract Drawings. With written approval from the Owner, number 131 and 132 Screenings may be substituted for FDOT No. 89 and FDOT No. 57 stone.

E. Structural Fill: Materials for structural fill shall be bedding rock or select common fill as specified herein or suitable material as approved by the Owner.

F. Unsuitable Material: Materials deemed not suitable for use on the project by the Owner.

2.2 USE OF FILL, BACKFILL, AND BEDDING MATERIAL TYPES

A. Backfill and bedding material types shall be used as indicated in the Drawings.

B. Structural Fill shall be used as backfill against the exterior walls of structures, or as shown on the Contract Drawings.

PART 3 -- EXECUTION

3.1 EXCAVATION - GENERAL

A. General: Excavation shall include the removal of all existing soil materials encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the work. The removal of these materials shall conform to the lines and grades indicated in the Contract Drawings. Where indicated, the entire construction site shall be stripped of all vegetation and debris, and such material shall be removed from the site prior to performing any excavation or placing any fill. Excavations shall be sloped or otherwise supported in a safe manner in accordance with the Florida Trench Safety Act and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926). The Contractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations.

B. Sheeting and Bracing:

1. Furnish, put in place, and maintain sheeting and bracing as required to support the sides of excavations, to prevent movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other approved methods. If the Owner is of the opinion that sufficient or proper supports have not been provided, the Owner may order additional supports be installed at the expense of the Contractor, and 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 besides the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the Owner.

2. The Contractor shall construct sheeting outside the neat lines of the foundation unless another configuration is desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall withstand all pressure to which the structure or trench will be subjected. Any deformation shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.

3. Where sheeting and bracing is required for construction, the Contractor shall engage a Professional Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall conform to the design, and certification of this shall be provided by the Professional Geotechnical Engineer. The Owner reserves the right to require sheeting and bracing where it is deemed necessary, at the sole discretion of the Owner.

4. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.

5. The Contractor shall leave in place to be embedded in the backfill, all sheeting and bracing not shown on the Drawings but which the Owner directs him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Owner may direct that timber used for sheeting and bracing be cut off at any specified elevation.

6. 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. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted for that purpose, or otherwise directed by the Owner.

7. The right of the Owner 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.

8. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than one (1) foot above the top of any pipe.

C. Pumping and Drainage

1. All dewatering activities shall be in accordance with specification 02140, when appllicable.

2. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures 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 levels as stipulated in Section 02140. The Contractor shall submit to the Engineer for review a plan for dewatering systems prior to commencing work. The installed dewatering system shall be in conformity with the overall construction plan. The Contractor shall be required to monitor the performance of the dewatering systems during the progress of the work and require such modifications as may be required to assure that the systems are performing satisfactorily.

3. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the bottom of the excavation and to preserve the integrity of adjacent structures. Well or sump installations shall be constructed with proper sand filters to prevent intermixing of finer grained soil from the surrounding ground.

4. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.

4. The Contractor shall take all additional precautions to prevent buoyant uplift of any structure during construction.

6. The conveying of dewatered liquids in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. The Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Owner or the authority having jurisdiction, at no cost to the Owner.

7. Flotation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.

8. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system, shall be removed by the Contractor.

9. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater quality.

3.2 PIPELINE AND UTILITY TRENCH EXCAVATION

A. General: Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches as indicated in the Contract Drawings.

B. Trench Bottom: The bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.

C. Open Trench: The maximum amount of open trench permitted in any one location shall be 500 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater. For open trenches greater than 500 feet in length, pre-approval from the Owner must be obtained. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. If steel plates are used, no more than 40 feet in length along the trench will be allowed. The above requirements for backfilling or use of steel plate will be waived in cases where the trench is located more than 100 feet from any traveled roadway or occupied structure. In such cases, however, barricades, orange safety fences, and warning lights meeting safety requirements shall be provided and maintained.

D. Over-Excavation: Where trenches or excavations are required to be over-excavated to remove unsuitable materials, the excavation shall be to the minimum depth required to remove the unsuitable material, and shall be backfilled with common fill to the grade of the bottom of the pipe bedding as indicated in the Contract Drawings. Classification of the material as unsuitable shall be made by a Owner approved testing laboratory based on test results and or inspection of the material in the excavation at the time of construction.

E. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

3.3 ROCK EXCAVATION

A. Rock excavation shall include removal and disposal of the following:

1. All boulders and rock, which require breaking by the use of special equipment or extraordinary excavation methods (may include hammers, wrecking balls, rock trenchers, drills, or other approved equipment).

2. All rock material in ledges, bedding deposits, and unstratified or conglomerate masses which cannot be removed using normal excavation methods and equipment.

B. Rock excavation shall be performed by the Contractor. The cost for removal and disposal shall be included in the Contractor's Bid Price

C. Blasting will not be permitted without prior written authorization of the Owner.

3.4 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. The Contractor shall remove and dispose of all excess excavated material not suitable or required for use on the project at a site selected and obtained by the Contractor at his own expense. The removal shall be timely and the disposal of all excess excavated materials shall be performed at least once a month.

