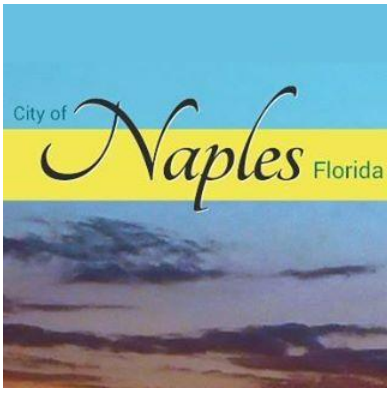

UTILITIES DEPARTMENT

NAPLES WATER TREATMENT FACILITY

ACCELATOR NO. 3 REHABILITATION AND IMPROVEMENT

TECHNICAL SPECIFICATIONS
ISSUED FOR BIDDING

September 2019
(Updated November 2019)

HOLE MONTES
ENGINEERS · PLANNERS · SURVEYORS

HM Project No. 2017.010C

CITY OF NAPLES
WATER TREATMENT FACILITY

ACCELATOR NO. 3 REHABILITATION & IMPROVEMENTS

DIVISION 1 – GENERAL REQUIREMENTS

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Section 01130 – Measurement and Payment
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SUPPLEMENTAL INFORMATION

Photographs
Existing Yard Piping
Existing Accelator Plans

SECTION 01110

SUMMARY AND SEQUENCE OF WORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

General description of the Work at the City of Naples Water Treatment Facility required under this Contract.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract consists of furnishing and installing and performing:

1. Cleaning of Accelator No. 3 and obtaining field measurements.
2. Removal and demolition of existing accelator equipment and catwalk and access walkway/pipe supports. The existing lights shall be removed and reinstalled. All accelator equipment removed shall be properly disposed of. Contractor shall provide temporary access to the accelator.
3. Structural repair of the existing accelator as identified. Upon removal of the existing accelator equipment and cleaning, the Engineer will conduct an onsite inspection to determine if any additional repairs are to be made.
4. Installation of lightweight fill material between the concrete ring wall and the slope steel wall. This shall include preparing the concrete and steel surfaces as identified.
5. Installation of the proposed accelator equipment and structure including, but not limited to, the rafters, hood plates, sloped steel plates, rotor impeller assembly, gear box and motor, deck plate, impeller shaft, radial launders, collection launder, outer and inner draft lubes with gussets, effluent launders, sludge flushing system, catwalk and access walkway/pipe support.
6. Coating and painting the entire accelator structure and access walkway/pipe support, including the top and interior of the concrete ring wall and effluent chamber, with the exception of stainless steel and aluminum structure, the exterior concrete ring wall, effluent chamber and floor. The existing influent, effluent and sludge flushing piping to be coated and touched up as needed.
7. Miscellaneous cleanup and restoration.
8. Startup, testing and training of the facility staff.
9. A Bid Alternate is included for the cleaning, crack and spall repair and recoating of the existing concrete wall.

B. Execution of the Work will require coordination and planning with the Water Treatment Facility Manager and the City's Project Manager. The Work shall be planned and executed in a manner and schedule that does not interfere with the on-going normal operational performance of the facility. Access for chemical deliveries shall be coordinated with Facility Manager.

C. The Contractor shall organize, coordinate, schedule and execute the various phases or sites of the Contract Work so as to be in strict compliance with the following:

1. Special Project Requirements as noted on Contract Drawings Sheet G-2.

D. The Contractor shall provide factory certified start-up and testing of the accelator mechanism with training of City staff.

E. The Contract Work includes handling and disposal of residual liquid, grit and solids in the existing tank. The Work also includes temporary measures as may be required to shut-off or control the flows affecting execution of the Work. Before proceeding with such temporary measures, the Contractor shall submit details for approval. Refer to Section 01140 and the Contract Drawings for additional information and requirements.

F. The facility may have other construction projects ongoing. As a result, the Contractor shall coordinate his work with these other projects. This coordination shall include submitting weekly schedules and cooperating with other contractors.

1.03 **S**EQUENCE OF WORK

A. The following construction constraints and work sequence are not intended to be a complete or exhaustive list, and the descriptions provided are general in nature. The Contractor is responsible for identifying all work activities that could affect any operational aspect of the facility and providing the Owner and Engineer sufficient prior notice. Refer to Sections 01140 and 01150 for additional information and requirements. Also refer to Contract Drawing Sheet G-2. The following work sequences are intended to be general in nature and not inclusive of all steps or details. The Contractor can submit alternative work sequences to the Engineer for review.

B. Work under this Contract shall be conducted as noted in the following general sequence and work constraints unless an alternative sequence has been approved by the Engineer.

1. The Contractor shall schedule delivery of the accelator mechanism to coordinate closely with the Work progress in order to minimize the time of on-site storage.

2. The accelator shall be cleaned and field measurements taken prior to submission of final shop drawings.

3. The Contractor is responsible for establishing all dimensions and sizing information required to furnish and install new fully functional accelator mechanism as well as launders and appurtenances. The intent of the Contract Documents is for all fabricated components to be manufactured in an off-site facility normally engaged in the fabrication of such components. Field fabrication and extensive field modifications of new materials will not be allowed.

4. Refer to the Technical Specifications and Contract Drawings for special Contractor responsibilities related to furnishing and installing the new accelator mechanism, launders, and all appurtenances.

5. The Contractor shall schedule their work to complete the demolition of the existing accelator equipment to be replaced, assist the Engineer in evaluating the existing structure for any

additional repairs to be made and complete the installation of the lightweight fill in the void area.

6. Install the new accelator mechanism, launders, sludge blow off lines and sludge flushing system. Launders shall be water based leveled. Upon installation of the equipment, catwalk and access walkway/pipe support, the lights shall be reinstalled. This shall include electrical as required.

7. A Bid Alternate is included for the cleaning, crack and spall repair and recoating of the existing concrete wall.

8. Provide any final touchup to painting and coatings.

9. Provide Owner startup, testing and training.

1.04 CONTRACTOR EXPERIENCE REQUIREMENTS

The Owner requires certain experience qualifications. The Contractor must have direct experience over the last five years with the successful installation of at least two accelators, clarifier mechanism and similar treatment plant mechanisms in water or wastewater treatment facilities. Installation by a subcontractor shall not satisfy this requirement unless that same subcontractor is the installing subcontractor for this project.

1.05 CONTRACT METHOD

Construct the Work under a single contract.

1.06 WORK BY OTHERS

During the construction period of this project, the Owner (either with his own forces or under a separate contract) will be performing other work that will require the cooperation of the Contractor in scheduling and his coordination to avoid conflicts.

END OF SECTION

SECTION 01130

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. Payment for the various items in the Schedule of Payment as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufactured articles, and for all labor, operations, taxes, materials, commissions, transportation and handling, bonds, permit fees, insurance, overhead and profit, and incidentals appurtenant to the items of Work being described, as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Such compensation shall also include payment for any loss or damages arising directly or indirectly from the Work.

B. The Contractor's attention is called to the fact that the quotations for the various items of Work are intended to establish a total price for completing the Work in its entirety. Should the Contractor feel that the cost for any item of Work has not been established by the Schedule of Payment items or this Section, it shall include the cost for that Work in some other applicable bid item, so that its proposal for the project does reflect its total price for completing the Work in its entirety.

1.02 PAYMENT ITEMS

A. The Contractor shall submit a Schedule of Payment Values for review with the return of the executed Agreement to the Owner. The schedule shall contain the installed value of the component parts of Work broken down into labor and material categories for the purpose of making progress payments during the construction period.

B. The schedule shall be given in sufficient detail for proper identification of Work accomplished. The Schedule of Payment Values shall coincide with the activities of work detailed in the construction progress schedule and the construction network analysis in order to accurately relate construction progress to the requested payment. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

A. Make payment on the basis of work actually completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the Contract Drawings and described in the Specifications. Payment for each item includes compensation for cleanup and restorations. Cost of cleanup and

restorations (including pavement replacement) will be considered as the percentage retained in accordance with the Contract Documents, and complete payment will not be made until cleanup, restorations and as-builts are complete.

BASE BID

1. Mobilization/Demobilization: Measurement and Payment for mobilization/demobilization shall be by Lump Sum for each portion of the project and shall not exceed 10% of the amount of the Base Bid for that work. The work shall include, but not be limited to, preconstruction video, field measuring, those operations necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site and for the establishment of temporary offices, buildings, safety equipment and first aid supplies, sanitary and other facilities. The cost of insurance and any other preconstruction expense necessary for the start of the work, excluding the cost of construction materials, shall be included.

2. Demolition of Existing Accelator Equipment and Walkway: Measurement and Payment shall be by Lump Sum for the demolition and disposal of the existing accelator equipment and walkway. This shall include all piping, steel, anchor bolts and electrical. Existing lights shall be temporarily removed for reinstallation. Electrical shall be disconnected and locked out. Existing electrical shall be reworked and reused. The existing rotor motor and gear box shall be removed and returned to the City.

3. Demolition of Existing Access Walkway/Pipe Support (With Temporary Piping Support): Measurement and Payment shall be by Lump Sum for the removal and disposal of the existing access walkway/pipe support and the existing concrete foundation. Care shall be taken in the demolition and removal of the existing walkway and foundation due to the close proximity of existing pipes and conduits.

4. Lightweight Structural Fill of Void Area: Measurement and Payment shall be Lump Sum for the installation of the rigid insulation board and infill concrete in the void area. It shall include all materials, labor and equipment to complete. All temporary access ports shall be welded closed when work is completed.

5. Installation of New Access Walkway/Pipe Support and Foundation: Measurement and Payment shall be Lump Sum for the installation of the new access walkway/pipe support between the filter building and the accelator complete with new foundations. It shall include, but not be limited to, locating the existing utilities (pipes and conduits) in the area of the new foundation, installation of new foundations, new steel supports, pipe rollers, walkway grating and railing, reinstallation of the existing lights.

6. Installation of New Accelator Equipment and Walkway: Measurement and Payment shall be Lump Sum for the installation of the new accelator mechanism and equipment. This shall include, but not be limited to, new anchor bolts, new steel internal walls, mechanism and launders, new piping, new walkway with grating and railing and reinstallation of the existing electrical supply and lights.

7. Preparation and Coating of Accelator Carbon Steel: Measurement and Payment shall be Lump Sum for the preparation and coating of the accelator carbon steel. It shall include all labor, material and equipment to prepare all surfaces for coating, coat all carbon steel surfaces and touchup any damaged areas prior to startup.

8. Preparation and Coating of Access Walkway/Pipe Support: Measurement and Payment shall be Lump Sum for the preparation and coating of the walkway/pipe support carbon steel and any touchup of the existing piping. It shall include all labor, material and equipment to prepare all surfaces for coating, coat all carbon steel surfaces and touchup the existing piping as needed.

9. Preparation and Coating/Painting Accelator Concrete Ring Wall/Effluent Chamber: Measurement and Payment shall be Lump Sum for the preparation and coating of the interior and top wall surfaces of the concrete ring wall and the effluent chamber. It shall include all labor, material, and equipment to prepare all surfaces for coating and coat all interior wall surfaces including the tops of the walls. Upon completion of the preparation and prior to coating, the Engineer will conduct an inspection to verify the concrete condition.

10. Startup, Testing and Training: Measurement and Payment shall be Lump Sum for the startup, testing and training by the manufacturer. The startup, testing and training shall be coordinated with the Engineer and Owner.

BID ALTERNATE

1. Clean and Recoat Exterior Concrete Ring Wall and Effluent Chamber: Measurement and Payment shall be Lump Sum for the cleaning and coating of the concrete ring wall. It shall include removal of the existing coating, preparation of the existing wall surfaces and recoating. The wall shall be inspected by the engineer following removal of the existing coating for any required repairs. Repairs shall be made under the established unit prices.

2. Concrete Spall Repair: Measurement and Payment shall be per cubic foot of spalled concrete removal and replacement. It shall include all labor, material, and equipment to remove spalled concrete to solid, prepare the existing surface and patch back to its original condition.

3. Crack Injection: Measurement and Payment shall be per linear foot of concrete crack injection. It shall include all labor, material, and equipment necessary to prepare the crack for injection including all injection and inspection ports, chemical crack injection and removal of ports upon completion.

END OF SECTION

SECTION 01140

MAINTENANCE OF UTILITY OPERATIONS

PART 1 - GENERAL

1.01 THE REQUIREMENT

A. The existing plant will be maintained in continuous operation by the Owner during the entire construction period of the Contract as hereinafter specified.

B. Work shall be scheduled and conducted by the Contractor so as not to impede any treatment process, reduce the quality of the plant effluent or cause odor or other nuisance except as explicitly permitted hereinafter. In performing the work shown and specified, the Contractor shall plan and schedule his work to meet the plant operating requirements.

C. The Contractor shall be responsible for coordinating the general construction and the schedules of all trades and for ensuring that permanent or temporary power and controls are available for all existing, proposed, and temporary facilities that are required to be on line at any given time.

1.02 GENERAL CONSTRAINTS

A. The Contractor shall schedule the Work so that the plant is maintained in continuous operation. All treatment processes shall be maintained in continuous operation during the construction period.

B. The Contractor shall comply with the scheduling and coordination requirements and restrictions identified in the Special Project Requirements noted in the Contract Drawings. Refer to Section 01110 for additional information and requirements.

C. The Contractor shall review all bidding documents and shall be responsible to determine all such connections or modifications, and the scope and cost of all temporary measures required to isolate the work area without the need for a shutdown of the affected facility, process area, piping or utility.

D. Any temporary work, facilities, roads, walks, protection of existing structures, piping, blind flanges, valves, equipment, etc. that may be required within the Contractor's work limits to maintain continuous and dependable plant operation shall be furnished by the Contractor at the direction of the Engineer at no extra cost to the Owner.

E. The Owner shall have the authority to order Work postponed, stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the plant operations.

F. If the Contractor impairs performance or operation of the plant as a result of not complying with specified provisions for maintaining plant operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the Owner and the Engineer. Such work shall progress continuously to completion on a 24-hours per day, seven work days per week basis.

G. The Contractor shall provide the services of emergency repair crews on call 24-hours per day.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION

SECTION 01150

PROTECTION OF EXISTING FACILITIES

PART 1 – GENERAL

1.01 SECTION INCLUDES

Requirements for protection of existing facilities and completed construction

1.02 GENERAL

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities as well as public, development and private improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

B. The Contractor shall verify the exact locations and depths of all utilities shown and the Contractor shall make exploratory excavations of all utilities that may interfere with the Work. All such exploratory excavations shall be performed as soon as practicable after award of Contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's Work. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall so notify the Engineer.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.03 PROTECTION OF MARKERS

The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. It shall be the Contractor's responsibility to notify the Owner of the time and location that Work will be done. Such notification shall be sufficiently in advance of construction so that there will be no delay due to waiting for survey points to be satisfactorily referenced for restoration.

1.04 EXISTING UTILITIES AND IMPROVEMENTS

A. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or other communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, wire or cable.

B. The Contractor shall protect all underground utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

C. Where the proper completion of the Work requires the temporary or permanent removal, or relocation of an existing utility or other improvement which is shown, the Contractor shall contact the utility owner and proceed as required by the Owner and the utility owner.

D. Unrecorded Underground Utilities or Improvements

1. Existing underground utilities shown on Drawings are based upon available records. Data regarding existing utilities is presented for Contractor's convenience only, and shall not be used as a basis for claims of extra compensation.
2. Examine available records and make exploratory excavations whenever necessary to determine locations of existing pipes, valves, or other underground improvements.
3. Take prudent precautions not to damage unrecorded underground utilities and improvements.
4. If unrecorded underground utilities or other improvements are encountered, immediately notify the Engineer and inform the Engineer of the conditions encountered. Include written report of conditions encountered with Progress Schedule covering period in which unrecorded underground utilities or improvements were encountered. If unrecorded underground utilities or improvements conflict with Work, changes shall be made under the terms of the Agreement. Changes to the Work shall be as approved by the Engineer.
5. The Contractor shall contact the affected utility owner and proceed as required by the Owner and the utility owner.

1.05 TREES WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

A. The Contractor shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs and shall not trim or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or owner.

B. All existing trees and shrubs which are damaged during construction shall be repaired or replaced by the Contractor as required by the Owner.

1.06 NOTIFICATION BY THE CONTRACTOR

In additional to State and County requirements regarding location of existing underground utilities and prior to any excavation in the vicinity of any existing underground facilities including all water, sewer, storm drain, gas, petroleum products or other pipelines, all buried electric power, communications or television cables, all traffic signal and street lighting facilities, and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 3 days nor more than 7 days prior to excavation so that a representative of said owners or agencies can locate their facilities or be present during such work if they so desire.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 PRECONSTRUCTION MEETING

A. A preconstruction meeting will be held after Award of Contract, but prior to starting work at the site. The Engineer shall prepare and distribute the meeting agenda and shall preside at the meeting. The Engineer shall record and distribute minutes of the proceedings and decisions.

B. Attendance:

1. Owner
2. Engineer
3. Contractor
4. Major subcontractors

C. Minimum Agenda:

1. Tentative construction and submittal schedules
2. Critical work sequencing
3. Designation of responsible personnel
4. Processing of Field Decisions and Change Orders
5. Adequacy of distribution of Contract Documents
6. Submittal of Shop Drawings and samples
7. Procedures for maintaining record documents
8. Use of site and Owner's requirements
9. Major equipment deliveries and priorities
10. Safety and first aid procedures
11. Security procedures
12. Housekeeping procedures
13. Processing of Partial Payment Requests

14. General regard for community relations

1.02 PROGRESS MEETING

A. Progress meetings will be held biweekly at the Water Treatment Facility Conference Room during the active performance of the field work of this Contract. Additional meetings may be called as progress of work dictates.

B. Engineer will prepare and distribute agenda, preside at meetings and record minutes of proceedings and decisions. Engineer will distribute copies of minutes to participants.

C. Attendance:

1. Owner

2. Engineer

3. Contractor

4. Subcontractors, only with Engineer's approval or request, as pertinent to the agenda

D. Minimum Agenda:

1. Review and approve minutes of previous meetings.

2. Review progress of Work since last meeting.

3. Review proposed 30-60 day construction schedule.

4. Note and identify problems which impede planned progress.

5. Develop corrective measures and procedures to regain planned schedule.

6. Revise construction schedule as indicated and plan progress during next work period.

7. Maintaining of quality and work standards.

8. Complete other current business.

9. Schedule next progress meeting.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01315

COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements and procedures for structural, mechanical and electrical coordination to ensure proper selection, installation, fit and operation of all mechanical, electrical and control devices as well as building components.

1.02 COORDINATOR

Contractor shall employ an individual or a firm, technically qualified and experienced in field coordination for the type of work required for this Project for the duration of the Work.

1.03 SUBMITTALS

A. General: As specified in Section 01330 – Submittals.

B. Submit name, address, and telephone number of Coordinator and, if a firm, the name of its principal officer, to Engineer for approval.

C. Submit necessary coordination drawings and schedules prior to submitting shop drawings, product data, and samples.

1.04 COORDINATION REQUIRED

A. Coordinate submittals for structural, mechanical and electrical products.

B. Conduct conferences with Subcontractors and others concerned with the Work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

C. Participate in progress meetings. Report on progress of Work to be adjusted under coordination requirements, and any required changes in schedules. Transmit official minutes of meetings and reports to concerned parties.

1.05 DOCUMENTS FOR COORDINATION

A. Prepare necessary coordination drawings to organize installation of products for efficient use of available space, to meet requirements of Work sequence, for proper sequence of installation, and to identify potential conflicts.

B. Prepare a master schedule to identify responsibilities under each section of Divisions 1 through 17 of the Specifications for activities that directly relate to mechanical and electrical coordination, including submittals and temporary utilities.

C. Maintain documents for the duration of the Work, recording changes due to site restrictions, modifications or adjustments.

D. After Engineer review of original and revised documents, reproduce and distribute copies to concerned parties.

1.06 COORDINATION OF SUBMITTALS

A. Coordinate shop drawings, product data, and samples.

1. Check field dimensions and clearances and relationship to available space and anchors.
2. Check compatibility of products with products furnished or installed under other sections.
3. Check electrical characteristics, and operational control requirements.
4. Check motor voltages, speed, and control characteristics.
5. Coordinate controls, interlocks, power wiring, control wiring, and instrument wiring.
6. Coordinate wiring and control diagrams.
7. Review the effect of any changes on work of other sections.

B. Verify and coordinate maintenance of Record Documents.

1.07 COORDINATION OF SUBSTITUTIONS AND MODIFICATIONS

A. Submit requests for substitutions as specified in Section 01600 – Materials and Equipment.

B. Review proposals and requests from subcontractors.

C. Verify compatibility of substitutes with other products. Identify modifications required to make other products compatible with substitutes.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.01 OBSERVATION OF WORK

A. Observe Work for structural, mechanical and electrical coordination.

B. Maintain a list of observed deficiencies and defects and promptly report observed deficiencies and defects to appropriate parties.

3.02 EQUIPMENT START-UP

A. Verify utilities, connections and controls are complete and equipment is in operable condition prior to equipment start-up.

B. Observe start-up of equipment and demonstrations to Owner, as noted in Section 01750.

C. Coordinate adjustments or modifications required to provide equipment and systems that operate properly, both mechanically and electrically.

3.03 INSPECTION AND ACCEPTANCE OF EQUIPMENT

Prior to inspection, verify that equipment and systems are tested and operating properly.

END OF SECTION

SECTION 01330

SUBMITTALS

PART 1 – GENERAL

1.01 SECTION INCLUDES

Requirements and procedures for submittals.

1.02 SCHEDULE

A. Transmit submittals in accordance with approved Progress Schedule, and in such sequence to avoid delay in the Work or work of other contracts.

B. Do not fabricate products or begin work that requires submittals until return of submittal with Engineer acceptance.

C. Identify the appropriate specification sections and parts on each submittal.

1.03 CONTRACTOR REVIEW

A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.

B. Sign each sheet of shop drawings and product data, and each sample; label to certify compliance with requirements of Contract Documents**. Notify Engineer of any deviations from requirements of Contract Documents in writing at time of submittal.**

C. Identify the relevant specification sections and parts on each submittal.

D. For each submittal, the Contractor must submit a statement letter that they have met all contract requirements.

1.04 SUBMITTAL REQUIREMENTS

A. Apply Contractor's stamp, signed certifying to review and approval, verification of products, field dimensions and field construction criteria, and coordination of information with requirements of Work and Contract Documents.

B. Number each submittal sequentially beginning with *001*. **Each submittal shall describe only one product or one equipment system.** Re-submittals shall use the same number identifier with a letter suffix; e.g. *001A*.

C. Coordinate submittals into logical groupings to facilitate interrelation of the several items:

1. Finishes that involve Engineer selection of colors, textures, or patterns.

2. Associated items that require correlation for efficient function or for installation.

D. Submit under transmittal letter. Identify Project by title and number.

E. If any submittal requires more than three reviews (normally an original and two re-submittals), the Engineer may charge the Contractor for additional review time based on his actual incurred time and expenses. These charges shall be summarized for the Contractor and deducted from the Contractor's next pay request.

F. The Contractor may expect most submittals to be reviewed within 21 calendar days following receipt of the submittal. Certain submittals such as Owner color selection or instrumentation may require a longer review time.

G. The submission of submittals by email may be allowed subject to prior specific approval by the Engineer. Before the first electronic submittal, the Contractor must with the Engineer to review the format and protocols for such submittals.

Any digital file submittal or re-submittal must be complete in every respect. Any digital file submittal must include only one piece of material or equipment.

Digital transmission of O&M data, electrical and instrumentation submittals must include two hard copies of the complete submittal.

In the event that digital transmission of submittals is not allowed, then email shall not be used for transmission of the follow submittals: (a) construction schedules, (b) electrical submittals, (c) instrumentation submittals, (d) structural submittals, (e) any submittal over one page in length and (f) any submittal in color.

H. Provide submittals on the following items and as required by the Contract Documents:

1. Accelator mechanism and equipment.
2. Structural repair materials and procedures.
3. Lightweight fill material.
4. Paints and coatings.

1.05 NUMBER OF COPIES

A. Number of Copies: Electronic submittals are to be made, except as noted:

	Number of Copies	
Submittal	To Engineer	Returned to Contractor
Progress Schedules	Electronic	Electronic
Shop Drawings & Product Data	Electronic	Electronic
Samples & Test Reports	Electronic	Electronic
O&M Data	Refer to Section 01830	Refer to Section 01830
Certificates of Compliance	3 copies	--

Request for Substitution	Electronic	Electronic
Requests for authorization, requests for information, and other similar requests	Electronic	Electronic

1.06 PROGRESS SCHEDULES

Submit progress schedules in accordance with Contract documents

1.07 SHOP DRAWINGS

A. Present in a clear and thorough manner. Title each drawing with Project name and number. Transmittal letter shall reference item as listed on Submittal Schedule.

B. Identify each element of drawings by reference to sheet number and specification section of Contract Documents.

C. Identify field dimensions; show relation to adjacent or critical features or Work or products.

1.08 PRODUCT DATA

A. Submit only pages that are pertinent. Mark or highlight each copy of standard printed data to identify pertinent products. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.

B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information not applicable.

1.09 SAMPLES

A. Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures, and patterns, for Owner selection.

B. Submit samples to illustrate functional characteristics of products, including parts and attachments.

C. Approved samples that may be used in the Work are indicated in the Specification section.

D. Label each sample with identification required for transmittal letter.

E. Provide field samples of finishes at Project, at location acceptable to Engineer, as required by individual Specifications section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed work.

F. Accepted samples shall establish the standards by which the completed Work will be judged.

1.10 MANUFACTURER'S CERTIFICATES

A. Prior to delivery at project site, furnish an Affidavit of Compliance certified by the equipment manufacturer that the equipment and appurtenances furnished comply with all applicable provisions of applicable referenced standards and these Specifications.
B. Do not deliver equipment to job site until Affidavit of Compliance has been submitted and accepted by the Consultant.

1.11 REQUESTS

If there are any questions about interpretations of plans, specifications or Contract Documents, the Contractor may submit a written request for information or a request for clarification to the Engineer.

1.12 RESUBMITTAL

A. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.

B. Identify resubmittal as a resubmittal and reference previous submittal.

C. Identify changes made since previous submittal.

1.13 DISTRIBUTION

A. Distribute reproductions of shop drawings, copies of product data, samples, substitutions and other submittals which bear Engineer's review stamp, to job site file, Record Documents file, subcontractors, suppliers, and other entities requiring information.

B. Instruct recipients to promptly report any inability to comply with provisions.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION

SECTION 01410

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements and procedures for obtaining permits complying with permits and compliance with all regulatory requirements.

1.02 PERMITS

A. No permits are anticipated.

1.03 CODES AND ORDINANCES

A. Codes applicable to this project include, but are not necessarily limited to, the following:

1. Standard building codes as applicable.
2. Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
3. Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
4. Accessibility Requirements Manual, Department of Community Affairs, Florida Board of Building Codes and Standards.
5. The Americans with Disabilities Act (ADA) 1990 36 CFR Part 1191 Architectural and Transportation Barriers Compliance Requirements.
6. NFPA 101 Life Safety Code, Latest Edition.
7. NFPA Standard Fire Prevention Codes as applicable, Latest Editions.
8. State Fire Marshal's Uniform Fire Safety Rules.
9. National and State of Florida Electrical Codes and Regulations.

B. All materials and workmanship shall confirm to local city or county ordinances.

C. If there is a conflict in regulations, codes, or regulations and codes, the more stringent requirements shall govern.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.01 VERIFICATION AND CONFORMANCE

A. Conform to all requirements of all permits.

END OF SECTION

SECTION 01430

MATERIALS TESTING

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements and procedures for independent testing laboratory services for concrete, soils compaction and other testing as may be required by the Contract Documents.

1.02 REFERENCES

A. ANSI/ASTM Standards

1. ANSI/ASTM D3740 Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
2. ANSI/ASTM E329 Practice for Inspection and Testing Agencies for Concrete, Steel, Bituminous Materials as Used in Construction

1.03 SELECTION AND PAYMENT

A. The Contractor shall employ services of an independent testing laboratory to perform required inspection and testing.

B. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.04 QUALITY ASSURANCE

A. Standards: Comply with requirements of ANSI/ASTM E329 and ANSI/ASTM D3740.

B. Laboratory: Authorized to operate in State of Florida.

C. Laboratory Staff: Maintain a full time Registered Professional Engineer on staff to review services.

D. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

1.05 LABORATORY RESPONSIBILITIES

A. Test samples submitted by Contractor.

B. Provide qualified personnel at site. Cooperate with County and Contractor in performance of services.

C. Perform specified inspection, sampling, and testing of products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Engineer, County and Contractor of observed irregularities or non-conformance of Work or products.

F. Perform additional inspections and tests required by Engineer or County.

G. Attend preconstruction conferences and progress meetings as appropriate.

1.06 LABORATORY REPORTS

A. After each inspection and test, the laboratory shall promptly submit three (3) copies of laboratory report to Engineer, Contractor and County.

B. Report shall include:

1. Date issued,
2. Project title and number,
3. Name of inspector or technician,
4. Date and time of sampling or inspection,
5. Identification of product and Specifications section,
6. Location in the Project,
7. Type of inspection or test,
8. Date of test,
9. Results of tests,
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

1.08 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of Contractor.

D. Laboratory has no authority to stop the Work.

1.09 CONTRACTOR RESPONSIBILITIES

A. Deliver to laboratory, at designated location, adequate samples of proposed materials that require testing, along with proposed design data as required.

B. Cooperate with laboratory personnel and provide access to the Work.

C. Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

E. Pay for all testing services.

1.10 SCHEDULE OF INSPECTIONS AND TESTS

As specified in the Contract.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION

SECTION 01450

QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements to ensure that the products and installation meet industry standards, manufacturers requirements and government regulations and ordinances.

1.02 GENERAL QUALITY CONTROL

A. The Contractor shall maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Public Inspection: The Contractor shall inform the Engineer and local authorities, such as building and plumbing inspectors, Fire Marshall, OSHA inspectors, and others, in order that they may approve all required work and witness all required tests for foundations, piping, plumbing, fire protection systems, pressure vessels, safety systems, electrical systems and other systems requiring regulatory authority inspections to obtain all required permits and certificates.

C. Site Inspection: The Contractor shall verify all dimensions in the field and shall continuously check field conditions during construction.

D. Sampling and Testing: The Engineer reserves the right to take samples and make independent tests to verify that the Work meets the requirements of the specifications.

1.03 RIGHT OF REJECTION

A. Engineer shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after installation. If the Engineer or its representative, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected.

B. The Contractor shall promptly remove rejected articles or materials from the site of the Work after notification of rejection.

PART 2 – PRODUCTS

2.01 MANUFACTURERS' CERTIFICATES

Submit manufacturer's certificate that product meets or exceeds specified requirements as specified in Section 01600 – Material and Equipment and Section 01750 – Testing and Startup.

2.02 MATERIALS TESTING

The Contractor shall employ the services of an independent, testing laboratory to perform inspections, tests, and other services as specified in Section 01430 – Materials Testing. The Contractor's responsibilities are described in Section 01430.

PART 3 – EXECUTION

3.01 MANUFACTURERS' INSTRUCTIONS

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

3.02 WORKMANSHIP

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

B. Comply with all local, state and federal regulations and ordinances.

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

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

3.03 MANUFACTURERS' FIELD SERVICES

A. When specified in the individual product section, require manufacturer or manufacturer's representative to provide qualified personnel to observe field conditions; conditions of surfaces and installation; quality of workmanship; start-up, testing, adjustment, and balance of equipment as applicable; and to make appropriate recommendations.

B. The extent of the manufacturer's field services shall be as specified in the individual product specification sections.

END OF SECTION

SECTION 01470

COLOR AUDIO-VIDEO PRECONSTRUCTION RECORD

PART 1 - GENERAL

1.01 SCOPE

Prior to commencing work, the Contractor shall take a continuous color audio-video digital DVD recording of Project site to serve as a record of pre-construction conditions.

1.02 APPROVAL

No construction shall begin prior to review and approval by Engineer of the DVD recording covering construction area. The Engineer shall have authority to reject all or any portion of the recording not conforming to specifications and order that it be done again at no additional charge. The Contractor shall reschedule unacceptable coverage within five days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-video coverage. Recordings shall not be made more than 60 days prior to construction in any area. All DVDs and written records shall become property of the City. Prior to video recording, there will be a meeting between Engineer, Contractor and electrographer.

1.03 PROFESSIONAL ELECTROGRAPHERS

Engage the services of a professional electrographer. The color audio-video recording shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of preconstruction color audio-video documentation. The electrographer shall furnish to Engineer a list of names and addresses of two references that electrographer has performed color audio-video recording for projects of a similar nature.

PART 2 - PRODUCTS

2.01 AUDIO-VIDEO DVDs

Audio-video DVDs shall be new as manufactured by Maxell or equal. Reprocessed disks will not be acceptable. The Contractor shall submit two copies of each DVD recording for review and approval.

2.02 EQUIPMENT

A. Furnish all equipment, accessories, materials and labor to perform this service. The total audio-video system shall reproduce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity and be free from distortion and interruptions.

B. The color video camera used in the recording system shall have a horizontal resolution of 300 lines at center, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of 25 foot-candles.

PART 3 - EXECUTION

3.01 SCHEDULING

No recording shall be done during precipitation, mist or fog. Recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.

3.02 RECORDED INFORMATION – AUDIO

Each recording shall begin with current date, project name and Owner and followed by general location, i.e., viewing side and direction of progress. Audio track shall consist of an original live recording. Recording shall contain the narrative commentary of electrographer, recorded simultaneously with his fixed elevation video record of the zone of influence of construction.

3.03 RECORDED INFORMATION - VIDEO

All video recordings must, by electronic means, display continuously and simultaneously generated with the actual taping transparent digital information to include the date and time of recording, and station numbers as shown on the Drawings. Date information shall contain the month, day and year. Time information shall contain the hour, minutes and seconds. Additional information shall be displayed periodically. Such information shall include but not be limited to project name, contract number, name of street or structure, direction of travel and view. This transparent information shall appear on the extreme upper left hand third of the screen.

3.04 AREA OF COVERAGE

A. Recorded coverage shall include all surface features located within the zone of construction supported by appropriate audio coverage. Such coverage shall include special attention to existing driveways, sidewalks, curbs, pavements, structures, exposed piping, electrical and control devices, landscaping, culverts, fences, signs and headwalls within the area covered.

B. When a conventional wheeled vehicle is appropriate for use, distance from the camera lens to the ground shall not be less than twelve feet. Rate of speed in the general direction of travel of the vehicle used during recording shall not exceed 15 feet per minute. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the object. Tape coverage may be required in areas not accessible by vehicles. Such coverage shall be obtained by walking or special conveyance approved by the Engineer.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements for temporary utilities.

1.02 TEMPORARY SERVICES

A. Each temporary service shall meet the requirements of the utility having authority over the temporary service. Provide metering and isolation to meet requirements of utility authority over temporary service.

B. Obtain permission of utility having authority over temporary service prior to connecting temporary service.

C. Remove temporary services after temporary services are no longer needed for construction operations, site security, field offices, or testing. Restore to pre-construction condition.

1.03 APPLICATION AND PAYMENT FOR TEMPORARY SERVICES

A. Make applications and arrangements and pay all fees and charges for temporary electrical, potable water, non-potable water, sanitary and telephone services.

B. Provide and pay for temporary generators, pumps, wiring, switches, piping, connections, meters, and appurtenances for temporary utilities.

C. The following permanent utility services and services relative to temporary utilities shall be provided by the Owner.

1. Electricity for facilities that are occupied and operated by the Owner.
2. Potable water for facilities that are occupied and operated by the Owner.
3. Telephone service for facilities that are occupied and operated by the Owner.

1.04 ELECTRICITY, LIGHTING

A. For facilities connected to permanent electrical services, the Contractor shall pay the Owner by deductive cost Change Order for all electrical power used in new facilities until facility is accepted, occupied, and operated by the Owner.

B. Provide temporary electrical service, or services, for the following:

1. Power tools for construction operations.
2. Construction lighting.
3. Security lighting.

4. Field offices and sheds.
5. Testing specified in individual Sections.

C. Provide construction lighting as required for the following:

1. Prosecution of Work;
2. Observation of Work by Engineer, Owner, and regulatory authorities;
3. Access to facilities occupied by Owner within project site.

D. Wiring for Temporary Electrical Services

1. Properly install and maintain wiring for temporary lighting and power.
2. Provide separate circuits for temporary lighting and for temporary power.
3. Provide branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
4. Securely fasten wiring and electrical devices.
5. Temporary lighting and power facilities shall meet the requirements of OSHA Safety and Health Standards for Construction.

1.05 WATER

A. Provide temporary water services for the following:

1. Potable water or non-potable water for construction operations.
2. Potable water for consumption by Contractor's and subcontractors' personnel.
3. Potable water for field offices.
4. Potable water or non-potable water for fire protection on the construction site.

B. Piping for Temporary Water Services

1. Provide pipe, fittings, valves, and hydrants for temporary water service, or services.
2. Provide temporary pumps, storage tanks, and controls if available water volume, pressure, or volume and pressure are not sufficient for construction operations.
3. Extend branch piping with outlets located so that water is available by use of hoses.
4. Securely anchor and support temporary water piping.
5. Provide warning signs at each temporary non-potable water outlet.

1.06 SANITARY FACILITIES

A. Provide sanitary facilities (fixed toilets or portable chemical toilets) for Contractor's and subcontractor personnel.

B. Sanitary Facilities for Contractor's and Subcontractor Personnel shall meet the requirements of OSHA Safety and Health Standards for Construction.

C. Seclude sanitary facilities from public observation as follows:

1. Locate sanitary facilities so that sanitary facilities cannot be observed by public, or
2. Provide screening around sanitary facilities so that public cannot observe sanitary facilities.

D. Maintain sanitary facilities so that sanitary facilities are clean and dry at all times.

E. Enforce use of sanitary facilities. Do not commit nuisances on the project site.

1.07 HEAT, VENTILATION, AND AIR CONDITIONING

A. Provide temporary heat, ventilation, and air conditioning for the following:

1. Construction operations.
2. Protection, drying, and curing of materials and finishes.
3. Field offices and sheds.

B. Temporary heat and ventilation for construction operations shall meet the requirements of OSHA Safety and Health Standards for Construction.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION

SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements for project site security

1.02 SITE SECURITY

A. Site Not Occupied by Owner: The Contractor shall be fully responsible for site security until site is partially or fully occupied by Owner.

B. Facilities Partially Occupied by Owner: Site security of partially occupied sites shall be joint responsibility of Contractor and Owner.

1. Contractor shall provide security for the following:

a. Contractor's and subcontractors' staging areas and storage areas.

b. Field offices and sheds.

c. New facilities under construction.

d. Existing facilities being renovated.

2. Owner shall provide security for the following:

a. Facilities occupied by Owner.
b. Site areas solely occupied by Owner.

3. Site Entrance

a. Contractor shall provide security for site entrance for Contractor's and subcontractors' use.

C. The Contractor shall be fully responsible for security of construction equipment, products, small tools, and other items related to the construction.

1.03 SECURITY PROGRAM

A. Protect Work from theft, vandalism, and unauthorized entry.

B. Maintain program throughout construction period until Owner acceptance precludes the need for Contractor security.

1.04 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into construction site.

B. Owner will control entrance of persons and vehicles related to Owner's operations.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

General requirements for materials and equipment and requirements for procurement, handling, storage and startup of materials and equipment, and training of Owner's staff.

1.02 SUBMITTALS

A. General: As specified in Section 01330 – Submittals.

B. Lubricant Test Report: as specified in this Section.

C. Substitutions: as specified in this Section.

D. Manufacturer Certificate of Completion: The Contractor shall obtain written certification from the equipment manufacturer, stating that the equipment will efficiently and thoroughly perform the required functions in accordance with the Specifications and as indicated on the Drawings. Contractor shall have responsibility for coordination of all equipment, including motors, variable speed drives, controls, and services required for proper installation and operation of the completely assembled and installed equipment. The Contractor shall submit all such certificates to the Engineer with the shop drawings.

1.03 INFORMATION REGARDING BUY AMERICAN

A. Products manufactured outside of the United States will not be considered acceptable for the Work unless the Manufacturer submits current certifications as ISO/9001 compliant and the manufacturing location(s) is currently certified as ISO/9001 compliant. The ISO certification must come from a firm having itself been certified by the International Accreditation Forum.

B. Products manufactured outside of the United States will not be considered acceptable for the Work unless the Manufacturer is a City of Naples approved manufacturer.

C. Refer to part 2.02 of this section.

1.04 QUALITY ASSURANCE

A. Inspection, Field Adjustment, and Startup: Demonstrate that all equipment meets the intended function and specified performance requirements.

B. Tolerances: Tolerances and clearances shall be shown on the shop drawings. Adhere to approved tolerances and clearances. Machine work shall be of high-grade workmanship and finish, with due consideration to the special nature or function of the parts. Members without milled ends and which are to be framed to other steel parts of the structure may have a

variation in the detailed length of not greater than 1/16 of an inch for members 30 feet or less in length, and not greater than 1/8 of an inch for members over 30 feet in length.

C. Machine Finish: The type of finish shall be the most suitable for the application and shall be shown in micro-inches in accordance with ANSI B46.1. The following finishes shall be used:

1. Surface roughness not greater than 63 micro-inches shall be required for all surfaces in sliding contact.
2. Surface roughness not greater than 250 micro-inches shall be required for surfaces in contact where a tight joint is not required.
3. Rough finish not greater than 500 micro-inches shall be required for other machined surfaces.
4. Contact surfaces of shafts and stems that pass through stuffing boxes and contact surfaces of bearings shall be finished to not greater than 32 micro-inches.

D. Manufacturer's Experience: Unless otherwise directed by the Engineer, all equipment furnished shall have a record of at least 5 years of successful, trouble-free operation in similar applications within the United States, from the same manufacturer.

PART 2 – PRODUCTS

2.01 GENERAL

A. Products include material, equipment, and systems.

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

C. All products shall be new and of the very best quality.

D. Components that are supplied in quantity within a Specification section shall be the same, and shall be interchangeable.

E. All parts of the equipment furnished shall be amply designed and constructed for the maximum stresses occurring during fabrication, erection and continuous operation.

2.02 STAINLESS STEEL

A. All stainless steel fasteners shall be polished during the manufacturing process to provide a bright surface finish.

B. The submittal data on stainless steel fasteners manufactured outside the United States shall include documentation of alloy elemental analysis performed as routine and ongoing quality control measures associated with the manufacture of the specific products for this project.

2.03 PRODUCT OPTIONS

A. Products specified by reference standards or by descriptions only: Any product meeting these requirements can be submitted for approval.

B. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not specifically named.

C. Products specified by naming one or more manufacturers with no provision for substitutions: No substitutions will be allowed.

2.04 SUBSTITUTIONS

A. A request for substitution should be made enough time in advance of procurement to allow time for review by the Engineer. A substitution may not be accepted if it delays the project schedule.

B. Document each request for substitution with complete data substantiating compliance of proposed substitution with material or product specifications.

C. Request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

2. Will provide the same warranty for substitution as for specified product.

3. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.

4. Waives claims for additional costs that may subsequently become apparent.

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

E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

2.05 MANUFACTURERS' CERTIFICATIONS

A. Prior to or upon delivery at project site, furnish an Affidavit of Compliance certified by the equipment manufacturer that the equipment and appurtenances furnished comply with all applicable provisions of applicable referenced standards and these Specifications.

B. Do not deliver invoice for equipment at job site until Affidavit of Compliance has been submitted and accepted by the Engineer.

2.06 NOISE AND VIBRATION

A. When in operation, no single piece of equipment shall exceed the OSHA noise level requirements for a one-hour exposure.

B. Equipment that transmits vibration to structures, piping, conduit, or other items connected to the equipment, shall be provided with restrained spring-type vibration isolators or pads per manufacturer’s written recommendations.

C. Equipment that can be damaged by vibration generated by the equipment or by vibration transmitted through piping or other connecting items, shall be provided with vibration damping per manufacturer's written recommendations.

2.07 WELDING OF EQUIPMENT AND PIPE

A. Shop Welding: Unless otherwise specified or shown, shop welding shall conform to the following:

1. Applicable Standards of the American Welding Society for the material and type of item being welded.

2. All composite fabricated steel assemblies, which are to be erected or installed inside a hydraulic structure, including any fixed or movable structural components of mechanical equipment, shall have continuous seal welds to prevent entrance of air or moisture.

3. All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

4. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

B. Field Welding: Field welding shall be as specified in individual specification sections. Qualification of welders shall be in accordance with the AWS standards. Prior to commencement of any field welding, the Contractor shall furnish the Engineer a copy of each welder's current certification for the alloy, position and type of welding to be performed.

2.08 PROTECTIVE COATINGS FOR EQUIPMENT

A. Equipment shall be painted or coated in accordance with manufacturer’s recommendations unless specified otherwise or as approved by the Engineer. Coated surfaces shall be protected from abrasion or other damage during handling, testing, storing, assembly, and shipping.

B. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to the Engineer up to the time of the final acceptance.

C. Shop-painted items which suffered damage to the shop coating shall be touched up as recommended by the manufacturer.

2.09 GEARS AND GEAR DRIVES

A. Unless otherwise specified, gears shall be of the helical or spiral-bevel type, designed and manufactured in accordance with AGMA Standards, with a minimum B-10 bearing life of 60,000 hours and a minimum efficiency of 94 percent. Gear reducer service factor shall be based on nominal motor horsepower and shall be:

1. 2.0 for drives incorporating flexible connections between the driven shaft and the gear reducer.

2. 2.5 for coupled drives with pinion gears incorporating a torsionally soft coupling between the motor and pinion shaft.

3. 2.75 for integral gear motors with pinion gears where the pinion is rigidly affixed to the motor shaft.

B. For integral gear motors with pinion gears, pinions shall not be of the shell type. The pinion gear shall be easily removable from the motor shaft in the field.

C. Gear speed reducers or increasers shall be of the enclosed type, oil- or grease-lubricated and fully sealed, with a breather to allow air to escape but keep dust and dirt out. Casings shall be of cast iron or heavy-duty steel construction with lifting lugs and an inspection cover for each gear train.

D. Each oil lubricated gear speed reducer or increaser shall be provided with an oil level sight glass and an oil flow indicator, arranged for easy reading. Oil level and drain location relative to the mounting arrangement shall be easily accessible. Provide oil coolers, or heat exchangers, with required appurtenances when necessary to maintain the proper oil temperature for the application.

E. Input and output shafts shall be designed for the service and load requirements of the equipment of which gear drives are a part. Gears shall be computer-matched for minimum tolerance variation. Each output shaft shall have seals that prevent lubricant leakage. Each oil lubricated gear dive output shaft shall have two positive seals.

F. Where gear drive input or output shafts connect to couplings or sprockets not supplied by the gear drive manufacturer, the gear drive manufacturer shall supply matching key taped to the shaft for shipment.

G. Ship gears and gear drives fully assembled for field installation.

2.10 DRIVE CHAINS

A. General

1. Power drive chains shall be commercial type roller chains and meet ANSI Standards.

2. Provide chain take-up or tightener that provides easy adjustment of chain tension.

3. Provide a minimum of one connecting or coupler link with each length of roller chain.

4. Chain and attachments shall be of the manufacturer's best standard material and suitable for the process fluid.

B. Sprockets

1. Sprockets shall be used in conjunction with all chain drives and chain-type material handling equipment.

2. Unless otherwise specified, sprockets material shall be as follows:

a. Sprockets with 25 teeth or less, normally used as a driver, shall be made of medium carbon steel in the 0.40 to 0.45 percent carbon range.

b. Type A and B sprockets with 26 teeth or more, normally used as driven sprockets, shall be made of minimum 0.20 percent carbon steel.

c. Large diameter sprockets with Type C hub shall be made of cast iron conforming to ASTM A 48, Class 30.

3. Sprockets shall be accurately machined to ANSI Standards. Sprockets shall have deep hardness penetration in tooth sections.

4. Finish bored sprockets shall be furnished complete with key seat and setscrews.

5. Sprockets shall be of the split type or shall be furnished with taper-lock bushings as required.

6. Idler sprockets shall be furnished with brass or Babbitt bushings, complete with oil hole and axial or circumferential grooving. Steel collars with setscrews may be provided in both sides of the hub.