B. Backfill replacement for unsuitable materials shall be provided from excess common fill available from on-site stockpiles. Refer also to Section 02100 – Site Preparation.

C. The Contractor shall obtain all required permits, landowner, and agency approvals for disposal of excess excavated material and shall pay all costs associated with the removal and disposal.

D. Depositing clean fill on private property will not be permitted unless the property owner possesses a current building permit that requires fill. Contractors shall provide proof of said permit to the Engineer for review and approval prior to placing clean fill on the permitted property.

3.6 BACKFILL - GENERAL

A. The Contractor shall examine the areas and conditions under which excavating, filling and grading are to be performed, and shall not proceed with the work until unsatisfactory conditions have been corrected. The Contractor shall examine existing grade prior to commencement of the work and report to the Owner if elevations of existing grade vary from elevations shown on the Drawings.

B. The Contractor shall employ a qualified testing laboratory for all testing required. The Contractor shall notify the Owner a minimum of 48 hours in advance of any scheduled testing.

C. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength (minimum of 75% of the 28-day design strength) to support the loads imposed.

D. Except for rock bedding materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

E. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally, The Contractor shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

F. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have all loose sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

G. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the Drawings. No soft spots or uncompacted areas will be allowed in the work.

H. Backfill shall be compacted to 98 percent of maximum density (AASHTO T-180) under structures and paved areas, and 95 percent of maximum density (ASSHTO T-180) elsewhere unless otherwise indicated on the drawings.

3.7 PLACING AND SPREADING OF BACKFILL MATERIALS

A. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted, each layer shall not exceed 6 inches in thickness. Thicker lifts of backfill may be permitted when the Contractor has satisfactorily demonstrated that proper compaction has been achieved with the methods and materials in use. The use of thicker lifts will be at the sole discretion of the Owner.

B. The use of flooding and jetting methods to achieve compaction may be permitted upon approval. The Contractor shall submit methods documenting procedures to be utilized for approval to the Engineer and for the Owner for final approval.

C. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer. Backfill around pipes shall be manually spread around the pipe so that when compacted the backfill will provide uniform bearing and side support.

D. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved.

E. Where the backfill material moisture content is too high to permit the specified degree of compaction the material shall be dried until the moisture content is satisfactory.

1. Backfilling shall be carried up evenly on all walls of an individual structure. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength (minimum of 75% of the 28-day design strength).

2. Bedding rock shall be used for bedding under all structures and pipe as indicated on the Drawings. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of the bedding.

3. In locations where pipes pass through structure walls, Structural Fill shall be placed for a distance of not less than 3 feet either side of the vertical center line of the pipe and the Contractor shall make special efforts to consolidate the fill up to the horizontal centerline of the pipe.

3.8 COMPACTION OF FILL, BACKFILL, AND BEDDING MATERIALS

A. Any damage caused by the Contractor’s compaction efforts will be the sole responsibility of the Contractor to repair, at no expense to the Owner.

B. Each layer of backfill materials shall be compacted to the density indicated on the Drawings. A compacted effort approved by the Owner shall be employed to compact backfill layers before the water table is reestablished. Equipment that is consistently capable of

achieving the required degree of compaction shall be used and each layer shall be compacted over its entire area while the material is at the required moisture content.

C. Hydraulic compaction will be an acceptable alternative under certain soil conditions. Contractor shall submit methods to the Owner for approval.

D. Flooding, ponding, or jetting shall not be used for backfill around structures, for final backfill materials, or aggregate base materials without written authorization of the Owner.

E. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.

3.9 PIPE AND UTILITY TRENCH BACKFILL

A. Backfilling over and around pipes shall begin as soon as practical after the pipe has been laid, jointed and inspected.

B. After compacting the bedding the Contractor shall perform a final trim using a stringline or other method for establishing grade, such that each pipe section when laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells shall be made as required.

C. Bedding and backfill under, around and over pipes shall be compacted using light, hand operated, vibratory compactors and rollers. After completion of at least two feet of compacted backfill over the top of pipeline, heavier compaction equipment may be used to complete the trench backfill.

D. If a moveable trench shield is used during backfill operations the shield shall be lifted so as to not displace the pipe or backfill while the shield is being moved.

E. See Collier County technical specifications for requirements on locating wire and early warning detection tape.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Slabs-on-grade.

B. Related Sections:

1. Section 02200: Earthwork for drainage fill under slabs-on-grade.

1.03 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

2. Water/cement ratio (total gallons of water per cubic yard).

3. Brand, type, and quantity of cement.

4. Type and quantity of aggregates.

5. Type and quantity of admixtures.

6. Type, composition, and quantity of fly ash, slag (GGBFS), or silica fume.

7. Unit weight (wet density).

8. Composition strength based on 28-day compression test.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer manufacturer testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.07 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.08 PROJECT CONDITIONS

A. Protect adjacent finish materials against spatter during concrete placement.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.

2. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

C. Deformed-Steel Wire: ASTM A 496/A 496M.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150 Type II.

2. Use one brand of cement throughout Project, unless otherwise acceptable to Engineer.

B. Fly Ash: ASTM C 618, Type C or Type F (corrosive environments) with loss on ignition not more than 6 percent.

C. Ground Granulated Blast-Furnace Slag: ASTM C 989.

D. Silica Fume: ASTM C 1240, amorphous silica.

E. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

F. Water: ASTM C 94/C 94M.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixes for each concrete class and strength by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use independent testing facilities acceptable to Engineer for preparing and reporting proposed mix designs. Testing facility shall not be identical to that used for field quality control testing.

B. Fly ash shall be used to partially supplant cement content in Class A and Class S concrete, unless noted otherwise, and is optional in other classes. Replacement quantity of cement content by weight shall be not less than 15 percent for Class A and Class S concrete or more than 25 percent for all classes except Class F.

C. For concrete Class A and Class S, concrete mix design with fly ash and silica fume shall be maximum 30 percent of cement content by weight, and shall constitute no more than 20 and 10 percent, respectively, of the total weight of cementitious materials.

D. For concrete, Class S, use Portland cement Type II with fly ash, Type F.

E. Ground granulated blast furnace slag (GGBFS) shall only be permitted for mass concrete placement and as approved by Engineer. Replacement quantity of cement content weight shall not be less than 35 percent or more than 50 percent.

F. Coarse aggregate shall be 1-1/2” top size, except for Class G concrete which shall be 3/8” top size.

G. Design mixes to provide normal weight concrete for following classes and properties:

1. Locations for concrete classes are as follows:

   a. Class B Sidewalks and manhole bases (unless otherwise indicated on Drawings).

2. Properties for concrete classes are as follows:

Concrete Class		**B**
28-Day* Compressive Strength (f'c), psi		3,000
Cement Content per cubic yard of concrete, sacks minimum **		5
Water/Cement Ratio by weight, max.		0.58
Air Content, percent by volume		2±1.5
Slump at point of placement, inches.	WR***	3-5
	MRWR	NA
	HRWR****	NA
Monofilament Polypropylene, Type F1		NA

* 7-day compressive strength for high-early-strength concrete. 56-day compressive strength for mass concrete with ground granulated blast furnace slag.
** For concrete with fly ash, values are total of cement plus fly ash (except Class F concrete).
*** Slump prior to the addition of mid-range or high-range water reducers.
**** High range water-reducing admixture shall be used for all concrete walls.

3. Adjustment of Concrete Mixes: Mix designs may be adjusted when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, when approved by Engineer, at no additional cost to Owner. Submit laboratory test data for revised mix design and strength results to Engineer before using in work.

4. Admixtures:

   a. Use water-reducing admixture or high range water-reducing admixture (superplasticizer) in concrete for placement and workability.

   b. Use nonchloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 degrees F (10 degrees C).

   c. Add air-entraining admixture at manufacturer's prescribed rate to result in placed concrete having total air content specified.

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

B. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.

2. Class B, 1/4 inch (6 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.

2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 REMOVING AND REUSING FORMS

A. Vertical Forms not supporting concrete weight may be removed when concrete has sufficiently set to resist damage from removal operation.

B. Other forms shall be left in place until concrete has attained strength to support its own weight and construction live loads, unless removed in sections, and each structural section immediately reshored.

C. Time Periods: Forms remain in place as shown in table below. If form removal occurs before time shown in the table, apply curing procedures previously specified.

Minimum Time Forms are to Remain in Place:

	Average Air Temperature* During Period	
Part of Structure	40 - 50 degrees F	50 degrees F
Walls, columns and sides of beam (hours)	72	24
Bottom forms for slabs, beams arches not reshored (days)	12	7
Bottom forms for slabs, beams and arches if reshored (days)	7	4

* Air temperature near form.

D. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

E. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.03 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, reinforcing steel, waterstop installation, and other embedded or cast-in items.

1. Notify other crafts to permit installation of their work.

2. Cooperate with other trades in setting their work.

3. Moisten wood forms immediately before placing concrete where form coatings are not used.

4. Apply temporary protective covering to lower 2 feet of finished walls where adjacent floor slabs are poured to guard against spattering during slab placement.

B. Comply with ACI 304R and as specified in this Section.

C. Discharge Concrete at Site within 1-1/2 hours after cement is added to water or aggregates. When air temperature exceeds 85 degrees F, the discharge time shall be less than 45 minutes. The 45-minute requirement may be waived with the use of a water reducing, retarding admixture and approval of Engineer.

D. Provide trip ticket in duplicate for each ready-mixed concrete load delivered, stating truck number, Project name, Contractor and producer, batching time, total yards of concrete and material contained therein. Show ticket to Engineer upon request. Fill in concrete discharge time and turn over to Engineer trip ticket copies at end of each day.

E. Deposit concrete continuously or in layers so that no concrete is placed on concrete which has hardened sufficiently to cause seams or planes of weakness. If section cannot be placed continuously, provide construction joints as specified. Deposit concrete as nearly as practical to its final location to avoid segregation.

F. When depositing by chute, provide equipment of size and design to ensure continuously flowing concrete. Provide discharge end of chute with baffle plate to prevent segregation. Position chute so that concrete need not flow more than 5 feet horizontally.

G. Do not drop concrete from chute end distances greater than 3 times the deposited layer thickness, nor more than 5 feet. Where distance from chute end to surface of concrete exceeds these distances, use spout and maintain lower end as near to deposit surface as practical. When operations are intermittent, discharge chutes into hoppers.

H. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24 inches to avoid inclined construction joints. Where placement involves several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Fill bottom of wall space with 2 to 4 inches of cement slurry immediately before depositing concrete in walls. Use cement slurry composed of 1 part Portland cement, 2 parts fine aggregate, and sufficient water (but not to exceed 0.45 parts) for 7-inch slump mixture.

2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for concrete consolidation in accordance with ACI recommended practices.

3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible machine effectiveness. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into concrete layers that have begun to set. At each insertion, limit duration to time necessary to consolidate concrete and complete reinforcement embedment and other embedded items without causing mix segregation. Keep vibrators away from waterstops to prevent displacement.

I. Placing Concrete Slabs: Deposit and consolidate concrete slabs in continuous operations between construction joints until panel or section placement is complete.

1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces before beginning finishing operations.

3. Maintain reinforcing in proper position during concrete placement operations.

4. Maintain waterstop in proper position during concrete placement operations.

5. Concrete Placement against Expanding Bentonite Waterstop. Direct concrete flow away from bentonite water stops. If flow cannot be away from bentonite, direct flow parallel to waterstop.

6. Moisten soil when depositing concrete directly on granular soil.

J. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

K. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 95 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

D. Nonslip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, ramps, and elsewhere as noted.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required finish with Engineer before application.

3.13 CONCRETE PROTECTING AND CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Start curing as soon as free water has disappeared from concrete surface after placing and finishing. Maintain curing as follows:

1. All concrete unless otherwise noted: 7 days.

2. High-early-strength concrete: 3 days.

3. Mass concrete with ground granulated blast furnace slag: 14 days.

C. Curing Methods: Cure concrete for water-retaining structures by moist curing. Cure concrete for other structures by curing compound, moist curing, moisture-retaining cover curing, or combinations thereof.

D. Provide Moist Curing by following methods:

1. Keep concrete surface continuously wet by covering with water.

2. Continuous water-fog spray.

3. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to cover concrete surfaces and edges, with 4 inches lap over adjacent absorptive covers.

E. Provide Moisture-Retaining Cover Curing as follows:

1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped 3 inches and sealed by waterproof tape or adhesive.

2. Immediately repair holes or tears during curing period using cover material and waterproof tape.

F. Provide Curing Compound as follows:

1. Apply specified curing compound to concrete slabs as soon as last finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain coating continuity and repair damage during curing period.

2. Transparent curing compound shall be used for structural concrete (Class A concrete). White curing compound shall be used for exterior pavements (Class P concrete) and sidewalks (Class B concrete).

3. Do not use membrane curing compounds on surfaces that are covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (ceramic or quarry

tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Engineer.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including beam undersides, supported slabs and other similar surfaces by moist curing with forms in place for full curing period. If form removal occurs before curing period is up, continue curing by methods specified above as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by application of appropriate curing method.

END OF SECTION

SECTION 15115

VALVE ACTUATORS, ELECTRIC

PART 1 - GENERAL

1.01 SECTION INCLUDES

Electric valve operators and appurtenances specified in this Section and shown on the Drawings.

1.02 SYSTEM DESCRIPTION

A. General: Furnish and install electric valve actuators as shown on the Drawings.

1.03 SUBMITTALS

A. General: As specified in:

1. This Section.

B. Submit the following prior to valve manufacture:

1. Outline of manufacturer's representative services.

C. Submit the following prior to valve installation:

1. Manufacturer's installation instructions.

2. Manufacturer's Operation and Maintenance Data.

1.04 QUALITY ASSURANCE

A. Testing: Test valve operators with valves.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Rotork

2.02 ELECTRIC ACTUATORS

A. Electric actuator shall include motor, power gearing, limit switches, torque switches, built-in controls, de-clutch, and auxiliary handwheel for manual operation. Electric actuator shall have grease-tight, NEMA rated, weatherproof housing.

B. Actuator shall be sized to operate valve from full open to full closed in not less than two seconds per inch of valve diameter, plus or minus 50%.

C. Size actuators to deliver not less than 1.5 times required torque based upon maximum dynamic flow conditions.

D. Actuator shall drive valve shaft through a worm gear operator and intermediate link. Power gearing shall consist of helical or spur type gears of alloy heat-treated steel. Worm gears shall be carbonized and hardened alloy steel and ground after heat treatment. Worm gear pinion shall be alloy bronze. Gearing shall be designed so that gear ratio can be field changed and gearing can be field repaired. Design gearing for 100% overload.