2.11 V-BELT DRIVES

A. V-belts and sheaves shall be highest industrial grade and shall conform to ANSI and MPTA Standards.

B. Unless otherwise specified, sheaves shall be machined from gray cast iron.

C. Sheaves shall be statically balanced. In some applications where vibration is a potential problem, sheaves shall be dynamically balanced. Sheaves operating at belt speeds exceeding 6,500 feet per minute may be required to be of special materials and construction.

D. Sheaves shall be furnished complete with taper-lock or QD bushings.

E. Finish bored sheaves shall be furnished complete with key seat and setscrews.

2.12 DRIVE GUARDS

A. Power transmission, prime movers, machines, and moving machine parts shall be guarded to conform to the OSHA Safety and Health Standards (29CFR1910).

B. Where required for lubrication or maintenance, guards shall have hinged access doors.

C. Drive guards shall be fabricated of 16 gauge minimum galvanized steel or 304 stainless steel. Drive guards shall be easily removable.

2.13 BEARINGS

A. Bearings shall conform to the standards of the Anti-Friction Bearing Manufacturers Association, Inc. (AFBMA).

B. Fitting practice, mounting, lubrication, sealing, static rating, housing strength, and other factors shall be considered in bearing selection.

C. Grease-lubricated type bearings shall be equipped with a hydraulic grease fitting in an accessible location and shall have sufficient grease capacity in the bearing chamber.

D. Install stainless steel tubing and supports as necessary to extend grease fittings so that greasing can be done from platforms and walkways used by the Owner in routine operations.

E. Permanently lubricated bearings shall be factory-lubricated with the manufacturer's recommended lubricant.

F. Except where otherwise specified or shown, bearings shall have a minimum B-10 life expectancy of 60,000 hours.

G. Bearing housings shall be of cast iron or steel and bearing mounting arrangement shall be as specified or shown, or as recommended in the published standards of the manufacturer. Split-type housings may be used to facilitate installation, inspection, and disassembly.

H. Sleeve-type bearings shall have a Babbitt or bronze liner.

2.14 SHAFTING

A. Shafting shall be continuous between bearings and shall be sized to transmit the power required. Keyways shall be accurately cut in line. Shafting shall not be turned down at the ends to accommodate bearings or sprockets whose bore is less than the diameter of the shaft. Shafts shall rotate in the end bearings and shall be turned and polished, straight, and true.

B. Shafting materials shall be appropriate for the type of service and torque transmitted. Environmental elements such as corrosive gases, moisture, and fluids shall be taken into consideration. Materials shall be as shown or specified unless furnished as part of an equipment assembly.

1. Low carbon cold-rolled steel shafting shall conform to ASTM A108, Grade 1018.
2. Medium carbon cold-rolled shafting shall conform to ASTM A108, Grade 1045.
3. Corrosion-resistant shafting shall be stainless steel or monel, whichever is most suitable for the intended service.

C. Where differential settlement between the driver and the driven equipment may be expected, a shaft of sufficient length with two sets of universal type couplings shall be provided.

D. All shafting shall be dynamically balanced in accordance with the recommendations of the shafting manufacturer.

E. The Contractor shall furnish and install a heavy-duty shaft guard for all drive shafting which is less than seven feet above floor or platform level I accordance with the provisions of

Paragraph 1910.210 of OSHA Rules and regulations. Provision shall be made in the guard as necessary for lubrication and inspection access of the joints and bearings without the necessity of removing the entire guard assembly.

2.15 COUPLINGS

A. Flexible couplings shall be provided between the drivers and driven equipment. Flexible couplings shall accommodate angular misalignment, parallel misalignment, end float. Flexible couplings shall cushion shock loads.

B. Equipment manufacturer shall select or recommend the size and type of coupling required to suit each specific application.

C. Where required for vertical shafts, 3-piece spacer couplings shall be installed.

D. Taperlock bushings may be used to provide for easy installation and removal on shafts of various diameters.

E. Where universal type couplings are shown, they shall be of the needle bearing type construction, equipped with commercial type grease fittings.

2.16 EQUIPMENT FOUNDATIONS

A. Provide equipment foundations in accordance with equipment manufacturers' written instructions.

B. Mount mechanical equipment, tanks, and floor mounted control cabinets on minimum 4" high concrete bases, as shown on standard details, unless otherwise shown or specified.

C. Submit foundation drawings for review.

2.17 ANCHOR BOLTS AND FASTENERS

All fastening devices used to secure pipe or equipment to a structure shall be type 316 stainless steel. This requirement includes nuts and washers.

2.18 SHOP FABRICATION

Perform shop fabrication in accordance with the final reviewed and processed shop drawings.

2.19 NAMEPLATES

A. Equipment nameplates shall be stainless steel. Nameplates shall be engraved or stamped. Fasten nameplates to equipment in an accessible location with No. 4 or larger oval head stainless steel screws or drive pins.

B. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the machine performance ratings.

2.20 WARRANTIES

Furnish warranties as specified in the individual specification sections.

2.21 SPARE PARTS

Following approval of the spare parts list by the Engineer and immediately prior to Substantial Completion, furnish spare parts suitably packaged for long-term storage and labeled with the date of supply, the equipment number and part number, equipment description and part description.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall be responsible for the delivery, storage, and handling of products.

B. Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry.

C. Each item of equipment shipped shall have a legible identifying mark corresponding to the equipment number shown or specified for the particular item.

D. Transport products by methods that prevent product damage. Deliver products dry and in undamaged condition in manufacturer's unopened containers or packaging. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

E. Load and unload equipment and appurtenances by hoists or skidding and in accordance with the manufacturer's recommendations. Do not drop products. Do not skid or roll products on or against other products. Pad slings and hooks in a manner that prevents damage to products.

F. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions. Store products that will be deteriorated by sunlight in a cool location out of direct sunlight. Rubber products shall not come in contact with petroleum products.

G. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering and as recommended by manufacturer; provide ventilation that avoids condensation.

H. Deliver pipe, fittings, valves, and accessories in a clean and undamaged condition. Store pipe, fittings, valves, and accessories off the ground and in accordance with manufacturer’s instructions. Do not stack ductile iron pipe higher than the limits shown in ANSI/AWWA C600. Stacking of pipe shall meet the requirements of the pipe manufacturer. Do not stack fittings, valves, valve boxes, or valve stands.

I. Keep stored products safe from damage or deterioration. Keep the interior of pipe, fittings, valves, and appurtenances free from dirt or foreign matter. Drain and store valves in a manner that will protect valves from damage. Store gaskets, plastic pipe and fittings, and other products that will be deteriorated by sunlight in a cool location out of direct sunlight.

J. Equipment having moving parts such as gears, bearings, and electric motors; instruments; control panels; motor control centers; and switchgear shall be stored in a temperature and humidity controlled area until equipment is installed and permanent HVAC systems are in operation.

K. Stored electric motors and actuators with space heaters shall have the space heaters energized. When electric motors and actuators with space heaters are installed, the space heaters shall be connected and energized. Space heaters shall remain energized until equipment is accepted and placed in service.

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

M. Promptly remove damaged products from the job site. Replace damaged products with undamaged products at no expense to Owner.

3.02 MANUFACTURERS' REPRESENTATIVES

A. Provide the services of experienced, competent, and authorized service representative of the manufacturer of the items of equipment when specified in the individual Product Section.

B. Manufacturers' representatives shall visit the site of Work, and shall perform the following tasks:

1. Assist Contractor in installation of equipment.

2. Inspect, check, adjust equipment, and approve equipment installation.

3. Start-up and field-test equipment for proper operation, efficiency, and capacity. Perform necessary field adjustments during the test period until equipment installation and operation are satisfactory to the Engineer.

4. Supervise functional test as specified in Section 01750 – Testing and Start-Up

5. Instruct Owner's personnel in operation and maintenance of equipment as specified in this Section.

C. The times specified in the individual product sections for the Manufacturer's Representative to provide services are exclusive of travel time to and from the facility. The times specified shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to place the equipment in satisfactory operation.

3.03 INSTALLATION

A. Install equipment in accordance with acceptable procedures submitted with the shop drawings and as indicated on the Drawings, unless otherwise accepted by the Engineer.

B. Measure drive shafts just prior to assembly to ensure correct alignment without forcing.

C. Support pipe, fittings, valves, conduit, and other items connected to equipment so that there are no excess stresses and loads on equipment.

D. Equipment shall be secure in position and neat in appearance.

3.04 LUBRICANTS

A. Furnish and install lubricants required for initial operation.

B. Maintain lubricants at proper levels until equipment is accepted.

C. Change lubricants in each piece of equipment following equipment initial run-in. The manufacturer shall test removed lubricants for metal particles and lubricant breakdown. Submit lubricant test report to the Engineer. If the equipment manufacturer requires the first lubricant change prior to Final Completion, the Contractor shall remove lubricant and furnish and install the necessary lubricants.

D. All oils and lubricants shall be food grade products. (Moly-Kote L-1146 oil and other lubricants per NLGI2)

3.05 FIELD TESTS

A. Field test equipment in accordance with Section 01750 - Testing and Start-up.

B. Field test equipment as specified in individual Specification Sections.

3.06 FUNCTIONAL TEST

Prior to placing systems in service, perform functional test of each system as specified in Section 01750 - Testing and Start-up.

3.07 TRAINING

A. Manufacturer's representative, responsible subcontractor, or both shall instruct Owner's designated operating and maintenance personnel in correct operation and maintenance procedures for equipment and systems when specified in individual product specification sections. Qualified persons who have been made familiar in advance with equipment and systems at Owner’s facility shall give on-site instruction.

B. Submit to Engineer not less than 14 days prior to each training session an outline of the training program and the qualifications of the trainer(s).

C. Coordinate training with the Owner. Notify Owner not less than 14 days in advance of each training session.

D. Provide training while equipment is fully operational.

E. Provide training for up to three separate shifts of Owner's personnel between the hours of 6:00 A.M. and 6:00 P.M. as necessary to accommodate Owner's personnel schedule. Duration of each training session shall be not less than two hours or more than six hours.

F. **Operation and Maintenance Data as specified in Section 01830 shall be submitted and accepted prior to commencement of training. Use accepted Operation and Maintenance manuals as the basis of instruction**.

1. Review contents of manual with personnel in full detail.

2. Explain all aspects of operation and maintenance.

3. Demonstrate start-up, operation, control, adjustment, calibration, trouble-shooting, servicing, maintenance, and shutdown of equipment.

END OF SECTION

SECTION 01740

CONSTRUCTION CLEANING

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements for cleaning project site and disposal of waste materials, debris, and rubbish during construction.

1.02 SITE AND FACILITIES CLEANING

A. Site Not Occupied by Owner: The Contractor shall be fully responsible for cleaning until site is partially or fully occupied by Owner after attaining Substantial Completion.

B. Facilities Partially Occupied by Owner: Cleaning of partially occupied sites shall be responsibility of the Contractor.

1. Contractor shall clean the following:
    a. Contractors and subcontractors' staging areas and storage areas.
    b. Field offices and sheds.
    c. New facilities under construction.
    d. Existing facilities being renovated.
2. Owner shall be responsible for cleaning the following:
    a. Facilities occupied solely by Owner.
    b. Site areas solely occupied by Owner.

PART 2 - PRODUCTS

2.01 EQUIPMENT

Provide covered containers for deposit of waste materials, debris, and rubbish.

PART 3 - EXECUTION

3.01 CLEANING - GENERAL

A. Maintain areas under Contractor's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to closing the space.

C. Periodically clean interior areas to provide suitable conditions for work.

D. Broom clean interior areas prior to start of surface finishing, and continue cleaning on an as-needed basis.

E. Control cleaning operations so that dust and other particulates will not adhere to wet or newly coated surfaces.

3.02 CLEANING OF NEW WORK

A. The Contractor shall be fully responsible for cleaning related to new Work including, but not necessarily limited to, the following:

1. Cleaning of cured, or partially cured, concrete surfaces prior to placement of additional concrete.

2. Cleaning of joint surfaces prior to making joints.

3. Cleaning of surfaces prior to application of finish.

4. Cleaning of equipment and enclosures prior to Substantial Completion.

5. Cleaning of new buildings and renovated buildings prior to Substantial Completion.

B. Cleaning relative to new Work shall be as specified in individual specifications sections.

3.03 DISPOSAL

A. Remove waste materials, debris, and rubbish from site periodically.

B. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.

3.04 REPAIR AND RESTORATION

A. Clean and repair damage caused by installation or use of temporary facilities.

B. Restore existing facilities used during construction to condition prior to construction.

END OF SECTION

SECTION 01750

TESTING AND START-UP

PART 1 - GENERAL

1.01 SECTION INCLUDES

Procedures for testing and startup of all equipment included in this project.

1.02 QUALITY CONTROL

A. When specified in individual Product Specification Sections, require manufacturer to provide authorized representative to be present at site at time of startup, testing, and training

B. Manufacturer's representative shall perform services as described in Section 01600 − Material and Equipment.

1.03 SUBMITTALS

A. General: as specified in Section 01330 – Submittals.

B. In addition, submit the following to the Engineer:

1. Preliminary schedule listing times, dates and sequence for start-up of each item of equipment fourteen days prior to proposed dates.

2. Manufacturer's representative reports within ten (10) days after testing.

3. Each manufacturer shall prepare and submit a completed document, which is contained at the end of this Section, certifying the installation is acceptable and meets their standards and the equipment or device is functioning properly. The Contractor shall submit these certifications to the Engineer prior to either Substantial Completion or placing the equipment in service. A sample of the required certification document is appended to this Section 01750.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that Project conditions comply with requirements.

B. Verify that status of Work meets requirements for starting of equipment and systems.

3.02 PREPARATION AND CONTRACTOR'S INITIAL START-UP AND INITIAL FUNCTIONAL TEST

A. Coordinate sequence for initial start-up of various items of equipment.

B. Notify Engineer fourteen (14) days prior to initial start-up of each item of equipment.

C. Have Contract Documents, shop drawings, product data, and operation and maintenance data at hand during entire start-up process.

D. Provide control diagrams that show actual control components and wiring.

E. Verify that each piece of equipment has been checked for proper lubrication, drive rotation, belt tension, control sequence, noise, vibration and other conditions that may cause damage.

F. Verify control systems are fully operational in automatic and alternate modes of operation.

G. Verify that tests, meter readings, and specific electrical characteristics agree with those specified by electrical equipment manufacturer.

H. Verify that instruments, meters, and gages have been calibrated. Perform three-point calibration on continuous elements and systems. Provide calibration records.

I. Conduct start-up and initial functional testing.

J. Provide temporary flow meters and other measurement devices as required for testing of equipment and systems.

3.03 START-UP AND FUNCTIONAL TEST – DEMONSTRATION FOR OWNER AND ENGINEER

A. Perform satisfactory Contractor's initial start-up and functional test prior to demonstration for Owner and Engineer.

1. Perform pre-startup inspection of installation.

2. Perform startup under no-load conditions, if possible. Observe noise, vibration and operation.

3. If all operating characteristics are normal, proceed with startup.

4. Operation equipment and system under all lead conditions and confirm all operating characteristics are normal. If normal operation is observed, proceed with witnessed functional test and performance test as required.

B. Perform functional and performance tests.

1. Perform functional and performance tests under supervision of responsible manufacturer's representatives, instrumentation and control subcontractor, and Contractor personnel.

2. Representatives of Owner and Engineer shall witness functional test.

3. Perform functional and performance tests an each piece of equipment and operational system as specified in the individual product sections.

4. If system is to be placed in service in phases, perform functional and performance tests on each part of system prior to placing each part of system in service.

C. Demonstrate that equipment operates and complies with specified performance requirements.

D. Demonstrate that control panel functions, including failures and alarms, operate and comply with specified performance requirements.

E. Functional test shall be non-destructive.

F. If approved by the Engineer, simulate failures and alarm conditions by jumping failure input terminals.

G. Provide signal generators that simulate control conditions if it is not feasible to create actual conditions.

H. Use actual as-built control diagrams in demonstration of functions.

I. Use Operation and Maintenance manuals to demonstrate operation of equipment.

J. If functional test or performance test does not meet requirements specified in this Section, Contractor shall compensate Engineer for additional time required to observe functional testing until system successfully completes functional testing.

3.04 TRAINING

A. Training shall not occur until after completion of successful functional testing and performance testing.

B. Comply with Section 01600 – Material and Equipment, Parts 3.02 through 3.07.

C. Comply with Section 01830 – Operation and Maintenance Data.

3.05 PLACING SYSTEMS IN SERVICE

A. Complete functional testing prior to placing system in service.

B. Execute start-up under supervision of responsible manufacturer's representative and Contractor personnel.

C. Place equipment in operation in proper sequence.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF

PROPER INSTALLATION AND OPERATION

PROJECT: ACCELATOR NO. 3 REHABILITATION & IMPROVEMENTS

Date: _____

PRODUCT: _____

SERIAL NO.: _____

SPECIFICATION SECTION: _____

As an authorized representative of the manufacturer, the undersigned certifies the product identified above has been inspected and is installed in accordance with the manufacturer's recommended standards, except as noted below.

The undersigned further certifies that the product identified above has been placed into satisfactory operation, except as noted below.

Exceptions and comments:

_____

_____

_____

_____

_____

_____

_____

Signature: _____

Printed Name: _____

A copy of this executed Certificate must be included in the Operation and Maintenance Data. A copy must be forwarded to the Engineer upon completion of startup and testing.

SECTION 01770

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements for contract closeout.

1.02 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. When Contractor considers work has reached final completion, submit written certification that Contract Documents have been reviewed, work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.

C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

D. If appropriate, Engineer will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

1.03 PROJECT RECORD DOCUMENTS

A. Project Record Documents shall be as specified in Section 01781 – Project Record Documents.

B. Prior to Contract closeout, submit Record Documents to Engineer with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

1.04 WARRANTIES AND BONDS

Contractor shall ensure that all warranties and bonds have been received and submitted to Owner as specified in the Contract Documents.

1.05 SPARE PARTS

A. Contractor shall ensure that all spare parts have been provided as specified in individual Product Sections. Spare parts shall be packaged and labeled as specified in Section 01600 – Material and Equipment.

B. Contractor deliver the spare parts to the Owner at one time. The delivery shall include an itemized list to be signed and dated by the receiving party for the City of Naples.

1.06 OPERATION AND MAINTENANCE MANUALS

Contractor shall ensure that Operation and Maintenance manuals have been provided to the Owner as specified in Section 01830 – Operation and Maintenance Data.

1.07 CERTIFICATES OF PROPER INSTALLATION AND OPERATION

Contractor shall provide complete Certificates of Proper Installation and Operation as specified in the Contract documents.

PART 2 - PRODUCTS (not used)

PART 3 – EXECUTION

3.01 FINAL CLEANING

A. Execute prior to final inspection.

B. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean or replace all filters of mechanical equipment immediately after issuance of Substantial Completion. Clean roofs, gutters, downspouts, and drainage systems.

C. Clean site, sweep paved areas, and rake clean other surfaces.

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

END OF SECTION

SECTION 01781

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 SECTION INCLUDES

Requirements for preparation, maintenance and submittal of project record documents. **The Contractor's attention is specifically directed to Part 3.02.B of this Section.**

1.02 SUBMITTALS

A. General: as specified in Section 1330 - Submittals

B. At Contract close out, deliver one copy of record documents to Engineer.

1.03 REQUIREMENTS

Contractor shall maintain at the site for the Owner one record copy of:

A. Drawings
B. Specifications
C. Addenda
D. Change orders and other modifications to the Contract
E. Engineer’s field orders or written instructions
F. Approved shop drawings, working drawings and samples
G. Field test records
H. Construction photographs
I. Detailed Progress Schedule

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION

3.01 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Project record documents shall be stored in Contractor’s field office or other location approved by the OWNER apart from documents used for construction

B. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

C. Make documents and samples available at all times for inspection by the Engineer and/or Owner.

3.02 RECORDING

A. General

1. Label each document “PROJECT RECORD” in neat, large printed letters.
2. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
3. Record information in red ink.

B. Record Drawings

1. Drawings shall indicate all deviations from Contract Drawings including:
   a) Field changes of dimension and detail
   b) Changes made by Change Order
   c) Details, utilities, piping or structures not on original Contract Drawings.
   d) Equipment and piping relocations.

C. Specifications and Addenda

Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
2. Changes made by Field Order or Change Order.

D. Shop Drawings

1. Keep one copy of the final, approved shop drawing with the Record Documents. Do not keep previously rejected submittals unless they are necessary to complete the submittal.
2. Record documents should include all shop drawing information submitted. Additional information submitted during the Engineer’s review process should be filed with the appropriate submittal.

END OF SECTION

SECTION 01830

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SECTION INCLUDES

Requirements for content and submittal of manufacturers' operation and maintenance data and content and submittal of Facility's Operation and Maintenance manual.

1.02 SUBMITTALS: MANUFACTURERS' O&M DATA

A. Submittals shall be as specified in Section 01330 – Submittals.

B. Draft: Submit electronic draft copy of manufacturer's O&M Data not later than shipment of product. Draft O&M Data shall include binding. The Engineer will review and return electronically with comments.

C. Final: Revise the manufacturer's O&M Data based upon the Engineer’s comments as well as the completed installation and any deficiencies noted during instruction of Owner’s personnel. Submit an electronic copy and, upon approval, submit two hard copies of the complete, final O&M Data along with two flash drives with each containing all of the O&M Data in PDF format. Submit final O&M Data not more than 30 days after final inspection and startup.

1.03 CONTENTS, EACH VOLUME OF MANUFACTURER O&M DATA

A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, subconsultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: List names, addresses, facsimile and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

E. Instructions: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Each manual shall comply with Parts 2.01and 2.02 of this Section.

G. Warranties and Bonds: Bind in copy of each.

H. Additional Requirements: As specified in individual Product specification sections.

1.04 DATA FOR MATERIALS AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. (Provide information for re-ordering custom manufactured Products.)

B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

1.05 DATA FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System: Provide the following:

1. Product description;
2. Operating Procedures;
3. Maintenance Procedures;
4. Parts;
5. Lubricants;
6. Other Specified Data.

B. Manufacturer's Printed Operation and Maintenance Instructions: Provide manufacturer's printed operation and maintenance instructions.

C. Control Data: Provide the following:

1. Include sequence of operation by controls manufacturer.
2. Control diagrams by controls manufacturer as installed.

D. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.

E. Drawings, Diagrams, and Charts: Provide the following:

1. Color coded wiring diagrams as installed;
2. Contractor's coordination drawings, with color-coded piping diagrams as installed.
3. Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

F. Tests and Reports: Include tests and reports as specified in the following Contract including:

1. Section 01750 – Testing and Startup
2. Division 02 through Division 16 − Individual Product specification sections.

1.06 OPERATION AND MAINTENANCE DATA REQUIREMENTS

A. Product Description

1. Identify each system and system component. Use identification numbers presented in the Contract Drawings and Specifications.
2. Describe function, physical characteristics, normal operating characteristics, and alternate operating procedure.
3. Present performance curves, engineering data, and test results.
4. Describe operating limitations, environmental limitations, and any other limitations.

B. Operating Procedures

1. Provide instructions, including required sequences, for the following operations:
   a) Start-up following installation.
   b) Break-in.
   c) Routine
   d) Preventative maintenance.
   e) Calibration.
   f) Emergency shutdown.
   g) Start-up following emergency shutdown.
2. Provide operating procedures for variations in sunlight, temperature, and humidity.
3. Provide operating procedures for variations in demand, flow, and loading.
4. Provide special operating procedures vital to the product.

C. Maintenance Procedures

1. Provide instructions for preventative, routine, and periodic maintenance including the following:
   a) Servicing and lubricating schedule and sequences.
   b) Wearing parts replacement schedule, including part numbers.
   c) Product disassembly and assembly.
   d) Alignment, adjustment, and testing.
   e) Product re-calibration.
2. Provide a "trouble shooting" guide and repair instructions.

D. Parts

1. Provide complete nomenclature for all product parts including manufacturer's part number for replacement parts.
2. Provide a list of recommended spare parts with instructions for storage of recommended spare parts.

3. Provide a list of local sources of supply for parts.

E. Lubricants

1. Provide a list of lubricants required. Identify the parts to be lubricated with each listed lubricant.
2. Submit separate lubrication schedule for each piece of equipment.
3. Other Data: Provide other Operation and Maintenance Data as specified in the individual Product specification sections.

F. Other Data: Provide other operation and maintenance data as specified in the individual product specification sections.

PART 2 – PRODUCTS

2.01 GENERAL DESCRIPTION: MANUFACTURER O&M DATA

A. General:

1. The Manufacturers' O&M Data shall be bound in multiple binders. Binding by suppliers and manufacturers of their O&M data is acceptable if the binding meets the requirements of this Section. Contractor shall provide binding for O&M Manual if the supplier does not provide binding which meets the requirements of this Section.
2. Binding shall be 8-1/2" X 11" size. Binder capacity shall be not less than 2" or more than 3".
3. Binding shall be three-hole, left margin.
4. Binders shall be three-ring, D-type.
5. Binder covers shall be polyethylene, 110 mil thickness.
6. Each binder shall be identified on the binder front and spine.

B. Table of Contents: Provide a detailed Table of Contents in each Binder.

C. Index of Tabs

1. Provide a tabbed index sheet for each equipment item, component, or subject. Index tabs shall provide quick reference points, which assist the Owner's personnel in the use of the manual.
2. Indexes shall be 90-lb. stock, minimum. Tabs and binding strips shall be reinforced.

D. Text

1. Text shall be legible and written in English. Each letter in the text shall be identifiable. Text shall be technically and grammatically correct.
2. Prepare the text so that operation and maintenance personnel can easily read, understand, and properly apply the instructions contained in the text. Arrange the text in a logical format. Use headings to identify each set of procedures.
3. Prepare text specific to this project. Preprinted text and brochures may be used to supplement text specific to this project if the text specific to this project contains reference,

or references, to the preprinted material and if the preprinted material has been annotated to clearly show the part, or parts of the preprinted material that are applicable to this project.

4. Text character height shall not be less than 8 points or more than 12 points. Larger size letters may be used for headings. Pitch shall be between 10 characters per inch and 16.66 characters per inch. The pitch may be less than 10 characters per inch in headings. Select character point and pitch to produce text, which is easy to read. Select a font style which is easy to read.

E. Illustrations

1. Provide illustrations as required to clearly present instructions, clarify the text, or both. Place illustrations so that the illustrations are in a logical relationship to the text.

2. Pages of the O&M Data may contain text, illustration, or text and illustrations. Preprinted illustrations and brochures containing illustrations may be used if the preprinted illustrations are applicable to this project or the preprinted illustrations are annotated to clearly show the illustrations or parts of illustrations that are applicable to this project.

F. Drawings

1. Provide drawings for each system in the O&M Data. Drawings shall show the relationship between the various components in each system and the equipment installed in each system. If there is fluid flow within a system, the drawings for the system shall include a flow diagram. If there is electrical power, control wiring, or both in a system, the drawings for the system shall include a wiring diagram, a control diagram, or both as applicable.

2. Identify systems, components, and enclosures on the O&M Data drawings. Present definitions of all abbreviations and symbols used on the O&M Data drawings.

3. Identify wire and terminal numbers on all wiring diagrams.

4. Drawings shall be specific to this project. Standard drawings may be used in the O&M data if the drawings are revised for this project.

G. Quality Assurance

1. Personnel who assemble the O&M Data and the Facility Manual shall be familiar with requirements of this Section.

2. O&M Data shall be written by, edited by, or written and edited by personnel skilled in technical writing to the extent required to communicate essential data.

3. Drawings, diagrams, figures, and illustrations shall be prepared by skilled draftsmen or CADD operators competent to prepare required drawings.

2.02 REPRODUCTION

A. Text and drawings, sketches and diagrams used for illustrations shall be on 8-½" x 11" paper, 20-lb. minimum. Do not use sensitized paper.

B. Photo prints shall be securely mounted on 8-½ x 11" backing or shall be mounted in sheet protectors. Photo print backing shall be heavy paper, 90-lb. minimum, card stock, or equal. Sheet protectors shall be non-glare, clear vinyl.

C. Drawings shall be 8-½" x 11", 11" x 17", or larger. Drawings 8-½" x 11" and 11" x 17" shall be bound together with text and shall have reinforced holes. Drawings larger than 11" x 17" shall be folded and placed in pockets which are bound together with text or inside the back cover of the binder.

D. Text and illustrations shall be originals, offset printed, photo prints, or first quality machine copies. Text and illustrations shall be crisp with a uniform background. If originals have characters, lines, or shading which are a color, or colors, other than black or the medium is a color, or colors other than white, provide machine color copies.

E. Drawings shall be offset printed, blue line prints, black line prints, or first generation machine copies. Drawings shall be crisp with a uniform background. If originals have lines, characters, symbols, or shading which are a color, or colors, other than black, provide offset prints of drawings.

PART 3 – EXECUTION

3.01 TRAINING OF OWNER'S PERSONNEL

A. Fully instruct Owner's designated operating and maintenance personnel in the operations, maintenance, adjustment, and calibration of products, equipment, and systems if specified in the applicable Section of the Specifications.

B. Use the O&M Data as the basis of instruction.

1. Review contents of manual with personnel in full detail.

2. Explain all aspects of operation and maintenance.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1: GENERAL

1.01 SUMMARY

A. Supply and install reinforcing steel as shown on the drawings and as specified.

1.02 REFERENCES

A. The installation of concrete reinforcement shall be in accordance with the following codes and standards:
   1. Florida Building Code (FBC)
      a. FBC 6th Edition (2017)
   2. Concrete Reinforcing Steel Institute (CRSI)
      a. CRSI – Manual of Standard Practice for Placing Reinforcing Bars
   3. American Concrete Institute (ACI)
      a. ACI 301 – Specification for Structural Concrete for Buildings
      b. ACI 315 – Details and Detailing for Concrete Reinforcement
      c. ACI 318 – Building Code Requirements for Structural Concrete
   4. American Welding Society (AWS)
      a. AWS D-1.4 – Structural Wending Code, Reinforced Steel

1.03 SUBMITTALS

A. Shop Drawings
   1. Provide bar schedules and placing lists or fabrication drawings in accordance with ACI 315 for all steel for ENGINEER'S review prior to fabrication. Clearly indicate construction joints, openings, bar arrangement, bar spacing, and splicing. Include sketch of typical mill marks and deformations on reinforcing bars. Furnish copies to the ENGINEER for approval.

1.04 QUALITY ASSURANCE

A. Reinforcing steel shall be clean, new stock, properly marked and tagged for identification prior to placing.

B. Deliver and handle materials to prevent damage to or weakening of reinforcement.

C. Prevent accumulation of rust or debris on reinforcement during storage. Store off of ground and under cover.

PART 2: MATERIALS

2.01 REINFORCEMENT AND FABRICATION

A. Reinforcing bars shall be deformed conforming to ASTM A 615, Grade 60.

B. Reinforcement shall be supported by suitably sized dense pre-cast concrete blocks for concrete poured on grade. For concrete members exposed to the elements or a corrosive environment, the reinforcement shall be supported by either plastic coated or stainless-steel chairs.

C. Ties shall be No. 16 gauge minimum, fully annealed, black steel wire.

D. Welded wire fabric shall meet ASTM A 185 or ASTM A 82, cold-drawn, resistance welded.

E. Hooks and bends in reinforcing shall conform to ACI 315, unless otherwise shown on the drawings.

F. Chemical anchors shall be achieved by using an equal two-part epoxy cartridge system such as HIT-HY200 manufactured by HILTI.

PART 3: EXECUTION

3.01 PLACING REINFORCING STEEL

A. Fabrication, detailing and placement of reinforcing steel shall conform to CRSI Manual of Standard Practice, ACI 315 and ACI 318. Reinforcement shall be carefully placed, rigidly supported and well tied with bar supports and spacers.

B. Reinforcement shall be accurately placed and securely tied at intersections with 16-gauge black annealed wire. It shall be maintained in proper position by chairs, bar supports, or other devices approved by the ENGINEER.

C. All splices shall be as shown on the drawings.

D. Concrete protection shall be as show on the drawings.

E. The clear distance between parallel bars in a layer shall be the nominal diameter of the bar, but not less than one inch. Wherever conduits, piping, inserts, or sleeves interfere with the placement of reinforcing steel as shown, the CONTRACTOR shall consult with the ENGINEER. Bending or field cutting of parts will not be permitted.

F. Clean bars of loose scale, heavy deposits of rust and oil, wax or other coatings that may reduce or destroy bonding before placing. Check and clean again if necessary, before concrete is poured.

G. Dowel column and wall reinforcement to footing or pile cap with same size and number of dowels as vertical bars above.

H. Dowels shall be hooked “L” at bottom and shall be lapped as indicated in the plans with the column or wall reinforcing above.

3.02 COORDINATION

A. Coordinate work with other trades in order to eliminate interference before concrete is poured. Do not cast concrete until all reinforcing bars have been inspected and permission prior to pour is granted by the ENGINEER.

3.03 CLEAN UP

A. Clean up shall be in accordance with General Conditions.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1: GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place concrete specifications for foundations, piers and in-fill of existing void space within Accelator as noted on the Structural Drawings.

1.02 REFERENCES

A. American Concrete Institute (ACI):

1. 116R – Cement and Concrete Terminology
2. 117 – Standard Specifications for Tolerances for Concrete Construction and Materials
3. 211.1 – Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete
4. 211.2 – Standard Practice for Selecting Proportions for Structural Lightweight Concrete
5. 214 – Recommended Practice for Evaluation of Strength Test Results of Concrete
6. 229 R – Controller Low-Strength Materials
7. 301 – Specifications for Structural Concrete
8. 304 R – Guide for Measuring, Mixing, Transporting, and Placing Concrete
9. 305 R – Recommended Practice for Hot Weather Concreting
10. 306 R – Recommended Practice for Cold Weather Concreting
11. 318 – Building Code Requirements for Reinforced Concrete

B. ASTM International (ASTM)

1. C 33 – Standard Specification for Concrete Aggregates
2. C 94 – Standard Specification for Ready-Mixed Concrete
3. C 143 – Standard Test Method for Slump of Hydraulic Cement Concrete
4. C 150 – Standard Specification for Portland Cement
5. C 260 – Standard Specification for Air-Entraining Admixtures for Concrete
6. C 309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
7. C 330 – Standard Specification for Lightweight Aggregates for Structural Concrete
8. C 494 – Standard Specification for Chemical Admixtures for Concrete
9. C 618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

1.03 SUBMITTALS

A. Product Data: Submit manufacturers literature for each type of product furnished.

B. Quality Assurance Submittals:
   1. Concrete Mix: Submit proposed concrete mix designs for each strength, slump, and combination of admixtures required for the Project.
   2. Test Reports:
      a. Submit chloride ion tests or total chloride test (with generally accepted method to relate total chloride to chloride ion) to show compliance with maximum ion concentrations.
         (i) Tests may be from another job, utilizing the same proportions of aggregates, cements, and admixtures.
      b. Submit slump, air-entrainment, compressive strength, and flatness and levelness test reports to the ENGINEER.

1.04 QUALITY ASSURANCE

A. Codes and Standards:
   1. In addition to complying with all pertinent codes and regulations, comply with all pertinent requirements of the following American Concrete Institute Publications:
      a. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials
      b. ACI 211.1 – Standard Practice for Selection Proportions for Normal, Heavy Weight, and Mass Concrete
      c. ACI 211.1 – Standard Practice for Selection Proportions for Structural Lightweight Concrete
      d. ACI 214 – Recommended Practice for Evaluation of Strength Test Results of Concrete
      e. ACI 305 R – Recommended Practice for Hot Weather Concreting
      f. ACI 306 R – Recommended Practice for Cold Weather Concreting
      g. ACI 318 – Building Code Requirements for Reinforced Concrete

B. Qualification for Testing:
   1. The following field-testing procedures shall be performed only by personnel holding current certificates issued by ACI for Concrete Field Testing Technician Grade I as required by local code.
      a. Sampling of fresh concrete
      b. Testing fresh concrete for slump
      c. Testing fresh concrete for entrained air
      d. Making concrete specimens for compression tests

C. Pre-installation Conference: Conduct conference at Project site to comply with requirements in General Conditions of the CONTRACTOR. Review methods and procedures related to Concrete Work, including, but not limited to, the following:
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review requirements for concrete tolerances, finishing, and curing methods, prior to commencing concrete work.

1.05 PROJECT CONDITIONS

A. Environment Conditions:
   1. Extreme Temperature Conditions:
      a. When extreme hot or cold weather conditions occur, or are expected to occur, which might detrimentally affect concrete, employ handling and placing techniques to guard against such effects.
      b. Comply with the recommendations of American Concrete Institute publications ACI 305 R and ACI 306 R, for hot and cold weather concreting.
   2. Inclement Weather:
      a. Unless adequate protection is provided, do not place exterior concrete during rain, sleet, or snow.
      b. Do not use calcium chloride or admixtures containing soluble chlorides.

PART 2: PRODUCTS

2.01 MATERIALS

A. Reinforcing Bars: ASTM A 615/M, Grade 60 Deformed.
B. Portland Cement: ASTM C 150, Type I or II
C. Water: Potable water that is clean and not detrimental to concrete.
D. Fly Ash: ASTM C618, Type C or F.
E. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 200.
F. Silica Fume: ASTM C 240, amorphous silica.
G. Aggregates: ASTM C33, uniformly graded as determined by ASTM D 422.

2.02 ADMIXTURES

A. Do not use admixtures containing calcium chloride or added chloride ions.
B. To ensure compatibility, all admixtures shall be from the same manufacturer.
C. Air-Entraining Admixture: ASTM C 260.
D. Extended Workability High Range Water Reducer, ASTM C 494
   1. Plastol 6200EXT by The Euclid Company

2.03 MIX DESIGNS

A. Comply with ACI 301 requirements for concrete mixtures.

B. Normal Weight Concrete: Prepare design mixes, proportioned according to ACI 301 as follows:

1. Minimum Compressive Strength:
   a. In-Fill: 2000 PSI
   b. Foundations: 4000 PSI
2. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete at or below grade.
3. Slump Limit: 8 inches for concrete with verified slump of 2 inches before adding high-range water-reducing admixture or plasticizing admixture.
4. Air Content: Maintain within range permitted by ACI 301, but not to exceed 3 percent.
5. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 20 percent.

C. Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 116.

1. When air temperature is above 90 °F, reduce mixing and delivery time to 60 minutes.

D. Do not add water to batched concrete.

PART 3: EXECUTION

3.01 SITE VERIFICATION OF CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that all items to be embedded in concrete are in place.
3. Verify that concrete may be placed to the lines and elevations indicated on the Drawings, with all required clearance from reinforcement.

B. Discrepancies:

1. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

A. Remove all wood scraps, standing water, soil, and debris from the surfaces in which newly placed concrete will contact.

B. Prepare the existing face of concrete to be in contact with new concrete with wet sandblast to achieve exposed aggregate surface with minimum profile of+/- 1/16" in accordance with ICRI CSP-5.

C. Thoroughly clean all transporting and handling equipment.

3.03 CONCRETE MIXING

A. Plant mix concrete materials in same proportions as approved concrete mix design and in accordance with ACI 304.
   1. Incorporate admixtures in quantities and using methods recommended by admixture manufacturers.
   2. Incorporate only admixtures included in the approved mix design, or with approval by ENGINEER.

B. Do not add water to batched concrete.

3.04 PLACING CONCRETE

A. Method:
   1. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
   2. For chuting, pumping, and pneumatically conveying concrete, use only equipment of such size and design to ensure a practically continuous flow of concrete at the delivery end without loss or separation of materials.
   3. Deposit concrete as neatly as possible in its final position to avoid segregation due to re-handling and flowing.
   4. CONTRACTOR shall use screed poles or similar devices to ensure that all slabs are cast at the proper elevations and that specified tolerances are maintained.

B. Rate of Placement:
   1. Place concrete at such a rate that concrete is at all times plastic and flows readily.
   2. Do not pour concrete in lifts greater than 4 feet. Subsequent lifts can be placed once previous list has begun to set.

C. Compaction:
   1. Thoroughly consolidate all concrete by suitable means during placement, working it around all embedded fixtures and into corners of forms.
   2. During placement, thoroughly compact the concrete by hand tamping and by mechanical vibration.

D. Acceptability:
1. Do not use retempered concrete or concrete that has been contaminated by foreign materials.

3.05 CURING

A. Formed Surfaces:
1. Cure formed surfaces by either of the following methods:
a. Leave forms in place until the cumulative number of days or fractions thereof, not necessarily consecutive, has totaled seven days during which the temperature of the air in contact with the concrete is 50°F or above.
b. Remove forms at an earlier time, but apply curing compound to the concrete surfaces.
c. Apply compound in accordance with manufacturer's recommendations.
d. Do not add curing/sealing compound to wall that receive high performance coating unless a letter has been submitted to the ENGINEER, prior to the compounds use, that the specific compounds are compatible with their system.

B. Wet Cure:
1. Concrete not covered with curing compound should be kept wet for at least 7 calendar days.
2. Keep forms continuously wet to prevent the moisture loss until forms are removed.

C. Curing Compound Removal:
1. Remove residual curing compound no earlier than 28 calendar days after application of after structure is enclosed and protected from exterior water sources.
2. Wet mop or rinse and wet vacuum slab to remove traces of cleaning products.

3.06 TESTS

A. Testing Laboratory:
1. The OWNER shall engage the testing agency to conduct the testing for compliance with the requirements of the Project Manual.

B. Compression Tests:
1. Secure minimum five standard cylinders from each pour of concrete, additional five sets of cylinders for every 50 cubic yards of concrete placement of the day, in accordance with ASTM C31, and cure under standard moisture and temperature conditions.
2. From each batch test in accordance with ASTM C39.
3. Test two cylinders at 7 calendar days and two cylinders at 28 calendar days, and save one for additional testing, if needed.

4. Submit duplicate tests reports of results from testing to the ENGINEER.
5. Take steps immediately to evaluate unsatisfactory test results.
6. In the event of unsatisfactory test results, an investigation as outlined in Section 5.6.4 of ACI 318 shall be employed.

C. Slump/Air-Entrainment
1. Perform slump tests in accordance with ASTM C 143.
2. Determine the air content of air-entrained concrete in accordance with ASTM standards.
3. Report results of slump tests on each compression test report, and report whether the concrete represented by the compression tests is air-entrained or non-air-entrained.

D. Retesting:
1. Should additional testing be required because of unsatisfactory test results, the CONTRACTOR shall reimburse the OWNER for the costs incurred for correcting any deficiencies and the costs of any tests.

END OF SECTION

SECTION 03312

CONCRETE REPAIR WORK

PART 1: GENERAL

1.01 SUMMARY

A. The ENGINEER will field mark geometry and extent of concrete repairs.

B. Compensation for completed Work shall be based on field-measured quantities as measured and reported by the ENGINEER.

1.02 REFERENCES

Comply with provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified.

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute.

B. ACI 318 - Building Code Requirements for Reinforced Concrete; American Concrete Institute.

C. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute.

D. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

E. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

F. ASTM A 416 - Standard Specification for Steel Strand, Uncoated Seven-Wire Stress-Relieved for Prestressed Concrete.

G. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

H ASTM C 33 - Standard Specification for Concrete Aggregates.

I. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

J. ASTM C 172 - Standard Practice for Sampling Freshly Mixed Concrete.

K. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

L. ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

M. NACE International – National Association of Corrosion Engineers.

N. SSPC – Steel Structures Painting Council.

1.03 QUALITY ASSURANCE

A. Comply with the following:

1. "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion" (Guideline No. 03730), published by the International Concrete Repair Institute, 1323 Shepard Drive, Suite D, Sterling, Virginia 20164-4428 - Copyright 1995.

2. Apply all repair materials in accordance with the manufacturer's recommendations for storage, preparation, mixing, placement and curing.

B. The CONTRACTOR shall contact ENGINEER to request and schedule inspections as follows:

1. Prior to chipping to allow scope of existing concrete excavation to be laid out in field.

2. Prior to placing repair mortar to verify reinforcing steel conditions, adjacent surface preparation, and corrosion mitigation anode placement.

1.03 SUBMITTALS

A. CONTRACTOR to submit shop drawings prior to work on each material and product to be used. Submittal may be submitted in electronic form. Data and SDS sheets shall be submitted for each product or material used.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. **Euclid Chemical Company**.

B. **Sika Corporation**.

C. **TNEMEC Company, Inc.**

2.02 MATERIAL SCHEDULE

Description	**Euclid Chemical Company**	**Sika Corporation**
Formed / Horizontal Repair	**Eucocrete**	**Sikacrete 211 SCC Plus**
Vertical / Overhead Repair	**Verticoat Supreme**	**SikaTop 123 Plus**
Reinforcing Protection / Bonding Agent	**Duralprep A.C.**	**Armatec 110 EpoCem**
Base Plate Grouting	**NS Grout**	**SikaGrout 212**

A. CONTRACTOR is responsible for ensuring compatibility of cementitious repair materials and weather protection products to be used.

B. Repairs deeper than allowed for neat mortar shall be extended with coarse aggregate per the manufacturer's recommendations.

C. Zinc rich rebar primers are not allowed.

D. Single Source Responsibility: Provide mortars and anti-corrosion and bonding agent produced by the same manufacturer for all concrete repairs.

E. Substitutions permitted if equivalent material is submitted and approved by ENGINEER prior to use.

2.03 REINFORCING MATERIALS

A. Reinforcing Steel: Shall be **Grade 60** deformed bars, complying with ASTM A615 free from oil, scale and rust, placed in accordance with the American Concrete Institute Standard Specifications and Details.

B. Coupled Splices may be achieved using the **ZAP Screwlock** system manufactured by **Barsplice Products, Inc.** or approved alternate.

C. Chemical Anchors shall be achieved using an equal two part epoxy cartridge system such as **HIT-HY200** manufactured by **Hilti**.

2.04 CONCRETE RESURFACING

A. Upon application of epoxy polyamine coatings at interior immersion service areas, voids after the 1st coat should be filled as required with **TNEMEC Series 215 Surfacing Epoxy.**

PART 3: EXECUTION

3.01 REMOVAL GEOMETRY

A. Excavate and remove all spalled and unsound concrete resulting from reinforcing steel corrosion. Maximum size chipping hammers shall be limited to 30 pounds. Fractured aggregate profile shall conform to ICRI CSP-7 & SSPC-SP13/NACE 6.

B. Saw cut along edges of excavated areas, to achieve a minimum depth of ¼ inch to a maximum of ½ inch. Adjust saw depth to avoid cutting into reinforcing bars. Sufficient room shall be provided around each bar marked to have a corrosion mitigation anode installed.

C. Edges of repair areas adjacent to sound existing concrete shall be cut in straight lined regular shaped patterns.

D. Existing reinforcing shall be chipped out all around the bar until the entire circumference has been exposed to clean unaffected cross-section and a ¾ inch minimum clearance is achieved behind the backside of each bar.

E. Excavate as required such that the total depth of repair is not less than 2".

3.02 SURFACE PREPARATION

A. Prepare surface of concrete and adjust pressure and blasting media as required to obtain a surface profile equal to CSP 3-4. Properly clean profiled concrete with clean water to receive repair material. Blasting media must be cleaned daily prior to leaving jobsite for the day.

B. All exposed reinforcing shall be abrasively cleaned free of bond inhibiting corrosion by sandblasting using oil-free compressed air to achieve a near white metal profile in accordance with SSPC-SP10/NACE-2.

C. All exposed and cleaned reinforcing shall be coated with anti-corrosion and bonding agent in accordance with the manufacturer's recommendations.

D. All existing concrete surfaces to receive new concrete or repair mortar shall be prepared and maintained in a surface saturated dry (SSD) condition up to time of placement.

E. Forms and excavated concrete areas shall be kept in clean condition, free of debris and standing water.

3.03 REINFORCING DETAILS

A. Contact ENGINEER if reinforcing bars that exhibit 20% or greater loss of the gross bar section are discovered. Do not remove corroded reinforcement unless directed by ENGINEER.

B. Reinforcing bars that exhibit 20% or greater loss of the gross bar section shall be chemically anchored with an epoxy set offset dowel or overlap spliced to achieve (48x) bar diameters length with a new bar of the same size.