E. Provide handwheel on electric actuator. Handwheel shall provide manual operation of valve. Handwheel shall not rotate during electric operation, and motor shall not rotate during hand operation. De-clutching lever shall mechanically (not electrically) disconnect motor drive from gear train. Failure of motor gearing or a fused motor shall not prevent hand operation. Hand operation shall not require more than 80 pounds of pull on handwheel rim. Handwheel shall rotate counterclockwise to open valve, unless otherwise specified. An arrow with the word OPEN shall be cast on handwheel. Operation shall automatically return to electric drive position when motor is energized.

F. Provide mechanical-type valve position indicator. Valve position indicator shall show valve position at all times. Indicator shall be part of an intermediate gear head or electric motor actuator.

G. Actuator motors shall be reversible, squirrel cage induction type. Actuator motors shall be designed for 230Volts, three phase, 60 Hertz power supply. Motors shall be totally enclosed, non-ventilated, with NEMA Class B insulation and a maximum continuous temperature rating of 120° C (rise plus ambient). Leads from motor shall be brought to limit switch compartment without external piping or conduit box.

H. Actuators shall have integrally mounted, full-voltage NEMA rated, reversing starters.

I. Actuators shall be provided with space heaters in the switch compartment and strip heaters in the motor.

J. Provide two adjustable torque switches of the quick break type. Torque switches shall be responsive to excessive load encountered in either opening or closing direction. Furnish four fully adjustable, double pole, double throw limit switches in addition to switches required for built-in control. Torque and limit switches shall be rated 10 amp. at 120 VAC. Furnish switch compartments with case heater.

K. Provide 12 contactor limit switches and gearing as an integral part of the actuator. Limit switch gearing shall be intermittent type. Limit switch gearing shall be totally enclosed in its own gear case and grease lubricated. Limit switch gearing shall be bronze.

L. Provide limit switches for over-travel protection and four auxiliary SPDT limit switches, each rated at 8 amps, minimum. Switches shall be independently

adjustable over the full range of travel. Limit switches shall be wired to a terminal board for remote output.

M. Actuator shall respond to 3-wire control signals. The open signal shall be a pulse across the "open signal wire" and common wire. The close signal shall be a pulse across the "close signal wire" and the common wire. Latching circuits in the actuator shall cause the actuator to drive the valve to its limit of travel upon receipt of the pulse signal.

N. Provide actuator with LOCAL/OFF/REMOTE selector switch and push buttons for local control.

1. Local Control

a. When LOCAL/OFF/REMOTE selector switch is in the "LOCAL" position, valve shall be controlled by actuator push buttons.

b. Provide three push buttons for local manual operation. Push buttons shall be marked "OPEN", "STOP", and "CLOSE". Actuator shall drive valve to its limit of travel when "OPEN" or "CLOSE" push buttons are depressed. Actuator shall stop when the "STOP" push-button is depressed.

2. Off: When LOCAL/OFF/REMOTE selector switch is in the "OFF" position, actuator motor shall be off.

3. Remote Control

a. When LOCAL/OFF/REMOTE selector switch is in the "REMOTE" position, valve shall be controlled by signals from a remote source.

b. Provide interposing relays to interface with remote devices as shown on the Electrical Drawings and specified in Division 16.

O. Provide actuators with dry contact outputs indicating that the valve is in the "REMOTE" mode (available), and that the actuator is powered and not overloaded.

P. Provide indicating lights as follows:

1. Amber indicating light for "Power On".
2. Red indicating light for "Torque Overload".
3. Red indicating light for "Valve Closed".
4. Green indicating light for "Valve Open".

Q. Wire leads for power and control signals shall be brought to a terminal board for field connection.

R. Wiring, switches, relays, and other electrical components shall be provided in a NEMA 4X weatherproof enclosure.

PART 3 - EXECUTION

3.01 INSTALLATION

In accordance with actuator manufacturer's written instructions.

3.02 TESTS

A. Hydrostatic Test: Test actuators with valves.

B. Functional Test

1. Following installation, inspect, and operate valve actuators.

2. After adjustments have been made and the actuator is properly lubricated, do the following:

a. Operate actuator with selector switch in "LOCAL" position.

(1) Run actuator through one complete cycle from full-closed to full-open to full-closed.

(2) Verify that that "STOP" push-button stops valve motion.

b. Operate actuator with selector switch in "REMOTE" position and test actuator operation from actuator terminal strip.

(1) Run actuator through one complete cycle from full-closed to full-open to full-closed.

(2) Verify that that remote stop signal stops valve motion.

c. Verify that contacts for remote monitoring of valve position and operation are functioning properly.

d. Verify that indicator lights are functioning properly.

e. Verify that limit switches are functioning properly.

END OF SECTION

SECTION 15130

PRESSURE GAUGES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: This section includes materials and installation of pressure gauges and accessories.

B. General Design: Minimum pressure rating shall be equal to that of the pipeline in which they are to be installed.

1.02 QUALITY ASSURANCE

A. Qualifications: The manufacturer shall have a minimum of three (3) years experience in the manufacture of pressure gauges.

B. Manufacturers: Gauges and tools shall be as manufactured by Ashcroft, Trerice, Winters Gauges, Palmer Gauges, or equal.