C. Dowels to be chemically anchored with epoxy adhesive shall be set into pre-drilled holes at a depth of no less than (12x) bar diameters.

D. Where reinforcement is to be supplemented or replaced with new reinforcement, per ENGINEER'S directive, new reinforcement shall be chemically anchored with an epoxy set offset dowel with a new bar of the same size maintaining 2" minimum clear cover to all sides and top of concrete pedestal. Epoxy embedment for new reinforcement shall be as follows:

1. # 4 – minimum concrete embedment 6"
2. # 5 – minimum concrete embedment 7-1/2"
3. # 6 – minimum concrete embedment 10"
4. # 7 or larger – contact ENGINEER

3.05 MIXING & PLACEMENT

A. Mix repair mortars in accordance with the manufacturer's instructions using a low speed drill and mixing paddle in suitable sized container. For extended mixes, the coarse aggregate shall be added last, once a lump free homogenous mixture is achieved.

B. At deep form and pour repair areas, the concrete or repair mortar shall be consolidated to remove entrapped air and evenly distribute the cement paste by means of vibration.

3.06 FINISHING & CURING

A. Moist cure all repair overlays with wet burlap in accordance with manufacturer's recommendations for particular material.

B. Repairs that require shoring must reach original design strength or the repair material 7-day strength prior to removal of temporary posts.

3.07 REPAIR LINE ITEM COMPENSATION

A. All Concrete Repairs are based on Cubic Feet of void form space.

3.08 REPAIR WORK / QUANTITIES

A. All Repair Counts indicated are estimated quantities for determining Base Bid Unit Prices for corresponding repair types using specified products.

END OF SECTION

SECTION 03320

CHEMICAL GROUT INJECTION

PART 1: GENERAL

1.01 RELATED REQUIREMENTS

A. The CONTRACTOR shall furnish all labor, tools, materials, supervision and equipment necessary to do all the work specified herein and as required for a complete installation.

1.02 SUMMARY OF WORK

A. Provide all materials, labor, equipment and tools necessary to seal the cracks by injection of hydrophobic polyurethane based solution.

B. Grout shall expand, when reacted, by foaming to approximately 10 times the initial liquid volume, and when set produce a flexible closed cell solid.

C. Completed installation shall be resistant to degradation by wet and dry cycles and chemicals found in the concrete host structure.

1.03 PRODUCT VERIFICATION / APPROVAL

A. Manufacturer's literature detailing the components, mixing and handling procedures, and set time characteristics for the grout products shall be submitted to the ENGINEER for approval prior to the start of injection work.

B. Grout shall have a recorded and published history of successful use in no less than (5) similar applications. Grout shall have proven quality assurance / quality control program in accordance with ANSI / NSF 61 Standards.

C. CONTRACTOR shall be required to submit the following forms:

1. Product Data Sheet for grout as published by manufacturer.
2. Material Safety Data Sheet (MSDS) for grout and accelerator.

1.04 STORAGE, HANDLING AND DISPOSAL

A. All grout materials shall be delivered to the site in unopened containers bearing the manufacturer's original labels.

B. Store and handle grout materials as recommended by the manufacturer, in a safe and responsible manner, as well as in accordance with all local, state and federal regulations, codes and ordinances.

C. Spilled, soiled or unused open chemicals shall be disposed of in accordance with all applicable Municipal, State and Federal codes and regulations.

PART 2: PRODUCTS

2.01 MANUFACTURER

A. The following materials as manufactured by: **De Neef Construction Chemicals Inc.**; 18314 Mathis Road; Waller, Texas 77484; are considered to meet the requirements of this specification and shall be used as the basis for selection of materials for each repair location.

B. All submittals or requests for substitution must be made in writing in accordance with general conditions and shall include supporting technical data sheets indicating equal or better performance attached.

2.02 MATERIALS

A. Hydro Active Grout :

1. **Hydro Active Flex SLV** (HA Flex SLV) for injecting cracks up to 30 mils wide. Contact ENGINEER if wider cracks are uncovered for additional instruction.

B. Accelerator: **Hydro Active Flex Cat**.

C. Cap Seal:

1. **Dene-Plug** hydraulic cement for saw-cut keys where indicated on drawings.
2. **Denepox Gel 125** where epoxy gel is denoted on drawings.

D. Injection porting devices shall be as required for either manual or automated applications and supplied by the equipment manufacturer.

2.03 PERFORMANCE PROPERTIES

Description	**HA Flex SLV**	**ASTM**
Uncured Solids 100%		D 1010
Uncured Viscosity	150-250 cps	D 1638
Cured Elongation	100%	D 3574
Cured Shrinkage	< 4%	D 1042

PART 3: EXECUTION

3.01 SURFACE PREPARATION

A. Cracks and adjacent substrate must be clean and sound. Remove all dust, dirt, efflorescence, debris and foreign contaminants by mechanical means.

B. Saw cut and excavate key or rout out concrete centered on crack to receive cap seal

materials as detailed on drawings. Blow out with oil-free compressed air prior to applying cap seal materials.

3.02 EQUIPMENT

A. CONTRACTOR shall supply all equipment, including pumps, containers, hoses, gauges, packers / ports, drills, bits, scaffolds, compressors, generators, vacuums, accessories and all other items required to perform the work and accomplish the goals outlined.

B. The equipment shall be of a type, capacity and mechanical condition suitable for doing the work in an effective and efficient manner. All equipment, including power sources, cables, chemical containers, scaffolds and anything used in the performance of the work, shall meet all applicable safety and other requirements of Local, State and Federal regulations, codes and ordinances.

C. All equipment shall be maintained in good working condition at all times. Sufficient spare parts and tools shall be maintained on the job to provide for immediate repairs of essential operating items.

3.03 PUMPING UNITS

A. Pumps shall be capable of continuous injection of liquid grout under variable pressures up to a maximum pressure of 2,000 psi and at flow rates of at least 5 fluid ounces per minute at high pressure and flow rates of at least ¼ gallon per minute at pressures of 500 psi and lower.

B. Pumps may be electric, air or hand driven provided the above capabilities are attained. Pumps shall be so arranged that rapid changes in pumping rates and pressures can be obtained by the pump operator without affecting the mixture of the grout being injected and without stopping the pumps.

C. Pumping units shall be made of materials compatible with the chemicals being used and shall be equipped with all necessary hoses, chemical containers, gauges, fittings, packers and other accessories required to properly inject the grout. Seals and joints shall be such that no grout leakage occurs and no air is aspirated into the injected grout.

D. Grouting units shall be so arranged that flushing can be accomplished with grout intake valves closed, flushing fluid supply open, and the pump operated at full speeds.

E. Pumping units shall be equipped with accurate pressure gauges at the pump and near the injection point. Gauge accuracy shall be within 5% and shall be periodically checked against new, undamaged or calibrated gauges. Damaged or inaccurate gauges shall be replaced immediately. Pumping units shall not be operated without properly functioning gauges. Replacement gauges shall be on hand at all times.

F. Hoses and fittings shall have maximum safe operating pressure ratings and dimensions as recommended by the manufacturer.

G. Suitable mixing and holding tanks shall be supplied with each grouting unit to permit continuous pumping at maximum pump capacity. Tanks shall have satisfactory covers

and shall be stable against tipping under normal usage.

H. Descriptions of pumping units for polyurethane grout shall be submitted for approval by the ENGINEER prior to the start of grouting. Pumps shall be either single or double pump type as recommended by the grout manufacturer.

3.04 PACKERS

A. Packers specifically designed for the grouting operations shall be supplied and used capable of safely sealing and packing grout holes drilled into concrete and injected at pressures up to 3,000 psi and as recommended by the grout manufacturer.

B. Packers shall be of the removable type such that the drilled holes can be cleaned and patched to a depth of no less than 3 inches.

3.05 DRILLS AND BITS

A. Hand drills capable of drilling small holes of ½ inch diameter in concrete shall be supplied and operated. The following two types of drills shall be supplied for each grouting crew:

1. Rotary percussion capable of drilling up to 18 inches deep into un-reinforced concrete;

2. Rotary flushing type with diamond coring bits capable of drilling up to 24 inches deep into reinforced concrete.

B. Drills shall be supplied with bits of a diameter and length consistent with packer requirements and hold lengths needed for the drilled holes to intersect the target crack.

C. Damaged or worn bits shall not be used. Back up drills and bits shall be supplied in sufficient quantity so that two drills of either type can be used simultaneously.

3.06 CRACK INJECTION

A. Cap the saw cut and excavated key way or routed crack with specified materials after adjacent surfaces have been cleaned.

B. Drill ½-inch diameter holes for injection ports as detailed on drawings.

C. Spacing of injection ports shall not exceed 6 inches on center. Where diagonal drilling is shown, the drilling distance offset from the crack shall be equal to one-half the thickness of the concrete.

D. Place packers into the drilled holes so the top of the sleeve is just below the concrete surface. Tighten by ratchet, socket or open-end wrench by turning clockwise until firm and secure.

E. Prepare two pumps for use, one for water and one for chemical grout. Flush both pumps with **Hydro-Active Washing Agent** to eliminate moisture and lubricate the system.

F. Flush the crack by injecting water to remove debris and dust. Provide sufficient water to prime the crack for the chemical reaction. Mix the chemical grout and accelerator at manufacturer's recommended proportions.

G. At vertical cracks, begin grouting at the lowest elevation and proceed upward. Overhead cracks shall begin at one end and proceed toward the other.

H. Inject at the first port until grout is observed at the next port. Repeat operation in sequence until the crack is completely grouted.

I. After injecting a few ports, return to the first port and inject a second time. Re-inject water into all competed ports to cure the resin remaining in the drill hole. Allow grout to fully cure before removing packers.

3.07 CLEANUP

A. Scrape off all cured resin from the concrete surface, then follow with hand held grinders to remove bonded residue.

B. Clean out pumps by circulating washing agent for a period of 10 to 20 minutes, within 30 minutes after injection has been completed.

C. Remove all fittings after grout has reached gel point and fill remaining holes with hydraulic cement.

END OF SECTION

SECTION 07211

FOAM BOARD INSULATION

PART 1: GENERAL

1.1 SUMMARY

A. Section Includes: Provide FOAMULAR® extruded polystyrene rigid board insulation at locations shown on the Drawings.

1.2 REFERENCES

A. Materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:

1. American Society for Testing of Materials (ASTM) C 578: Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.
2. American Society for Testing of Materials (ASTM) C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. American Society for Testing of Materials (ASTM) E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
4. International Code Council Evaluation Service (ICC-ES), Evaluation Report.

1.3 SUBMITTALS

A. Product Data: Submit data on product characteristics, performance criteria, and limitations, including installation instructions.

B. Warranty: Submit documentation for limited lifetime product warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain exterior building insulation through one source from a single manufacturer.

B. Each insulation board must be labeled with manufacturer's name, product brand name, ASTM material specification reference, and identification of the third party inspection agency used for building code qualification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer’s original packaging.

B. Store and protect products in accordance with manufacturer’s instructions. Store in a dry area and protect from water, direct sunlight, flame, and ignition sources. Do not install insulation that has been damaged or wet.

1. In the event the board insulation becomes wet, wipe dry prior to installation.

PART 2: PRODUCTS

2.1 MANUFACTURER

A. **Owens Corning Insulating Systems, LLC.**

2.2 FOAM PLASTIC BOARD INSULATION

A. Extruded Polystyrene Board Insulation: Comply with ASTM C 578, Type IV, 25 psi minimum compressive strength, 1.55 lb/cu. ft. (26 kg/cu. m)

1. Thermal Resistance: (180 day real-time aging as mandated by ASTM C578, measured per ASTM C 518 at mean temperature of 75F): [R-5.0, 5.6] per inch of thickness, with 90% lifetime limited warranty on thermal resistance.
2. Blowing Agent Formulation: Zero ozone depleting.
3. Edge Condition: Tongue & Groove.
4. Surface Burning Characteristics (ASTM E 84): Flame spread less than 25; smoke developed less than 450, certified by independent third party such as Underwriters Laboratories (UL).
5. Indoor Air Quality: Compliance certified by independent third party such as GREENGUARD Indoor Air Quality Certified® and/or GREENGUARD Children and Schools Certified℠.
6. Recycled Content: Minimum 20%, certified by independent third party such as Scientific Certification Systems.
7. Warranty: Limited lifetime warranty covering all ASTM C578 physical properties.
8. Panel Size: Provide 4” thick by 4 ft. wide by 8 ft. long.

PART 3: EXECUTION [Not Used]

END OF SECTION

SECTION 09960

HIGH PERFORMANCE COATINGS

PART 1: GENERAL

1.1 This specification defines the methods of surface preparation, coating systems, and methods of application for painting as outlined herein.

1.2 The Contractor shall furnish all supervision, labor, tools, materials, equipment, scaffolding or other structures, and supervision required for the transportation, unloading, storage, and application of the paint and associated products covered by this specification.

1.3 The work includes painting and finishing of interior and exterior exposed items above and below grade surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, pipe, handrails, posts, fittings, valves, pumps, tanks, equipment, and all other work obviously required to be painted unless otherwise specified herein or on the drawings. The omission of minor items in the schedule of work shall not relieve the contractor of his obligation to include such items where they come within the general intent of the specification as stated herein.

1.4 The following items will not be painted:

1. Any code requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
3. Aluminum handrails, walkways, and grating unless otherwise specified herein or on the drawings.
4. Signs and nameplates.
5. Finish hardware.
6. Stainless steel angles, tubes, pipe, etc.
7. Products with polished chrome, aluminum, nickel, or stainless steel finish.
8. Plastic switch plates and receptacle plates.
9. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.

1.5 All work shall be done in strict accordance with this specification, the design drawings and the painting package, including manufacturer's printed instructions.

1.6 The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules, and regulations promulgated by authorities having jurisdiction, which may bear on the work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970."

1.7 Wherever the word "Engineer" occurs in this specification, it shall apply to the authorized representative of the Owner. Where the word "Contractor" occurs in this specification, it shall apply to the contractor performing any part of or all of this work.

1.8 Contractor Qualifications to be Turned in with Bid:

- Contractor must include a minimum (5) referenced projects of similar size and complexity, completed within the past 2 years. Project references must include the use of Tnemec Products and include the Project Name, Project Location, Project Amount, Completion Date, and Owner/Engineer's Contact Information (for Follow Up).

PART 2: DEFINITIONS

2.1 Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.

2.2 Abbreviations: The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:

2.2.1 SSPC – Society for Protective Coatings
2.2.2 Exterior – Outside, exposed to weather
2.2.3 Interior Dry – Inside, not subject to immersion service
2.2.4 Interior Wet – Inside, subject to immersion service
2.2.5 ASTM – American Society of Testing Materials
2.2.6 NACE – National Association of Corrosion Engineers
2.2.7 NSF – National Sanitation Foundation (Standard 61)
2.2.8 AWWA – American Water Works Associates (AWWA D102-97)
2.2.9 ICRI – International Concrete Repair Institute
2.2.10 CSP – Concrete Surface Profile (1-9)

2.3 Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.

PART 3: RESOLUTION OF CONFLICTS

3.1 It shall be the responsibility of the Contractor to arrange a meeting prior to the start of painting between the Contractor(s), the Manufacturer, whose products are to be used, and the Owner's Representative. All aspects of surface preparation, application and coating systems as covered by this specification will be reviewed at this meeting.

3.2 Clarification shall be requested promptly from the Owner's Representative when instructions are lacking, conflicts occur in the specification, or the procedure seems improper or inappropriate for any reason.

3.3 Copies of all manufacturer's instructions and recommendations shall be furnished to the Owner's Representative by the Contractor.

3.4 It shall be the responsibility of the Coating Manufacturer to have their factory representative meet in person with the Contractor and Owner's Representative a minimum of three times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the Owner's Representative.

PART 4: INSPECTION OF SURFACES

4.1 Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the Manufacturer or Owner's Representative. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.

4.2 Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job.

4.3 When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the Manufacturer or Owner's Representative, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.

4.4 Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "tooke" gauge is classified as a destructive test.

PART 5: EQUIPMENT

5.1 Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practical from the compressor.

5.2 All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.

5.3 Contractor will provide access free of charge to the Owner's Representative a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the Owner's Representative and Contractor. The gauges may be used by the Owner's Representative and returned each day to the Contractor. Owner's Representative will return gauges to Contractor at completion of job.

PART 6: MATERIALS

6.1 All materials specified herein are manufactured by the TNEMEC Company, Inc. These products are specified to establish standards of quality and are approved for use on this project.

6.2 Equivalent materials of other manufacturers may be substituted on approval of the Owner's Representative. Requests for substitution shall include Manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials. Proposed substitutions shall be submitted (2) weeks prior to bid date for review and approval.

6.2.1 Abrasion – Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load
6.2.2 Adhesion – Elcometer Adhesion Tester
6.2.3 Exterior Exposure – Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)
6.2.4 Hardness – ASTM D3363-74
6.2.5 Humidity – ASTM D2247-68
6.2.6 Salt Spray (Fog) – ASTM B117-73

6.3 Bidders desiring to use coatings other than those specified shall submit their proposal in writing with the bid opening. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating, or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

6.4 All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5 lbs/Gallon after thinning.

6.5 Colors, where not specified, shall be as selected by the Owner or their Representative.

6.6 All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.

PART 7: WORKMANSHIP AND MATERIALS

7.1 SURFACE PREPARATION

7.1.1 The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Society for Protective Coatings Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

7.2 STANDARDS FOR SURFACE PREPARATION

SSPC-SP1 Chemical and/or Solvent Cleaning
Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter, and contaminants, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.

SSPC-SP2 Hand Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by hand chipping, scraping, sanding, and wire brushing.

SSPC-SP3 Power Tool Cleaning
Removal of loose rust, loose mill scale, and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing, and grinding.

SSPC-SP4 Flame Cleaning
Dehydrating and removal of rust, loose mill scale, and some light mill scale by use of flame, followed by wire brushing.

SSPC-SP5 (NACE-1) White Metal Blast Cleaning
Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

SSPC-SP6 (NACE-3) Commercial Grade Blast Cleaning
Complete removal of all dirt, rust scale, mill scale, foreign matter, and previous coatings, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.

SSPC-SP7 (NACE-4) Brush-Off Blast Cleaning
Removal of rust scale, loose mill scale, loose rust, and loose coatings, leaving tightly bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils, and solid contaminants. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bug holes, air pockets, and other subsurface irregularities, but so as not to expose underlying aggregate.

SSPC-SP8 Pickling
Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).

SSPC-SP10 (NACE-2) Near-White Blast Cleaning
Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale, and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.

SSPC-SP11 Power Tool Cleaning to Bare Metal
Complete removal of rust, rust scale, mill scale, foreign matter, and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.

SSPC-SP12 (NACE-2) Surface Preparation By Water Jetting
Surface preparation of steel and other substrates by ultra-high pressure water jetting.

SSPC-SP13 (NACE-6) Surface Preparation of Concrete
Surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

SSPC-SP14 (NACE-8) Industrial Blast Cleaning
Surface preparation standards for industrial blast cleaning allowing for traces of tightly adherent mill scale, rust, & coating residues on 10% of the surface.

SSPC-SP15 Commercial Grade Power Tool Cleaning
Commercial grade power tool cleaning a steel surface to produce a 1.0-mil surface profile. This method of cleaning falls between SP3 & SP11.

Visual standards – SSPC-VIS-1 (Swedish SIS OS 5900), "Pictorial Surface Preparation Standards for Painting Steel Surfaces," and the National Association of Corrosion Engineers, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.

Visual standards from International Concrete Repair Institute CSP1-9 for degree of roughness and surface profile of concrete.

7.3 GENERAL

7.3.1 Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to SSPC-SP1 Solvent Cleaning.

7.3.2 Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per SSPC-SP11-87T.

7.3.3 All weld seams, sharp protrusions, and edges shall be ground smooth prior to surface preparation or application of any coatings.

7.3.4 All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Owner's Representative.

7.3.5 All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in SSPC-SP11-87T.

7.3.6 "Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the Owner Representative's attention; otherwise, Contractor assumes full responsibility.

PART 8: PRETREATMENTS

8.1 When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

PART 9: STORAGE

9.1 Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutilated labels attached. Packages shall not be opened until they are inspected by the Manufacturer or Owner's Representative and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, and direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by him at the job site. Empty coating cans shall be required to be neatly stacked in an areas designated by the Owner and removed from the job site on a schedule determined by the Owner. Owner may request a notarized statement from contractor detailing all materials used on the project.

PART 10: PREPARATION OF MATERIALS

10.1 Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.

10.2 Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

PART 11: APPLICATION

11.1 GENERAL APPLICATION

11.1.1 Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50° F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.

11.1.2 No coatings shall be applied unless surface temperature is a minimum of 5° above dew point; temperature must be maintained during curing.

11.1.3 No coatings shall be applied unless the relative humidity is below 85%.

11.1.4 Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.

11.1.5 Field Painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Owner's Representative.

11.1.6 Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.

11.1.7 The Contractor's scaffolding shall be erected, maintained, and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observations shall be cleaned immediately after paint application.

11.1.8 Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the Owner's Representative.

11.1.9 The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.

11.1.10 Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.

11.1.11 Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.

11.1.12 Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the Manufacturer or Owner's Representative).

11.1.13 All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 1st coat prior to application of the full 1st coat.

11.1.14 All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

11.2 WORKMANSHIP

11.2.1 The Contractor must show proof that all employees associated with this project shall have been employed by the Contractor for a period not less than six (6) months.

11.2.2 Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work, which shows carelessness, lack of skill, or is defective in the opinion of the Manufacturer or Owner's Representative, shall be corrected at the expense of the Contractor.

11.2.3 The Contractor shall provide the names of at least 3 other projects of similar size and scope that they have successfully completed under their current company name.

11.3 APPLICATION OF PAINT

11.3.1 BY BRUSH AND/OR ROLLERS

11.3.1.1 Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenohl core shall be utilized.

11.3.1.2 The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.

11.3.1.3 Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.

11.3.1.4 It may require 2 coats to achieve the specified dry film thickness if application is by brush and roller.

11.3.2 AIR, AIRLESS, OR HOT SPRAY

11.3.2.1 The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.

11.3.2.2 Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.

11.3.2.3 High build coatings should be applied by a crosshatch method of spray application to ensure proper film thickness of the coating.

11.3.2.4 Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.

11.3.2.5 Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.

11.3.2.6 Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.

11.3.2.7 The first coat on concrete surfaces in immersion service should be sprayed and backrolled.

PART 12: PROTECTION AND CLEAN-UP

12.1 It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.

12.2 At the option of the Owner during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the Owner, including but not limited to, full shrouding of the area.

12.3 If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.

12.4 At completion of the work, remove all paint where spilled, splashed, splattered, sprayed or smeared on all surfaces, including hardware, equipment, painted, and unpainted surfaces.

12.5 After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials, and debris resulting from this work.

12.6 The Contractor is responsible for the removal and proper disposal of all hazardous materials from the jobsite in accordance with Local, State, and Federal requirements as outlined by the Environmental Protection Agency.

PART 13: TOUCH-UP MATERIALS

13.1 The Contractor shall provide at the end of the project at least one (1) gallon of each generic topcoat in each color as specified by the Owner for future touch-up. Two gallons may be required for (2) component materials.

PART 14: ON-SITE INSPECTION

14.1 During the course of this project the Owner's Representative will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this specification by the successful contractor.

PART 15: COATING SYSTEM SCHEDULE

15.1 STEEL – STRUCTURAL, TANKS, PIPES, AND EQUIPMENT

A. EXTERIOR EXPOSURE (NON-IMMERSION)

a. System: No. 1074U-1 High Build Urethane For Marginally Cleaned Surfaces or Topcoating Existing Coating Systems.

b. Surface Preparation: Pressure clean (3500 PSI), SSPC-SP7 Brush Off Blast Cleaning or SSPC-SP3 Power Tool Cleaning, Feather all edges.

c. Coating System:

		DFT-Mils
Spot Prime:	135 - Chembuild	3.0 – 5.0
Full Prime:	135 - Chembuild	3.0 – 5.0
Topcoat:	1074U-Color Endura-Shield	2.0 – 3.0
Total:		**5.0 – 8.0 + SPOTS**
Minimum:		**5.0 Mils**

B. IMMERSION SERVICE

a. System: No. 22-1 High Solids Epoxy (Potable Water)

b. Surface Preparation: Pressure clean (3500 PSI), SSPC-SP10 Near White Blast Cleaning

c. Coating System:

		DFT-Mils
1st Coat:	20-Pota-Pox	4.0 – 6.0
2nd Coat:	20-Pota-Pox	4.0 – 6.0
Pit Filler:	215-Surfacing Epoxy	As Needed
3rd Coat:	22 Epoxoline	16.0 – 20.0
Total:		**24.0 - 32.0**
Minimum:		**24.0 Mils**

15.2 CONCRETE

A. EXTERIOR/INTERIOR – ABOVE GRADE/ABOVE WATER LINE

a. System: No. 1026-1 Acrylic Emulsion

b. Surface Preparation: Pressure clean (3500 PSI), Surface must be clean and dry.

c. Coating System:

		DFT-Mils
1st Coat:	1026-Color Enduratone	2.0 – 3.0
2nd Coat:	1026-Color Enduratone	2.0 – 3.0
Total:		**4.0 – 6.0**
Minimum:		**4.0 Mils**

B. INTERIOR – IMMERSION

a. System: No. 22-2 Epoxy Polyamine (Potable Water)

b. Surface Preparation: Pressure clean (3500 PSI), Abrasive blast clean per SSPC-SP13 with a CSP5 or better finish.

c. Coating System:

	DFT-Mils
Surfacer: 218-MortarClad	1/8″±
1st Coat: 20-Pota-Pox	6.0 – 8.0
2nd Coat: 22–Epoxoline	16.0 – 20.0
Total :	**22.0 – 28.0 + Surfacer**
Minimum:	**22.0 Mils + Surfacer**

NOTE: Any remaining voids after the 1st coat should be filled as required with TNEMEC Series 215 Surfacing Epoxy.

PART 16: GENERAL STATEMENT

16.1 Manufacturer's Technical Data Sheets, Installation Instructions and Label Directions are considered to be part of this specification.

16.2 Consult TNEMEC for additional systems needed to address surfaces not included within these specifications.

16.3 For additional technical support, product availability, and pricing information, please contact:

ATTN: BLAKE HOLMES
FLORIDA PROTECTIVE COATINGS CONSULTANTS, INC.
Telephone: (407) 322-1243
Cell: (954)648-2787
E-mail: bholmes@tnemec.com

PART 17: WARRANTY

17.1 Upon completion of Work, Contractor to provide manufacturer's standard written warranty for all coating systems utilized.

17.2 If within one year after the date of completion of each facility component, any Work found to be defective, painting Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective work, or, if it has been rejected by Owner, remove it from the site and replace it with non-defective work. If painting Contractor does not promptly comply with terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, will be charge to the painting Contractor.

END OF SECTION

SECTION 11225

SOLIDS CONTACT CLARIFIER/SOFTENER

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: Solids Contact Clarifier/Softener

1. Type: Type of Solids Contact Clarifier/Softener includes:

a. Solids contact clarifier/softener treatment unit's equivalent to the NS Accelator® solids contact unit manufactured by SUEZ Treatment Solutions Inc. of Richmond, Virginia.
b. The treatment unit shall be installed in existing concrete basin as specified herein and/or shown on the Contract Drawings.

1.02 REFERENCES

A. General: Standard listed by reference, included revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. American Society for Testing and Materials (ASTM)

C. Occupational Safety and Health Act (OSHA)

D. American Society of Mechanical Engineers (ASME)

E. American Institute of Steel Construction (AISC)

F. American Waterworks Association (AWWA)

G. American Welding Society (AWS)
H. National Electrical Code, Electrical component listings by Underwriters Laboratories (UL)

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Process Description:

a. A solids contact unit is intended for softening of the influent stream. Raw water and chemicals shall be combined in the primary mixing and reaction chamber so that the reaction takes place in the presence of recirculating slurry. In the primary mixing and reaction chamber, the turnover shall be at least ten (10) times that of the unit throughput. There shall be recirculation from the primary mixing and reaction chamber up through the secondary reaction chamber, thence outward and downward through the solids separation chamber to the primary mixing and reaction chamber. This slurry recirculation rate shall be at least three (3) times that of the unit's throughput. In this way, there shall be formed a slurry pool in the lower portion of the outer, or separation chamber with a clear water zone above. Separation of solids from the water shall take place near the surface of the slurry pool. The surface of the slurry pool shall remain at substantially the same elevation for all treating rates.

b. The raw water enters through the inlet pipe into the primary zone where it is mixed with the previously formed slurry. Treatment chemicals are added as required. The rotor provides controlled velocity mixing of raw water and chemicals in the presence of a large volume of slurry in the primary mixing and reaction zone. The combination of returned

slurry flow and rotor mixing provides solids from settling on the floor of the basin. Precipitation takes place in the presence of previously formed precipitates, resulting in dense particle growth.

c. The independently adjustable impeller circulates two to four volumes of slurry from the primary zone to the secondary zone where continued slurry contact allows the treatment reactions to approach equilibrium. When the slurry leaves the secondary mixing and reaction zone, it is discharged downward between the inner and outer draft tubes, outward along the sloping hood, and onto the surface of the slurry pool.

d. The slurry is in controlled motion, outward and downward. From it the treated water is displaced upward. The slurry is drawn back under the hood structure to the primary mixing and reaction zone by the suction produced by the impeller. Recirculation of the slurry is independent of the flow rate. Because of this unique feature, rapid changes in flow rate can be handled.

1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with *Conditions of the Contract* and Division 1 Submittal Procedures Section.

B. Product Data: Submit product data, including Manufacturer's data, for specified products.

1. System Description: Include system description including the following:

a. Manufacturer's data, order sheet, or equivalent for each major piece of equipment, component, instrument or device being supplied.

b. Manufacturer's outline and mounting dimensions for all field mounted devices.

c. Manufacturer's wiring diagrams for instrumentation and control system, including necessary field connections (if required). NOTE: Existing electrical service, drive motor and gear box are to be reused.

d. Manufacturer's Dimensions and Field Fabrication Details for all mechanical equipment

e. The Manufacturer shall clearly identify any exception to the specification or drawings. Failure to do this shall be grounds for rejection of the submittal.

f. All equipment to be furnished under this Section must be approved prior to being released for manufacturing unless otherwise noted by the Engineer.

2. Statement: Confirmation that system including work and equipment locations is acceptable, or a list of those areas that must be changed to be compatible with the equipment being proposed.

C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including accessories, finish colors, etc.

1. All mechanical-equipment material submitted for review shall be contained in one submission.

D. Wiring Diagrams: Submit "as installed" straight-line wiring diagrams showing electrical connections of equipment. Furnish legend sheet with appropriated schematic reference number with drawings to provide electrical information. Wiring and labeling on electrical panels shall required approval.

1. Manufacturer's Instructions: Manufacturer's installation instructions.

E. Closeout Submittals: Submit the following:

1. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to performance.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2. Manufacturer Qualifications: The Manufacturer shall have experience in the design, installation and operation of a minimum of one hundred (100) solids contact units of comparable size and design (without a scraper). These installations shall have been in successful operation for five years. Upon request, the Manufacturer shall supply the Engineer with a listing of these at least twenty reference installations with capacity, date of installation, owner's name and telephone number.
The design of the solids contact unit shall be such that dynamic separation occurs during the separation of the slurry from the clarifier water. The design of the internal mechanism shall be that the clarified water shall be displaced upward from a downward moving slurry. Sludge blanket type units, where the clarified water must percolate up through a downward moving slurry shall not be allowed.

1.06 DELIVERY, STORAGE, & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.

B. Ordering: Comply with Manufacturer’s ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in Manufacturer’s original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by Manufacturer. If stored for more than two weeks, the equipment shall receive all maintenance considerations required by the Manufacturer for proper storage of the equipment. At no time, shall the treatment modules, including all associated equipment and appurtenances, be stored outdoors, uncovered and/or unprotected.

1.10 WARRANTY

A. Project Warranty: Refer to *Conditions of Contract* for project warranty provisions.

B. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

1. Warranty Period: The Manufacturer shall warrant the equipment being supplied to the Owner against all defects in workmanship and materials for a period of one (1) year from the date of startup or eighteen (18) months from shipment. This warranty shall be in force provided that the plant installation, startup and subsequent operations are performed in strict accordance with written and oral instructions provided by the Manufacturer. The Manufacturer shall replace or repair any part or parts that are determined to be defective during the warranty period, provided that the defects are not a result of misuse or neglect.

1.12 SYSTEM AND EQUIPMENT PATENTS

A. Owner/Engineer Protection: The bid price shall include all royalty and license fees for use of patented devices or systems and shall protect the Owner and Engineer from patent infringement litigation thereon.

PART 2 PRODUCTS

2.01 WATER TREATMENT EQUIPMENT SYSTEM

A. Manufacturer: SUEZ Treatment Solutions Inc.
   1. Contact: 8007 Discovery Drive, Richmond, Virginia, 23229; Telephone: 800.446.1150; Fax: 804/756-7643; website: www.suez-na.com.

2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.03 MATERIALS

A. System Materials Requirements:
   1. Exterior finish of painted assemblies shall be of a color as directed by the Owner. Carbon steel components shall be provided bare steel with no surface preparation or primer for coating in field by the installing contractor.
   2. Dissimilar metals, when used, shall be protected against electrolytic actions.

2.04 MANUFACTURED UNITS AND EQUIPMENT

A. Each solids contact unit shall have a design capacity of 7,000 gallons per minute (gpm) and a minimum of approximately 10% of this design capacity.

B. The structure within the treating tank shall provide a primary mixing and reaction chamber, a secondary reaction chamber, a separation chamber, and collection launders.

C. The equipment manufacturer shall include all internal steelwork and inlet piping as shown on the drawings to include the following.
   1. Hood and Support Structure
   2. Inner and Outer Draft Tube
   3. Concentrator Plates
   4. Rotor Impeller with Shaft
   5. Supporting Beams and Walkway with Handrailing and Kickplates across the tank
   6. Rotor Gear Box and Motor

D. The manufacturer shall also include the following equipment.
   1. Concentrator Gates with Gaskets and Mechanical Linkages
   2. Steel conical fillet plates

2.05 PERFORMANCE AND DESIGN REQUIREMENTS

A. Operating Requirements
   1. The unit shall be suitable for installation in a 70’-0” inside diameter with a 17’-5” sidewater depth, total tank depth of 17’-11” with six (6) inches of freeboard at a treatment capacity of 10.0 MGD. The tank bottom shall be sloped at ½-inch in twelve (12) inches.
   2. The treatment rise rate in the settling zone computed at least 4'-6" below design water level shall not exceed 2.2 gpm/sq.ft. Required basin detention times for treatment shall be a minimum of 52.8 minutes.
   3. Four (4) concentrators shall be provided to remove excess solids and maintain correct slurry concentrations. These concentrators shall be hopper-like compartments opening into the

separation chamber and each having a 6” diameter discharge leading from its bottom to the sump.

4. The plates and shapes herein specified shall be furnished by the Manufacturer and shall be shipped knocked-down with all members ready for field erection. All steel shall have a minimum thickness of 3/16” and shall be provided bare steel. All structural steel shapes shall have a minimum thickness of ¼”.

B. Mechanism Requirements

1. The hood and hood structure support shall be fabricated to be supported from the tank base which in turn shall support the center platform and outer draft tube. The hood shall contain two separate zones - in the lower section shall be the primary reaction zone and in the upper cylindrical section the secondary reaction zone.

2. The raw water shall enter through a side feed of 30” diameter carbon steel pipe terminating 1'-0" beyond the tank wall and entering the primary reaction zone via a triangular feed conduit. The triangular feed conduit shall be designed in such a manner to evenly distribute the flow into the primary reaction zone.

3. A series of (16) carbon steel structural member posts or rafters shall support the hood, inner and outer draft tubes and center platform as shown on the Contract Drawings.

4. Deck plate shall be removed and replaced. Deck plate shall bolt to existing inner draft tube bottom flange and weld to brackets at underside of hood plates. Manufacturer shall supply rods and hood plate mounting brackets.

C. Outer Draft Tube: A cylindrical outer draft tube forming a continuation of the structural support for the center platform shall be attached to the inner draft tube that shall be a continuation of the hood. The outer draft tube shall function to divert the recirculated slurry downwards; thus, providing dynamic separation between the slurry and clarified water. Outer draft tube with peripheral collection launder and steel rafter gussets shall be removed and replaced with 304L stainless steel. These parts shall be provided in sections for field assembly and seal welding by the Contractor.

D. Rotor-Impeller

1. There shall be furnished a rotor impeller complete with cantilevered shaft assembly to provide, primary mixing zone, recirculation of flow into the secondary zone and mixing in the secondary zone. The rotor impeller shall be comprised of a horizontal continuous top plate with a series of inverted "L" blades welded between the top plate and annular ring to form a semi-shrouded impeller. An external adjustable band shall be incorporated to provide flexibility in mixing to recirculation ratio. The maximum peripheral speed of the rotor-impeller shall be 6.83 feet per second (fps), without exception.

2. The rotor-impeller shall be attached to the drive via a flanged pipe shaft, specifically designed to minimize run out. The shaft shall be selected to maintain design stresses below 6250 psi based on all dynamic and static loads.

3. Pipe shaft and rotor impeller components shall be carbon steel.

E. Rotor-Impeller Drive

1. There shall be furnished a rotor-impeller drive selected for continuous mixer service.

2. The rotor-impeller drive shall be a flange mounted parallel inline helical or right angle helical bevel reducer, integrally mounted to a traction type or belt type mechanical variable speed drive. Variable speed drive shall have a minimum of 4:1 speed range with speed indicator. The gear reducer shall have a minimum service factor to meet AGMA Class II service over the brake horsepower demand of the rotor at full load speed.

3. All gears are to be manufactured from case hardening steel and hardened to 58-62 Rockwell C. Gear housings shall be cast iron with a high cross section modulus and center wall for maximum rigidity and vented with weather protected breather. Bearings shall be high capacity, anti-friction type, submerged in oil, splash lubricated, or grease packed. Output shaft shall be SAE 1045 steel or equivalent with captured keyway. Output seals to be nitrite rubber with 2 seals on the output shaft giving 3 sealing lips. Gear box shall be compatible with others at the Water Plant and shall be Delroyd Model DV170.

F. Drive: The mechanical variable speed drive shall be powered by an inverter duty motor of 30.0 horsepower (hp), suitable for a 460 volt, 3 phase, 60 Hertz power supply, TEFC, severe duty with Class F insulation, 1.15 service factor, NEMA Design B with Class B temperature rise at nameplate horsepower. Special features include the following: (1) 1/4" diameter holes in motor stator body; (2) end shields; and (3) conduit box. End shields and conduit box sealed at joints, enclosure rating IP65. Fastener hardware is plated or stainless steel. Manufacturer's standard severe duty paint.

G. Center Platform/Access Walkway

1. The center platform shall span the length of the outer draft tube and, in turn, be supported from the outer draft tube. An access walkway shall interconnect to the center platform support from the tank wall and draft tube.

2. The walkway and platform shall be furnished with 1 ½" square x 1 ½" thick aluminum bar grating and surrounded with 1-1/2" pipe double row handrail 3'-6" high. Kickplates 4" high x 1/4" thick shall be attached to the lower ends of the vertical handrail posts. All materials structural supports shall be carbon hot dipped galvanized steel and all handrails, grating and kickplates shall be aluminum.

H. Automatic Sludge Blowdown (Existing piping and gate gaskets to be replaced as shown and other components to be reused. Link seal by Contractor)

1. Each sludge concentrator shall be equipped with a sludge discharge pipe assembly controlled by a Type "F" sludge blowdown valve. The sludge blowdown lines and valves shall be 6" diameter and provided for automatic withdrawal of sludge from the sludge concentrators. Each valve shall be pneumatically operated and controlled on time cycle. The sludge withdrawal timer shall be a repeat cycle timer in a NEMA 4X enclosure suitable for wall or panel mounting. One (1) timer shall be provided for each concentrator. (To be reused.)

2. The Type "F" valve shall be double diaphragm angle type with a flanged ductile iron body, PVC-lined. The seating diaphragm shall be of a resilient material to reside on a solid seat to assure a drop-tight closure. (To be reused.)

3. Diaphragms shall have U-shaped loops to permit full travel without stretching to assure positive closure and long life. (To be reused.)

4. No packing glands or seals shall restrict the valve movement. The valve shall not require lubrication and shall have a vented chamber between the diaphragms to isolate control media (air or water) from the line fluid. (To be reused.)

5. Each sludge line shall have a manual wafer rubber-seated shutoff butterfly valve. For the entire sludge system, there shall be provided one (1) 1/2" pressure reducing and regulating valve and one (1) 1/2" relief valve. (To be reused.)

6. As part of the sludge blowdown system, there shall be provided for each concentrator a mechanically operated shut-off gate with gaskets with mechanical linkage operable from the operating platform. (Gate gasket to be replaced.)

I. Sample and Chemical Feed Piping (To be provided and installed by Owner.)

1. Sampling line shall be provided for the unit, terminating nine (9) inches from the tank wall. The line shall allow sampling of the inner draft contents.

2. Required vertical chemical feed lines shall be provided for the introduction of chemicals as shown on the Drawings.

J. Center Drain and Center Drain Baffle (Existing to be Reused)

1. An 12" diameter double flanged cast iron body stainless steel fitted quick-opening center drain valve shall be provided per unit.

2. A center drain baffle shall also be provided.

K. Effluent Launders (All launders to be removed and replaced.)

Radial Launders

Fourteen (14) stainless steel 304L, effluent radial collection launders spaced equally around the tank shall be furnished with the equipment. The launders shall be of the submerged orifice type. Each radial launder shall be 10" wide x 15" deep. Two (2) stainless steel 304L outlet launder(s) shall be 30" wide 28" deep. Collected effluent from the radial launders shall be conveyed by one (1) 30" wide x 28" deep annular launder around the outer draft tube through a radial discharge launder. All launder steel shall be 3/16" thick.

L. Bottom Flushing System (Existing to be replaced as shown)

1. The mechanism shall be provided with a bottom flushing system, consisting of the following components:

a) Thirty-two (32) flat jet nozzles of stainless steel construction to spray water between bottom of mechanism skirt and 45 degree sloped portion of tank. When energized, the total flow from the nozzles shall be 320 gpm at a nozzle pressure of 60 psi. (To be removed and replaced.)

b) In addition to nozzles, the following shall be provided: Lot of polyethylene plastic and black steel pipe with fittings, for installation inside of tank starting at tank wall; one 1/4" NEMA IV three-way solenoid with manual override; one (1) repeat cycle electric timer in a NEMA 4X enclosure suitable for wall or panel mounting; one 4" diaphragm valve for installation in main 4" header; and one line size, hand lever operated wafer butterfly valve for mounting just upstream of the diaphragm control valve to act as both a shutoff and throttling valve. (To be removed and replaced.)

2. The diaphragm control valve shall be a hydraulically operated, diaphragm-actuated, angle pattern valve, furnished with 125-lb flanges. It shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and disc guide, forming a tight seal against a single removable seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This diaphragm assembly shall by the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the valve. All necessary repairs shall be possible without removing the valve from the line. (To be removed and replaced.)

3. The bottom flushing system requires a water supply for flushing at 55 to 60 psi at upstream side of the diaphragm valve.

M. Bolts: Foundation bolts and anchor bolts shall be 304SS and shall be specified by the equipment manufacturer and furnished by the Contractor. NOTE: These are to replace existing bolts in the existing concrete.

N. Surface Preparation and Shop Priming: All ferrous steel shall be shipped bare steel. Section 09960 (High Performance Coatings) shall provide the Contractor with the proper surface preparation and painting schedule.

PART 3 EXECUTION

3.01 RESPONSIBILITY FOR EQUIPMENT

A. Contractor Responsibility:

1. The Contractor shall be responsible for all demolition of existing equipment and structure to be removed; furnishing, installing, testing, and placing in satisfactory operation all mechanical equipment, instruments, monitoring devices, appurtenant process equipment, piping, electric and manual operated valves, control instrumentation and equipment, and accessories. The Contractor shall coordinate all work with the Manufacturer to guarantee a complete, operating and satisfactory system.

2. The Contractor shall coordinate the work of the system supplier's service personnel during construction, testing, startup, calibration and acceptance of the system, and also operator training. The system design shall provide for complete operation of all signals from point to point and shall assure complete compatibility of all instrumentation and equipment.

B. Manufacturer Responsibility

1. The system supplier shall have in his steady employ, during the entire project period, capable personnel for administration; detailed engineering and drafting; coordination; procurement and expediting; scheduling; construction inspection; installation, testing, and startup assistance; and final commissioning. The system supplier shall also have available, for the duration of the specified warranty period, capable personnel for all necessary administration, engineering, and/or service.

2. The Manufacturer shall have available supervisory service during construction to review and advise the Contractor in the method of mounting, piping and wiring of each device, and advising protective measures needed for the equipment prior to placing it into service, if needed.

3.02 INSTALLATION BY THE CONTRACTOR

A. Contractor Performance:

1. All materials and equipment shall be installed in a neat, workmanlike manner.

2. The existing electrical power service shall be reused. The Contractor shall lock out and disconnect wiring at the various panels prior to demolition and reconnect prior to testing and startup.

3. All equipment specified herein shall be installed in accordance with the Manufacturer's recommendations and the contract drawings.

4. Where anchor bolts and other parts in concrete are required, such parts shall be furnished by Contractor. Pre-embedded anchoring is not required.

5. Field painting and the surface preparation is separate from the work specified in this section and shall be as specified in Division 9 Finishes.

6. Prior to startup and field testing, all foreign matter shall be removed from the equipment, inside of the control panel (if required), interconnecting piping and chemical lines, and spillage of lubricants used in servicing the equipment shall be cleaned from pumps, piping and concrete surfaces.

3.03 MANUFACTURER'S SERVICES

A. Installation and Startup Assistance

1. The Manufacturer shall furnish the services of a qualified field service engineer to supervise the startup of the softener unit(s). This shall also include the treatment equipment, pumps, drives, for a period not to exceed but not less five (5) days and two (2) trips to the job site.

B. Manufacturer's Training

1. A fully qualified field service engineer to provide this training shall furnish one (1) eight-hour day, not including travel time to and from the site.
2. The Manufacturer's services shall be included in the contract price. The service times specified shall be considered as full eight (8) hour working days and do not include travel time. A unit price per day shall be included in the proposal, should the Owner request additional time.

3.04 MANUFACTURER'S INSTRUCTIONS

Compliance: Comply with Manufacturer's product data, including product technical bulletins, product catalog installation instructions and product container instructions for installation.

END OF SECTION

CITY OF NAPLES
WATER TREATMENT FACILITY
ACCELATOR NO. 3 REHABILITATION & IMPROVEMENTS

SUPPLEMENTAL INFORMATION

The following photographs are provided for supplemental information concerning the existing construction and installation of the accelators. Except where noted, these photographs are from Accelator No. 4. Bidder/Contractor shall be responsible for his own observation of the existing conditions installation of the new equipment and rehabilitation shall be in accordance with the supplier's shop drawings and the Construction Plans and Specifications.