1.03 SUBMITTALS: Submit shop drawings in accordance with the General Conditions and Section 01340: Shop Drawings, Working Drawings, and Samples.

A. Manufacturer's catalog data and descriptive literature.

B. Materials of construction by ASTM reference and grade.

C. Manufacturer's certificate of compliance with the referenced ANSI standards.

PART 2 - PRODUCTS

2.01 GENERAL

A. Gauge Design: Gauges shall comply with ANSI B40.1, Grade 2A. Gauges shall incorporate the following features:

1. Solid or open front with side or rear blowout relief.

2. Pressure tight.

3. 270 degree arc with adjustable pointer.

4. Stem mounted.

5. Oil or glycerin filled unless specified otherwise.

6. Size of gauge shall be 4-1/2 inches for all process liquid and 6 inches for process air unless otherwise indicated on the Drawings.

7. Stem or connection size shall be 3/8 inch minimum.

8. Provide a gauge having a pressure range determined by the greater of the following two criteria:

   a. Two times the normal operating pressure; and
   b. One and one-third times the test pressure.

9. Gauges of size smaller than 4-1/2 inches shall conform to ANSI B40.1, Grade A. Otherwise, construction shall be as described above.

2.02 MATERIALS

A. Materials of construction shall be as shown in the following table:

	Item	Material	Specification
1.	Case	Stainless steel	AISI 316
2.	Bourdon tube	Stainless steel	AISI 316
3.	Windows	Glass or Plastic	--
4.	Ring	Stainless steel	AISI 316
5.	Stem	Stainless steel	AISI 316
6.	Dial face	Aluminum with clear baked-on acrylic coating	6061-T6, ASTM B 209

2.03 ACCESSORIES

A. Pipe Nipples and Fittings: Nipples for connection gauges to piping shall be Schedule 80S, Grade TP 316 seamless stainless steel, conforming to ASTM A 312. Fittings shall conform to ASTM A 403, Class WP316. Threads shall conform to ANSI B2.1. Size of pipe nipple shall match the gauge connection size.

B. Gauge Protectors (for use in process piping containing liquids having solids concentration greater than 1.0 percent):

1. Gauge protector shall consist of three parts: a flexible, impermeable, elastomer cylinder; a captive sensing liquid; and a stainless steel housing.

2. As process liquid flows through the housing, the cylinder shall transmit pressure through the sensing liquid. An attached 4-1/2 inch pressure gauge, as specified previously, shall indicate the pressure. Gauge outlet in the spool or ring shall be threaded, 1/4 inch, per ANSI B2.1.

3. Spools of sizes 1 inch through 4 inches shall be of the isolation-spool type with flanged ends. Spools of sizes 6 through 10 inches shall be of the isolation-ring type, fitting between two adjacent flanges.

4. Determine the flange rating based on the test pressure. For test pressure 200 psi and less, use Class 150 flanges, ANSI B16.5. For test pressures greater than 200 psi, use Class 300 flanges, ANSI B16.4.

5. Materials of construction shall be as follows:

Item	Material	Specification
Housing	Stainless steel	AISI 316
Flexible cylinder	Buna N. or Neoprene	---
Sensing liquid	Silicone oil	---

6. Protectors shall be manufactured by Ronningen-Petter, Red Valve, or equal.

C. Diaphragm Seals (for use in all processing piping containing liquids, except potable and nonpotable water):

1. Provide diaphragm seals with gauge mountings where shown on the drawings. Material of construction shall be Type 316 stainless steel. Pressure rating shall be at least that of the pressure gauge to which it is attached. Liquid filling shall be silicone.

2. Gauge and diaphragm seal shall be assembled together at the factory, with the liquid fill included. Provide a Type 316 stainless steel plug or cock in the flush connection.

3. Provide one pint of replacement fill liquid for every ten gauges having diaphragm seals or one pint for the entire project, whichever quantity is greater.

D. Pressure Snubbers: Provide pressure snubbers with gauge mountings where shown on the Drawings. Material of construction shall be Type 303 or 316 stainless steel. Inlet and outlet connections shall be 1/2-inch NPT.

PART 3 - EXECUTION

3.01 INSTALLATION: Install gauges before conducting pressure tests. Ream, clean and remove burrs from threaded piping before making up joints. Apply thread lubricant to threaded ends before assembling.

3.02 INSPECTION AND TESTING:

A. Compare pressure readings of permanent gauges with Master test gauge. If reading of installed gauges varies by more than ± 5 percent from the Master gauge the installed gauge shall be replaced.

B. Provide factory certification of testing and calibration for each Annular Seal or Diaphragm Seal Assembly. Unit shall be tested and calibrated in accordance with practice procedures on test equipment traceable to the National Institute of Standard (NIST).

END OF SECTION

SECTION 16050

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General administrative, procedural requirements, and installation methods for electrical installations specified in Division 16.

B. The Drawings are schematic and are not intended to show every detail of construction.
   1. In general, conduits/raceways, transitions and offsets shown on Drawings indicate approximate locations in plan and elevation where the systems are intended to be run.
   2. CONTRACTOR shall fully coordinate electrical Work with other trades to avoid interferences.
   3. In the event of interferences, CONTRACTOR shall request clarification from ENGINEER in writing.

B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Sections, apply to Work of this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section of Work. Shop Drawing submittals shall include:
   1. Submit product data covering the items included under this Section of Work.

B. Conforming to Construction Drawings: Submit a complete set of Drawings showing the locations of the piping, ductwork, etc., as actually installed. Such Drawings shall be submitted to ENGINEER on tracing cloth, mylar, or sepia paper from which blueprints can be obtained.

C. Operation and Maintenance Manuals: Submit operation and maintenance manuals for items included under this Section. Include following information for equipment items:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.

1.03 RECORD DOCUMENTS

A. CONTRACTOR shall submit, prior to final payment, Drawings conforming to construction records of systems it has installed. Vendor drawings shall be sized as manufacturers' standard.

B. Provide typewritten data sheets on motor control circuits with following information on each branch feeder: Load name..

1.04 QUALITY ASSURANCE

A. National Electrical Code: Comply with NFPA 70, National Electrical Code.

B. UL Compliance and Labeling: Use products and components labeled by UL.

1.05 PERMITS, INSPECTIONS, AND LICENSES

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

1.06 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL ELECTRICAL INSTALLATION

A. Provide electrical materials and equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction such as NEMA 4X if it is other than NEMA 1. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.

1. Exception: Provide manufacturer's standard construction for indoor or outdoor application where equipment is not manufactured to NEMA specifications (e.g., switchgear, transformers, high voltage capacitors, bus duct, and light fixtures; materials and equipment used in finished areas such as offices, laboratories, etc.).

B. Provide nonmetallic electrical materials and equipment enclosures in NEMA 4X areas..

C. Provide chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

D. Supporting devices and sleeves shall be set in poured-in-place concrete and other structural components as they are constructed.

E. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom possible. Locate light fixtures at approximately 8 feet above floor and where fixtures may be readily serviced.

F. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

G. Install systems, materials, and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by Drawings recognizing that portions of Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to ENGINEER.

H. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components where installed exposed in finished spaces.

I. As much as practical, connect equipment for ease of disconnecting with minimum of interference with other installations.

J. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.02 RACEWAY INSTALLATION

A. Outdoors, use the following materials:
   1. Exposed Conduit: Rigid aluminum conduit.
   2. Underground Direct Buried Conduit: Schedule 40 PVC.

B. Minimum size conduit shall be 3/4 inch unless shown otherwise.

C. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring. Provide knockout closures to cap unused knockout holes where blanks have been removed.

D. Provide fire-retardant barriers in all pull and junction boxes containing circuits that are otherwise continuously separated in conduit. Securely fasten these barriers within box. Size barriers so that space between barrier and box wall does not exceed 0.125 inch anywhere around the perimeter of barrier.

E. Support exposed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.

F. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box and tighten the chase nipples so no threads are exposed.

G. Complete installation of electrical raceways before starting installation of conductors within raceways and prevent foreign matter from entering raceways by using temporary closure protection. Cap spare conduit. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Install pull wires in empty raceways: Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end of the pull wire.

3.03 WIRE AND CABLE INSTALLATION

A. Use pulling means including fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant where necessary.

B. Keep branch circuit conductor splices to minimum. Splice feeders only where indicated. Use a standard kit. No splices are allowed for instrument and telephone cables except at indicated splice points.

C. Install splice and tap connectors which possess equivalent or better mechanical strength and insulation rating than conductors being spliced. Use splice and tap connectors which are compatible with conductor material and are UL listed as pressure type connectors.

D. Provide adequate length of conductors within electrical enclosures and train conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at terminal.

E. Terminate power conductors at equipment using pressure-type terminals specifically designed for type of terminations to be made. Terminate no more than 2 conductors No. 8 AWG and smaller within the same pressure-type terminal. These 2 conductors shall be no more than 4 wire gauge

sizes apart. Terminate no more than 1 conductor larger than No. 8 AWG within any pressure-type terminal.

F. Seal wire and cable ends until ready to splice or terminate.

3.04 CUTTING AND PATCHING

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

3.05 EQUIPMENT CHECKOUT AND TESTING

A. In addition to testing recommended by equipment or material supplier and called for in equipment or material specification, perform the following.

B. Equipment Testing: The following tests which are applicable for a particular item of equipment shall be performed:
   1. After Work has been completed, demonstrate to OWNER's Representative that entire electrical installation is in proper working order and will perform functions for which it was designed by functional testing.
   2. Make any specific tests required by the manufacturer's installation instructions.

C. Check-out Procedures. In general, check-out procedures (as listed below) which are applicable for a particular item of equipment shall be performed:
   1. Vacuum interior of cubicles and remove foreign material.
   2. Wipe clean with a lint-free cloth insulators, bushings, bus supports, etc.
   3. Check exposed bolted power connections for tightness.
   4. Check operation of breakers, contactors, etc., and control and safety interlocks.
   5. Check tightness of bolted structural connections.
   6. Check leveling and alignment of enclosures.
   7. Check operating parts and linkages for lubrication, freedom from binding, vibration, etc.
   8. Check tightness and correctness of control connections at terminal blocks, relays, meters, switches, etc.
   9. Clean auxiliary contacts and exposed relay contacts after vacuuming.