Support structure with deck plate

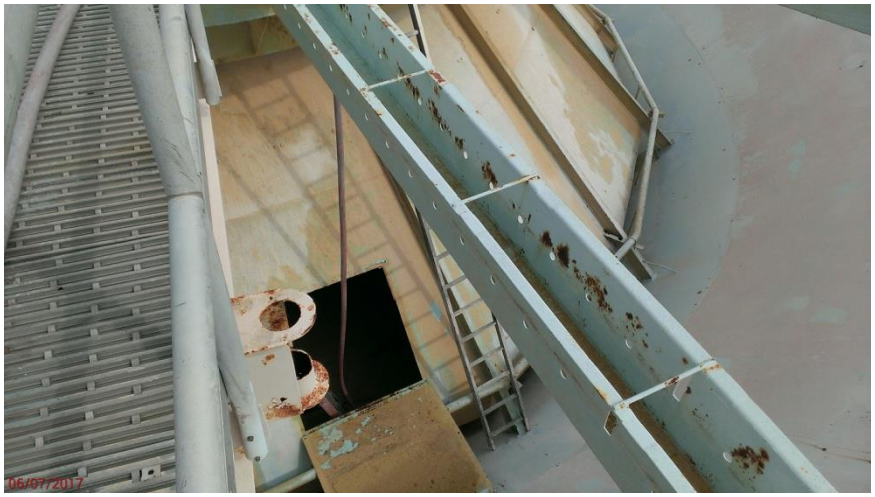
Radial launder, sloped steel plate with equalization opening

Radial launder with collection launder in foreground

Radial launder with sloped steel plate with equalization port

Catwalk with effluent launder; note chemical piping

Looking down at hood and rafters; note sludge flushing piping



Looking down at hood and rafter; note access for underside of hood and sludge flushing piping

Support structure; impellor/rotor assembly below

Collector launder

Impellor/rotor assembly and deck plate

Underside of deck plate assembly with impellor/rotor assembly

Deck plate assembly with impellor/rotor assembly

4" sludge flushing line in void area of tank

6" sludge blow off lines in void area of tank

View of sludge blow off lines on exterior of tank

4" sludge flushing line on exterior of tank

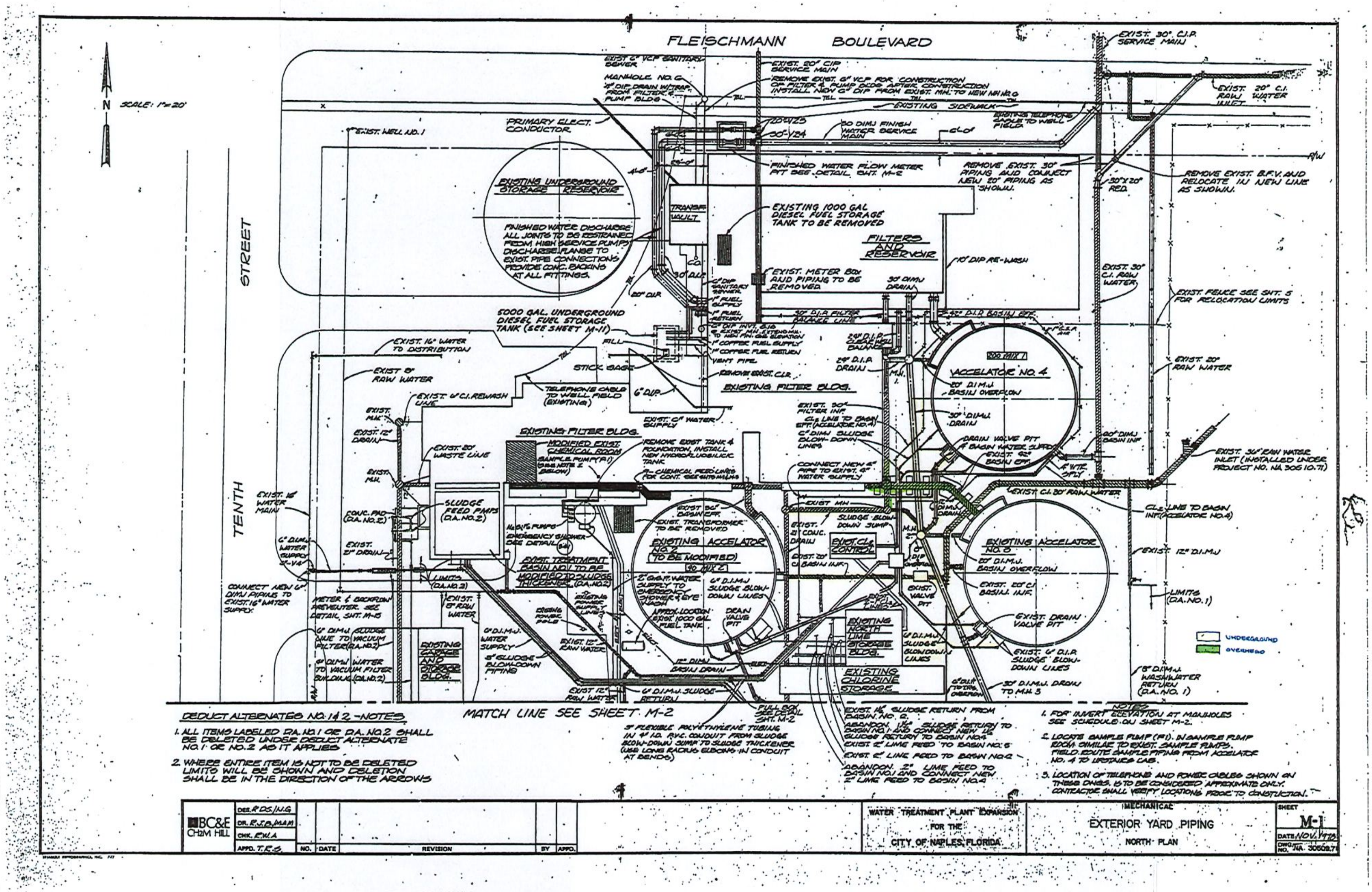
Existing interconnecting walkway/pipe support for Accelator No. 3

CITY OF NAPLES
WATER TREATMENT FACILITY
ACCELATOR NO. 3 REHABILITATION & IMPROVEMENTS

SUPPLEMENTAL INFORMATION

The following plan is provided for supplemental information concerning the existing utilities in the area of the access walkway/pipe support foundation. A blowup of this area is also included.

These documents have been taken from Water Treatment Plant Expansion Plans by BC&E/CH2M Hill dated November 1978.

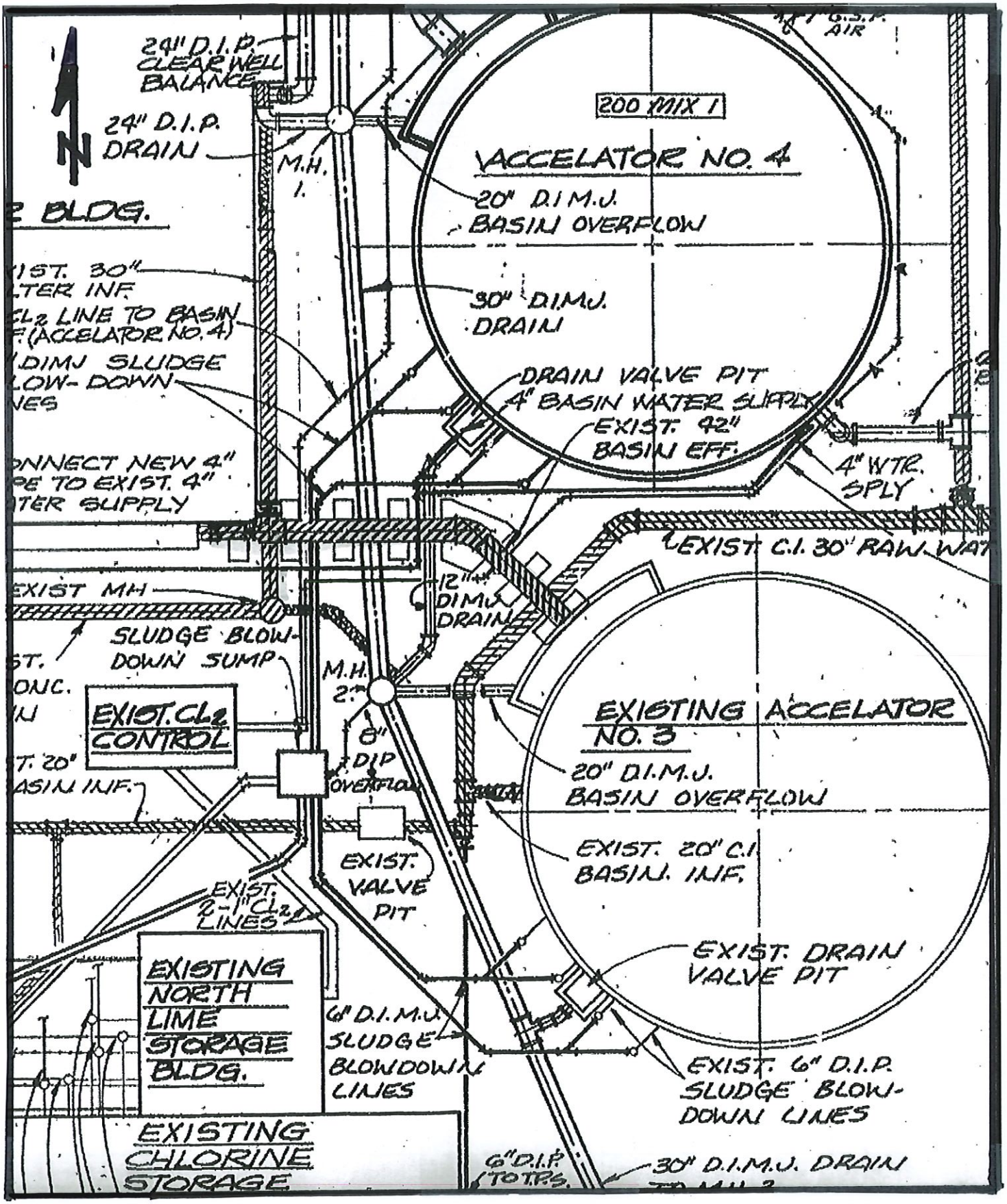

FLEISCHMANN BOULEVARD
TENTH STREET
N
SCALE: 1"=20'
EXISTING UNDERGROUND STORAGE RESERVOIR
FILTERS AND RESERVOIR
EXISTING 1000 GAL DIESEL FUEL STORAGE TANK TO BE REMOVED
5000 GAL. UNDERGROUND DIESEL FUEL STORAGE TANK (SEE SHEET M-11)
EXISTING FILTER BLDG.
ACCELATOR NO. 4
EXISTING ACCELATOR NO. 6
EXISTING ACCELATOR NO. 2 (TO BE MODIFIED)
SLUDGE FEED PUMPS (DA. NO. 2)
EXISTING NORTH LIME STORAGE BLDG.
EXISTING CHLORINE STORAGE
EXISTING GARAGE AND STORAGE BLDG.
MATCH LINE SEE SHEET M-2
UNDERGROUND
OVERHEAD
DEDUCT ALTERNATES NO. 1 & 2 - NOTES
1. ALL ITEMS LABELED DA. NO. 1 OR DA. NO. 2 SHALL BE DELETED UNDER DEDUCT ALTERNATE NO. 1 OR NO. 2 AS IT APPLIES.
2. WHERE ENTIRE ITEM IS NOT TO BE DELETED LIMITS WILL BE SHOWN AND DELETION SHALL BE IN THE DIRECTION OF THE ARROWS.
NOTES
1. FOR INVERT ELEVATION AT MANHOLES SEE SCHEDULE ON SHEET M-2.
2. LOCATE SAMPLE PUMP (P1) IN SAMPLE PUMP ROOM SIMILAR TO EXIST. SAMPLE PUMPS. FIELD ROUTE SAMPLE PIPING FROM ACCELATOR NO. 4 TO UPSTAIRS CAB.
3. LOCATION OF TELEPHONE AND POWER CABLES SHOWN ON THESE DWGS. IS TO BE CONSIDERED APPROXIMATE ONLY. CONTRACTOR SHALL VERIFY LOCATIONS PRIOR TO CONSTRUCTION.
BC&E CH2M HILL
WATER TREATMENT PLANT EXPANSION FOR THE CITY OF NAPLES, FLORIDA
MECHANICAL
EXTERIOR YARD PIPING
NORTH PLAN
M-1
REVISION

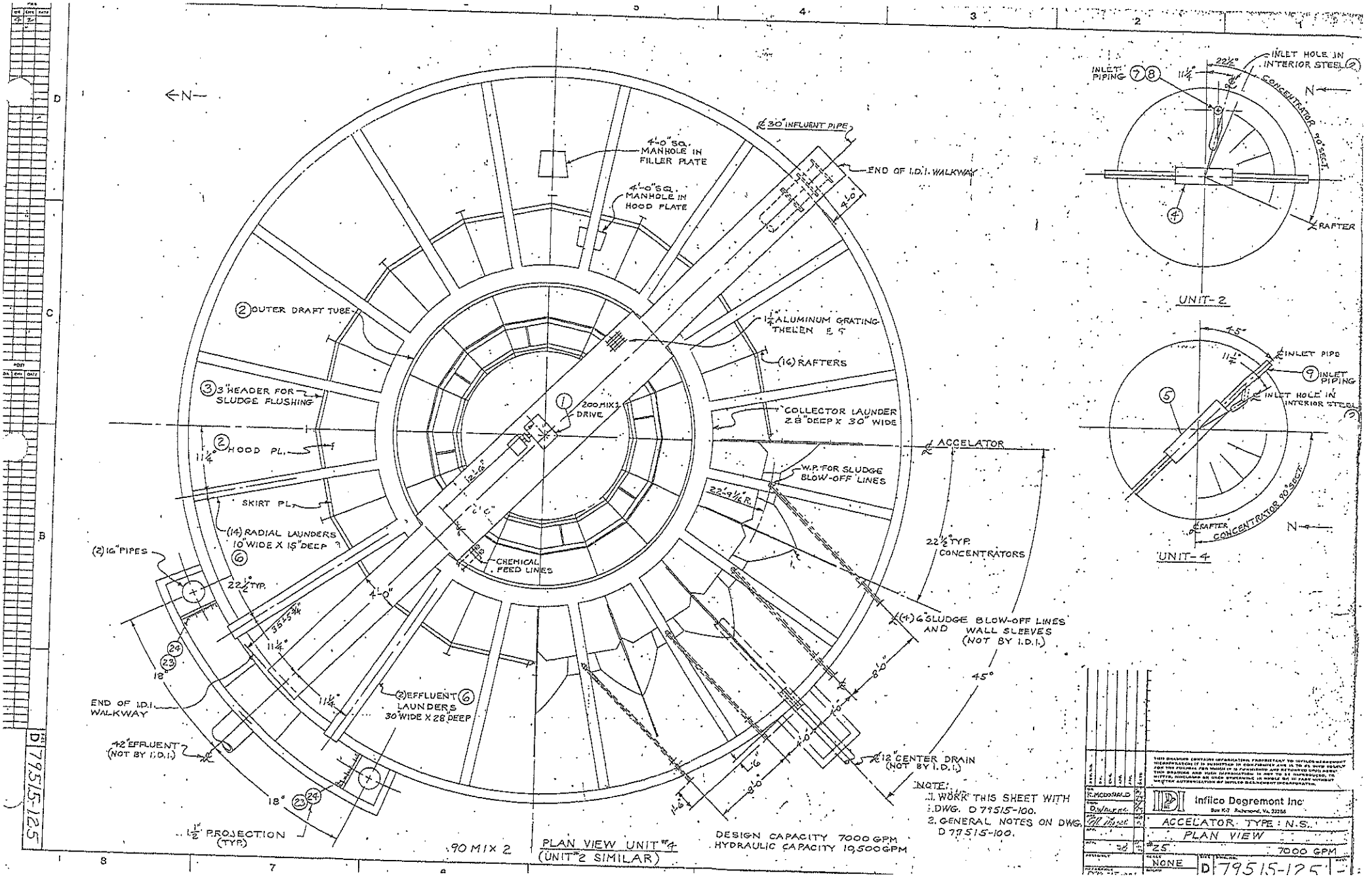
HOLE MONTES
ENGINEERS · PLANNERS · SURVEYORS

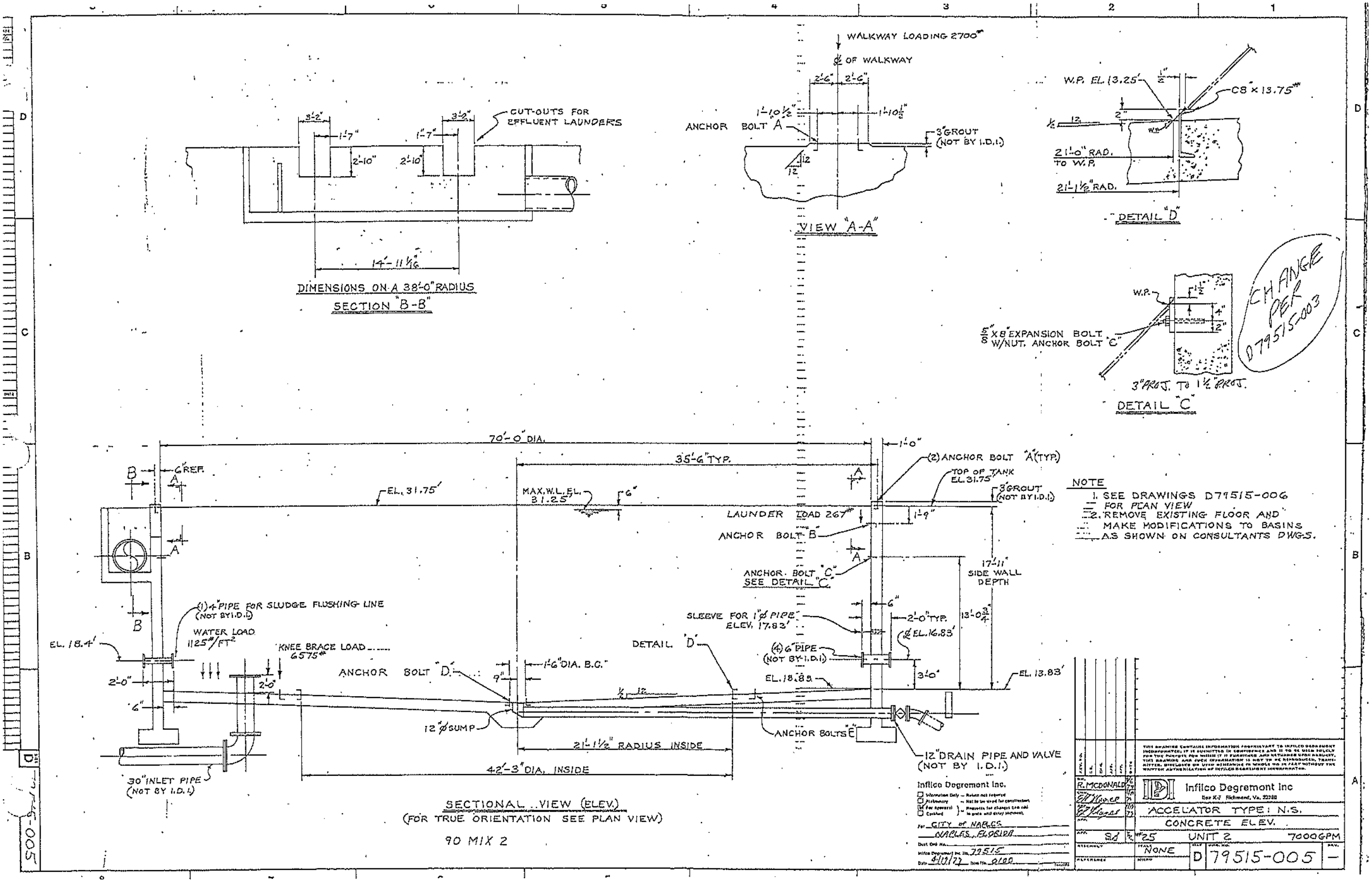
950 Encore Way • Naples, Florida 34110
P: 239.254.2000 • F: 239.254.2099

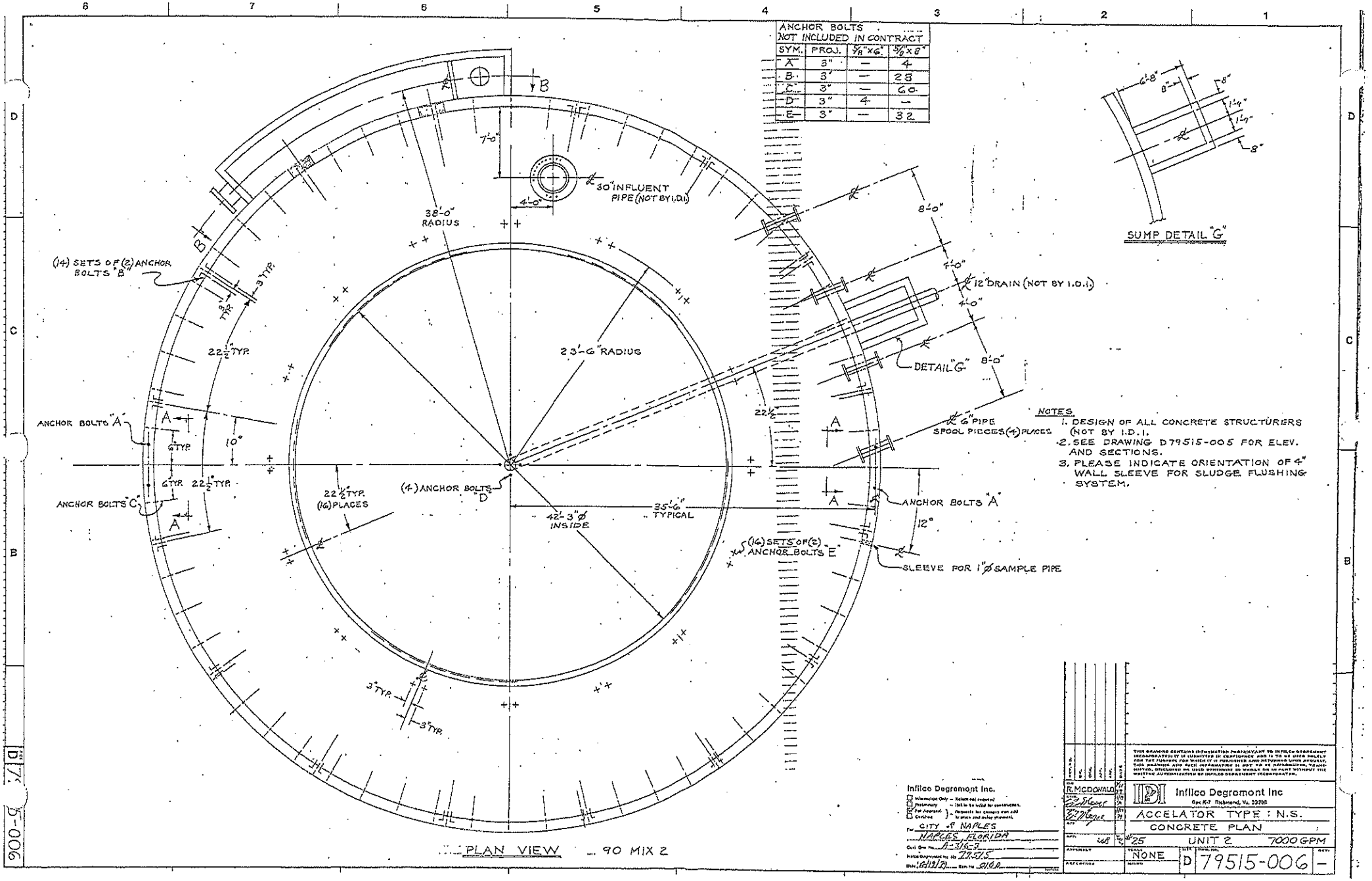
6200 Whiskey Creek Dr. • Ft. Myers, FL 33919
P: 239.985.1200 • F: 239.985.1259