END OF SECTION

SECTION 16060

GROUNDING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Electrical grounding and bonding Work as follows:
   1. Solidly grounded.

B. Applications of electrical grounding and bonding Work in this Section:
   1. Electrical power systems.
   2. Grounding electrodes.
   3. Raceways.
   4. Equipment.

1.02 SUBMITTALS

A. Shop Drawings: Submit shop drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

1.03 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING

A. Materials and Components:

1. Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
2. Conductors: Electrical copper grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
3. Grounding Electrodes: Coper Clad Steel with copper welded exterior, 3/4-inch diameter by 10 feet.
4. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

A. Connect grounding conductors to underground grounding electrodes using exothermic weld process.

B. Ground each separately derived system neutral to effectively grounded metallic water pipe, effectively grounded structural steel member, and separate grounding electrode.

C. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

D. Connect grounding electrode conductors to 1-inch diameter or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping at street side of flange.

E. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

F. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible while following building lines to minimize transient voltage rises. Protect exposed cables and straps where subject to mechanical damage.

G. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed and are subjected to corrosive action.

END OF SECTION

SECTION 16120

WIRES AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following:
   1. Low-Voltage Wire and Cable.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Include Shop Drawings of wires, cables, connectors, splice kits, and termination assemblies.

1.03 QUALITY ASSURANCE

A. UL Compliance: Provide components which are listed and labeled by UL. For cables intended for use in air handling space comply with applicable requirements of UL Standard 710, "Test Method for Fire and Smoke characteristics of cables used in Air Handling Spaces."

B. NEMA/ICEA Compliance: Provide components which comply with following standards:
   1. NEMA WC 70-1999/ICEA S-95-658-1999, Nonshielded Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.
   2. NEMA WC 71-1999/ICEA S-96-659-1999, Standard for Nonshielded Cables Rated 2,001-5,000 Volts for use in the Distribution of Electrical Energy.
   3. NEMA WC 74-2000/ICEA S-93-639, 5-46 kV Shielded Power Cable for use in the Transmission and Distribution of Electrical Energy.

C. IEEE Compliance: Provide components which comply with the following standard.
   1. Standard 82, Test procedures for Impulse Voltage Tests on Insulated Conductors.

D. Labeling: Handwritten labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or typewritten onto adhesive labels. The font shall be at least 1/8 inch in height, block characters, and legible. The text shall be of a color contrasting with the label such that is may be easily read. If labeling tape is utilized, the font color shall contrast with the background. Patch panels shall exhibit workstation numbers or some type of location identifier, in sequential order, for all workstations or devices attached. Each Network cable segment shall be labeled at each end with its respective identifier.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
   1. Low-Voltage Wire and Cable:
      a. American Insulated Wire Corp.
      b. General Cable.
      c. The Okonite Co.
      d. Southwire Co.
   2. Connectors for Low-Voltage Wires and Cable Conductors:
      a. AMP.
      b. O-Z/Gedney Co.
      c. Square D Company.
      d. 3M Company.

2.02 LOW-VOLTAGE WIRES AND CABLES

A. Conductors: Provide stranded conductors conforming to ASTM Standards for concentric stranding, Class B. Construction of wire and cable shall be single conductor (1/c) unless multiconductor cable is shown by notation in form (x/c) where x indicates the number of separate insulated conductors per cable.

B. Conductor Material: Copper. Minimum size power wire shall be No. 12 AWG.

C. Insulation: Provide RHW/USE insulation for power conductors used in single- and 3-phase circuits with more than 120 volts to ground. Provide RHW/USE OR XHHW insulation for power conductors used in single- and 3-phase circuits.
   1. Provide RHW or XHHW insulation for grounding conductors installed in raceways.
   2. Provide THHN/THWN insulation for control conductors.

2.03 CONNECTORS FOR LOW-VOLTAGE WIRES AND CABLES

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

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 16130

RACEWAYS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Raceways for electrical wiring. Types of raceways in this Section include the following:
   1. Rigid metal conduit.
   2. Rigid nonmetallic conduit.

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product data for the following products:
      a. Conduit.

1.03 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

   1. Conduit:
      a. Allied Tube.
      b. Carlon.
      c. General Electric Co.
      d. Johns Manville.
      e. Occidental Coatings.
      f. Orangeburg.
      g. Perma-Cote Industries.
      h. Republic Steel.

i. Robroy Industries.
j. Steelduct Co.
k. Triangle Conduit.
l. Wheatland Tube.
m. Youngstown Sheet and Tube.

2.02 METAL CONDUIT AND TUBING

A. Rigid Metal Conduit: Rigid Aluminum.

2.03 NONMETALLIC CONDUIT AND DUCTS

A. Rigid Nonmetallic Conduit (RNC): NEMA TC 2 and UL 651, Schedule 40 PVC.

PART 3 - EXECUTION

NOT USED

END OF SECTION