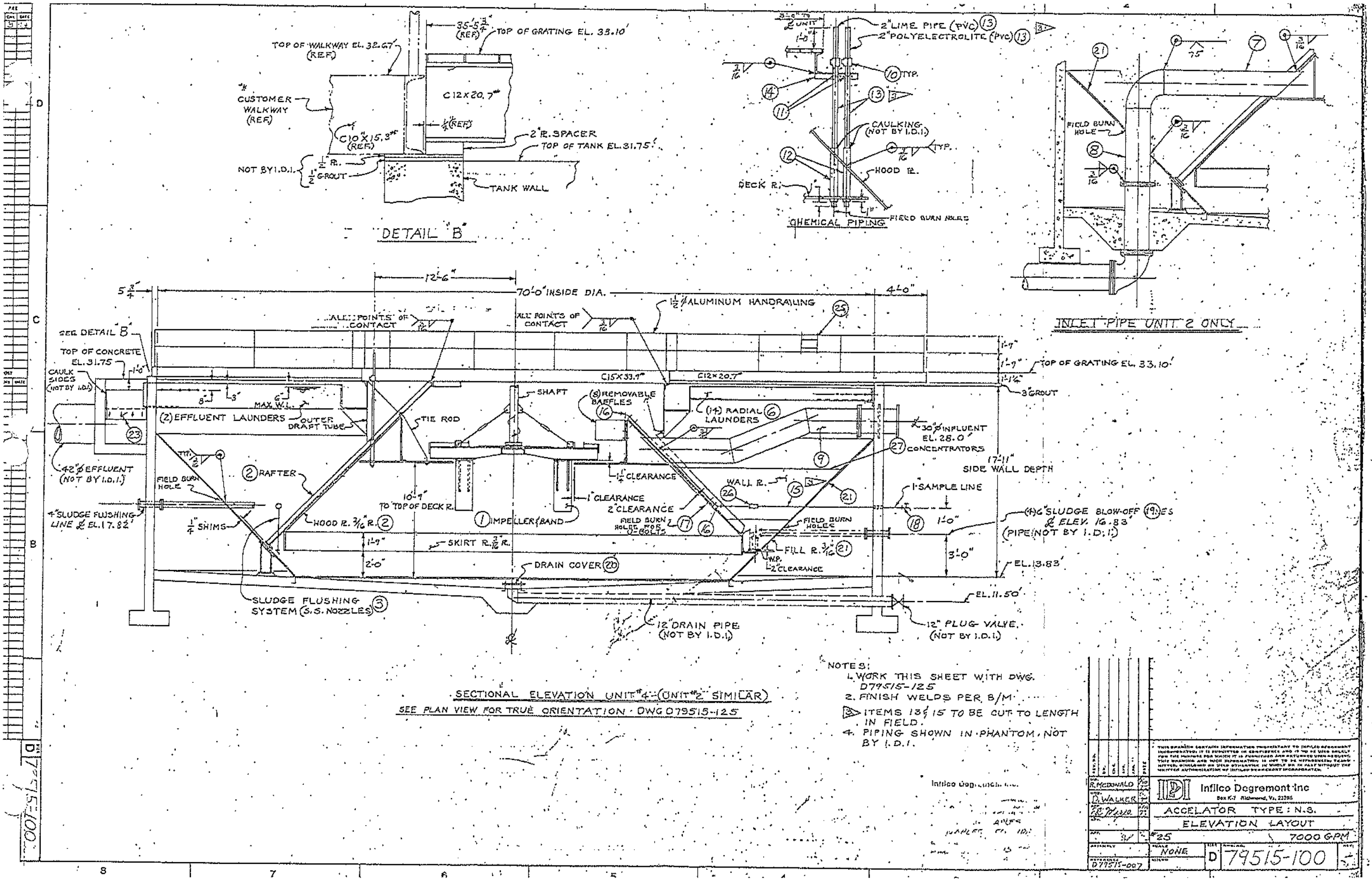
CITY OF NAPLES - ACCELATOR NO. 3 - YARD PIPING (EXIST.)
PROJECT
SHEET NO 1 OF 1
CALCULATED BY DATE
CHECKED BY DATE
SCALE

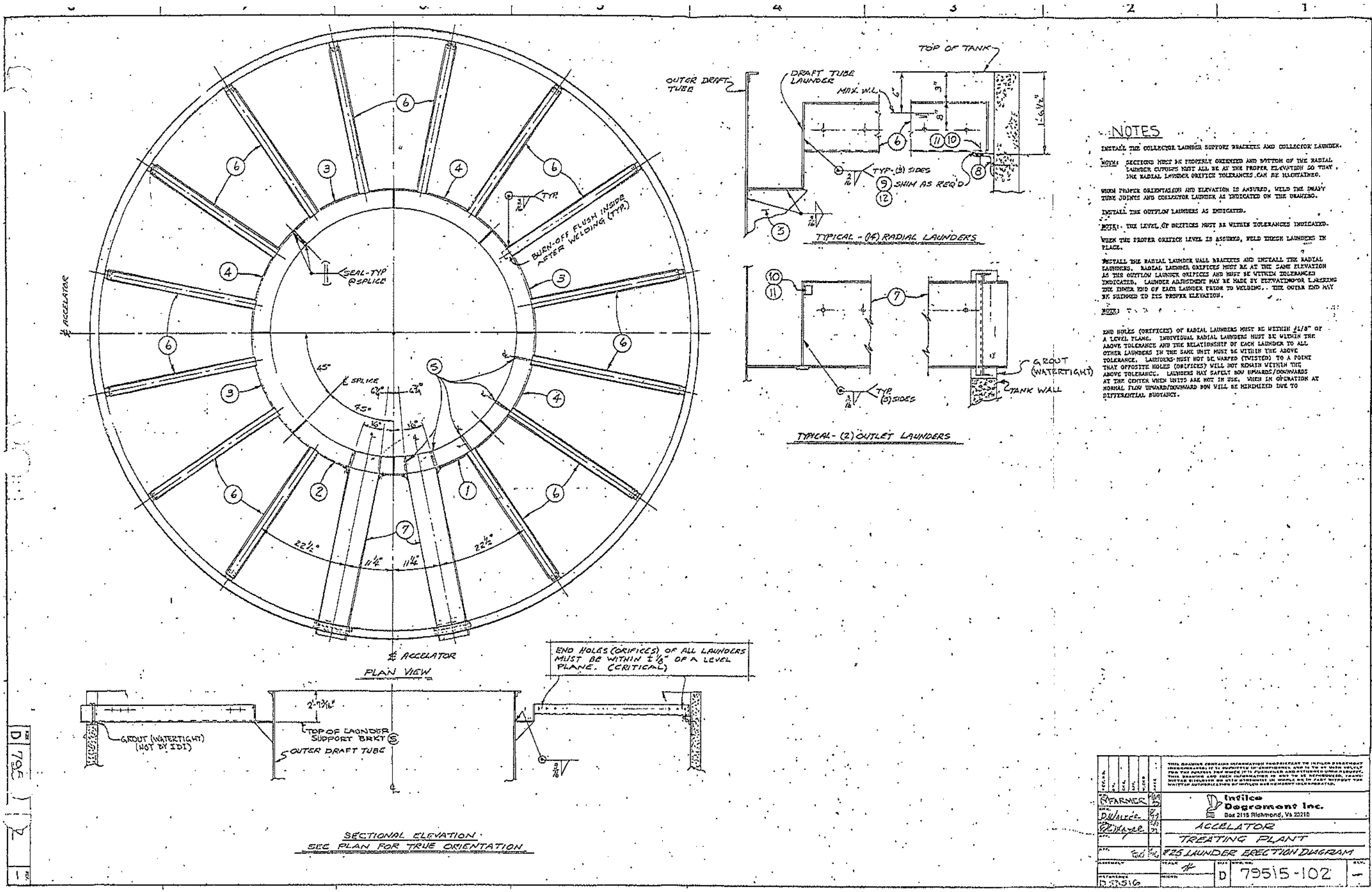


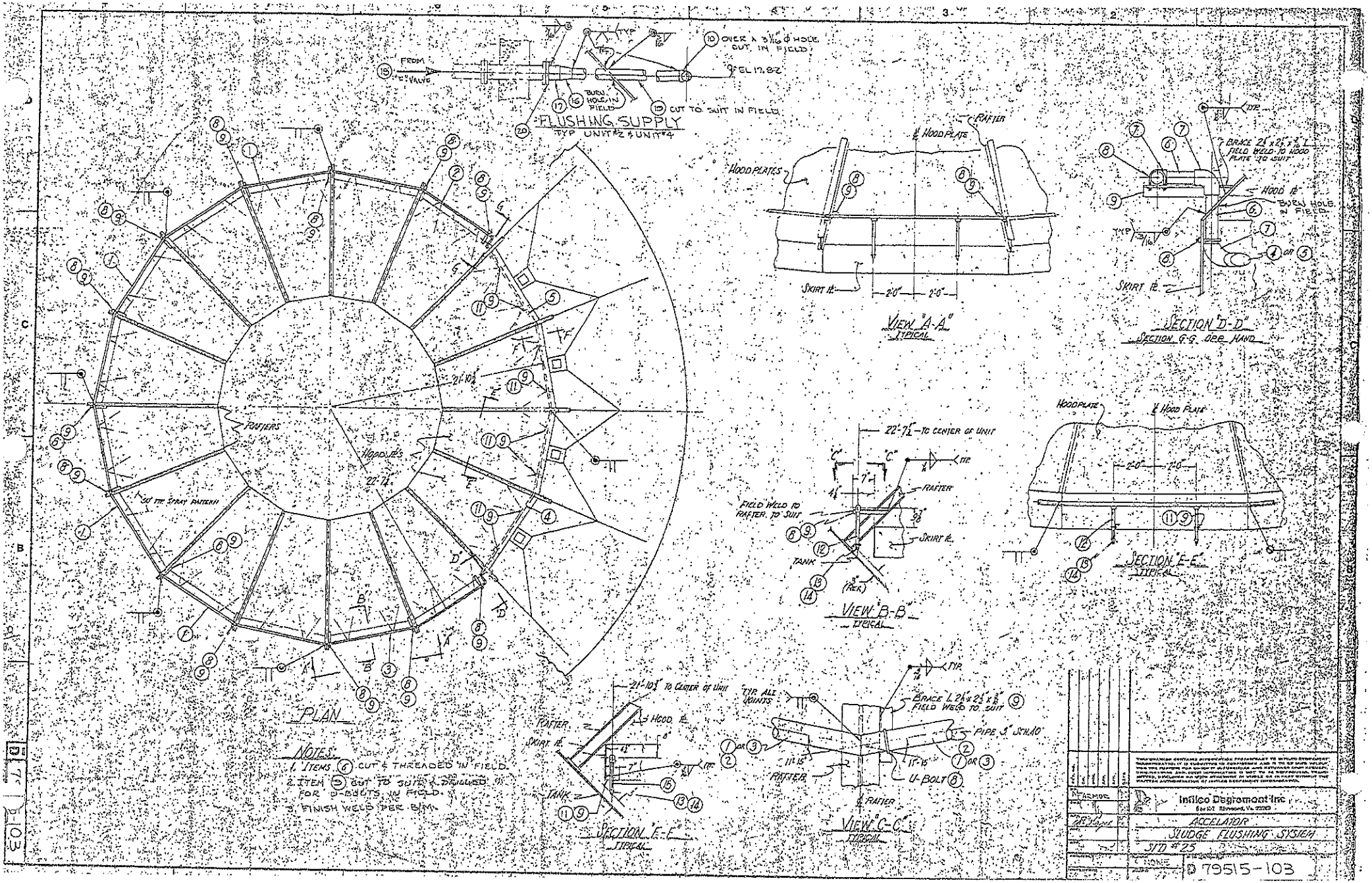

N
30" INFLUENT PIPE
END OF I.D.I. WALKWAY
4'-0" SQ. MANHOLE IN FILLER PLATE
4'-0" SQ. MANHOLE IN HOOD PLATE
2 OUTER DRAFT TUBE
1¼" ALUMINUM GRATING THEREON
16 RAFTERS
3 3" HEADER FOR SLUDGE FLUSHING
1 200 MIX 1 DRIVE
COLLECTOR LAUNDER 28" DEEP X 30" WIDE
2 HOOD PL.
ACCELATOR
W.P. FOR SLUDGE BLOW-OFF LINES
SKIRT PL.
14 RADIAL LAUNDERS 10" WIDE X 15" DEEP 6
22½° TYP. CONCENTRATORS
2 16" PIPES
CHEMICAL FEED LINES
22½° TYP.
4 6" SLUDGE BLOW-OFF LINES AND WALL SLEEVES (NOT BY I.D.I.)
45°
END OF I.D.I. WALKWAY
2 EFFLUENT LAUNDERS 30" WIDE X 28" DEEP 6
12" EFFLUENT (NOT BY I.D.I.)
12" CENTER DRAIN (NOT BY I.D.I.)
1½" PROJECTION (TYP.)
90 MIX 2
PLAN VIEW UNIT #4 (UNIT #2 SIMILAR)
DESIGN CAPACITY 7000 GPM
HYDRAULIC CAPACITY 10,500 GPM
NOTE:
1. WORK THIS SHEET WITH D.DWG. D 79515-100.
2. GENERAL NOTES ON DWG. D 79515-100.
INLET HOLE IN INTERIOR STEEL 2
INLET PIPING 7 8
CONCENTRATOR 90° SECT.
RAFTER
UNIT-2
INLET PIPE
INLET PIPING 9
INLET HOLE IN INTERIOR STEEL 2
UNIT-4
Infilco Degremont Inc
ACCELATOR TYPE N.S.
PLAN VIEW
#25
7000 GPM
NONE
D 79515-125

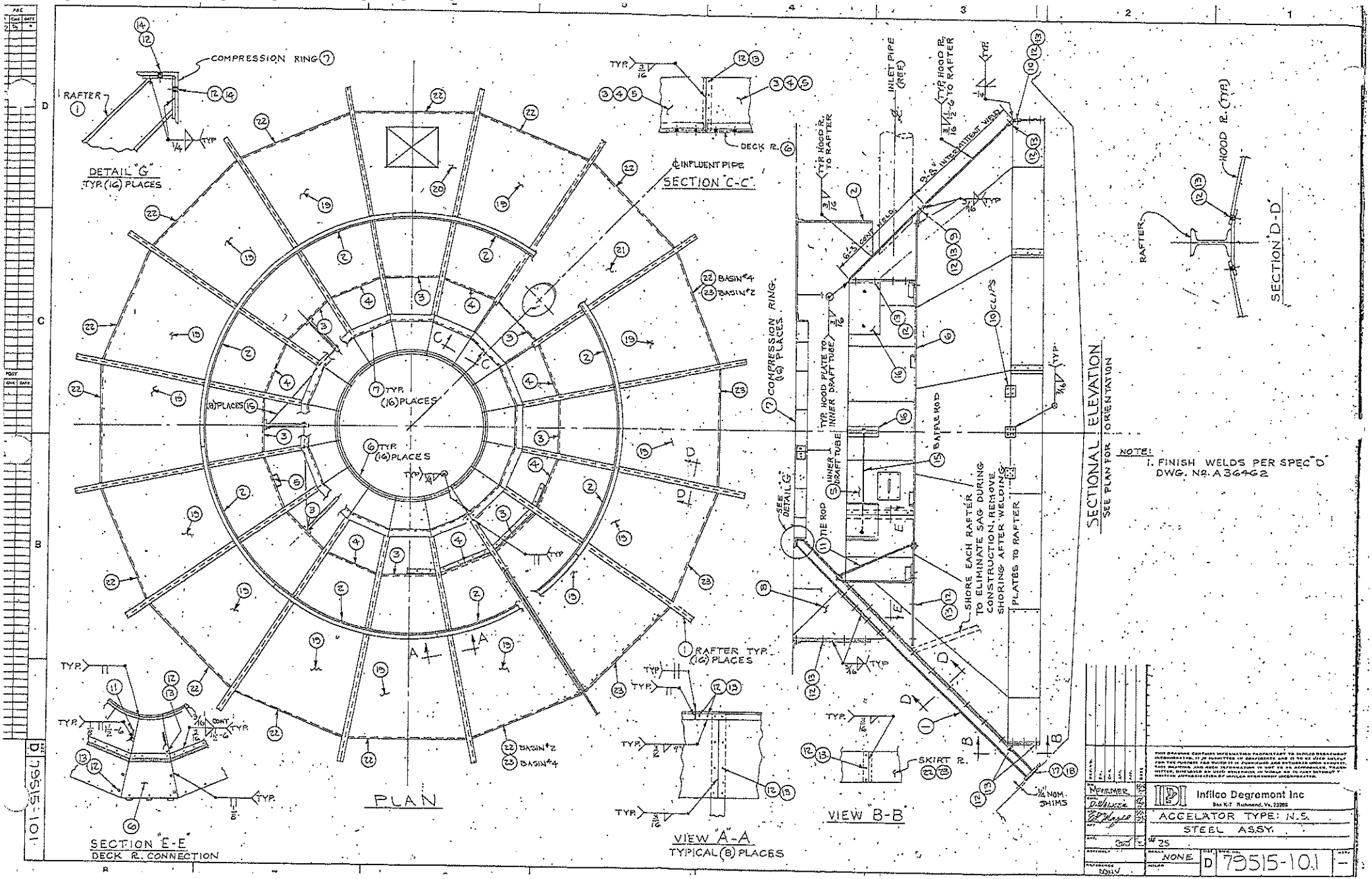

WALKWAY LOADING 2700#
℄ OF WALKWAY
CUT-OUTS FOR EFFLUENT LAUNDERS
ANCHOR BOLT "A"
3"GROUT (NOT BY I.D.I.)
W.P. EL.13.25'
C8 x 13.75#
21'-0" RAD. TO W.P.
21'-1½" RAD.
DIMENSIONS ON A 38'-0" RADIUS
SECTION "B-B"
VIEW "A-A"
DETAIL "D"
CHANGE PER D79515-003
5/8"x8" EXPANSION BOLT W/NUT. ANCHOR BOLT "C"
3" PROJ. TO 1½" PROJ.
DETAIL "C"
70'-0" DIA.
35'-6" TYP.
(2) ANCHOR BOLT "A" (TYP)
TOP OF TANK EL.31.75'
3"GROUT (NOT BY I.D.I.)
EL.31.75'
MAX.W.L.EL. 31.25'
LAUNDER LOAD 267#
ANCHOR BOLT "B"
ANCHOR BOLT "C" SEE DETAIL "C"
17'-11" SIDE WALL DEPTH
NOTE
1. SEE DRAWINGS D79515-006 FOR PLAN VIEW
2. REMOVE EXISTING FLOOR AND MAKE MODIFICATIONS TO BASINS AS SHOWN ON CONSULTANTS DWGS.
(1) 4" PIPE FOR SLUDGE FLUSHING LINE (NOT BY I.D.I.)
WATER LOAD 1125#/FT²
KNEE BRACE LOAD 6575#
EL. 18.4'
SLEEVE FOR 1"⌀ PIPE ELEV. 17.83'
℄ EL. 16.83'
(4) 6" PIPE (NOT BY I.D.I.)
DETAIL "D"
ANCHOR BOLT "D"
1'-6" DIA. B.C.
EL. 18.83
EL. 13.83'
12"⌀ SUMP
21'-1½" RADIUS INSIDE
ANCHOR BOLTS "E"
42'-3" DIA. INSIDE
12" DRAIN PIPE AND VALVE (NOT BY I.D.I.)
30" INLET PIPE (NOT BY I.D.I.)
SECTIONAL VIEW (ELEV.)
(FOR TRUE ORIENTATION SEE PLAN VIEW)
90 MIX 2
Infilco Degremont Inc.
CITY of NAPLES
NAPLES, FLORIDA
R. MCDONALD
Infilco Degremont Inc
ACCELATOR TYPE: N.S.
CONCRETE ELEV.
UNIT 2
7000GPM
NONE
D 79515-005

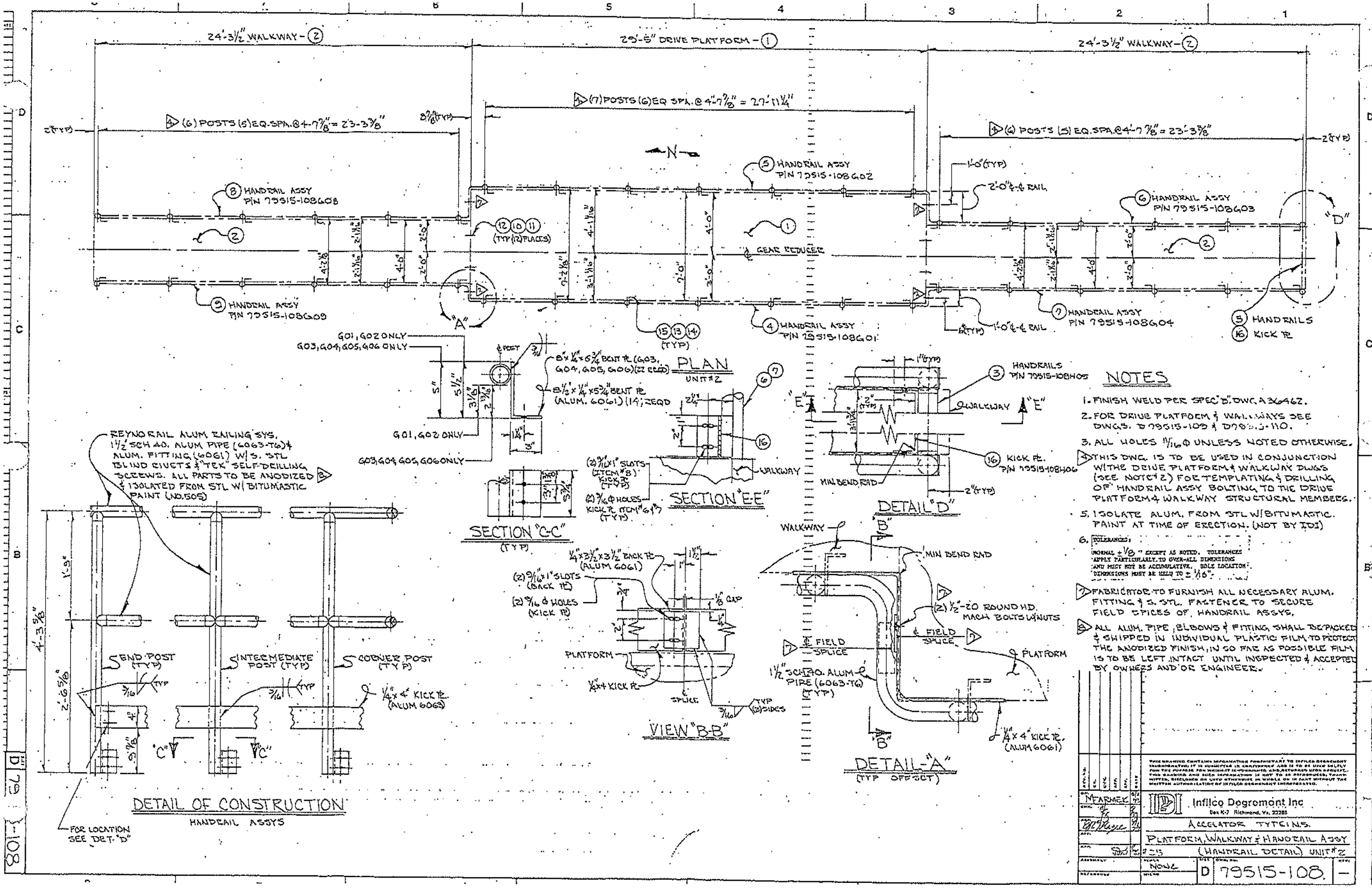

ANCHOR BOLTS NOT INCLUDED IN CONTRACT
SYM. | PROJ. | 5/8"xG. | 5/8"x8"
A | 3" | — | 4
B | 3" | — | 28
C | 3" | — | 60
D | 3" | 4 | —
E | 3" | — | 32
38'-0" RADIUS
23'-6" RADIUS
30" INFLUENT PIPE (NOT BY I.D.I.)
12" DRAIN (NOT BY I.D.I.)
(14) SETS OF (2) ANCHOR BOLTS "B"
ANCHOR BOLTS "A"
ANCHOR BOLTS "C"
(4) ANCHOR BOLTS "D"
(14) SETS OF (2) ANCHOR BOLTS "E"
6" PIPE SPOOL PIECES (4) PLACES
SLEEVE FOR 1"Ø SAMPLE PIPE
DETAIL "G"
42'-3"Ø INSIDE
35'-6" TYPICAL
22½" TYP. (16) PLACES
3" TYP.
6" TYP.
10°
12°
7'-0"
4'-0"
8'-0"
PLAN VIEW ... 90 MIX 2
SUMP DETAIL "G"
NOTES.
1. DESIGN OF ALL CONCRETE STRUCTURES (NOT BY I.D.I.
2. SEE DRAWING D79515-005 FOR ELEV. AND SECTIONS.
3. PLEASE INDICATE ORIENTATION OF 4" WALL SLEEVE FOR SLUDGE FLUSHING SYSTEM.
Infilco Degremont Inc.
For CITY of NAPLES
NAPLES, FLORIDA
R. McDONALD
Infilco Degremont Inc
ACCELATOR TYPE : N.S.
CONCRETE PLAN
UNIT 2 7000 GPM
NONE
D 79515-006

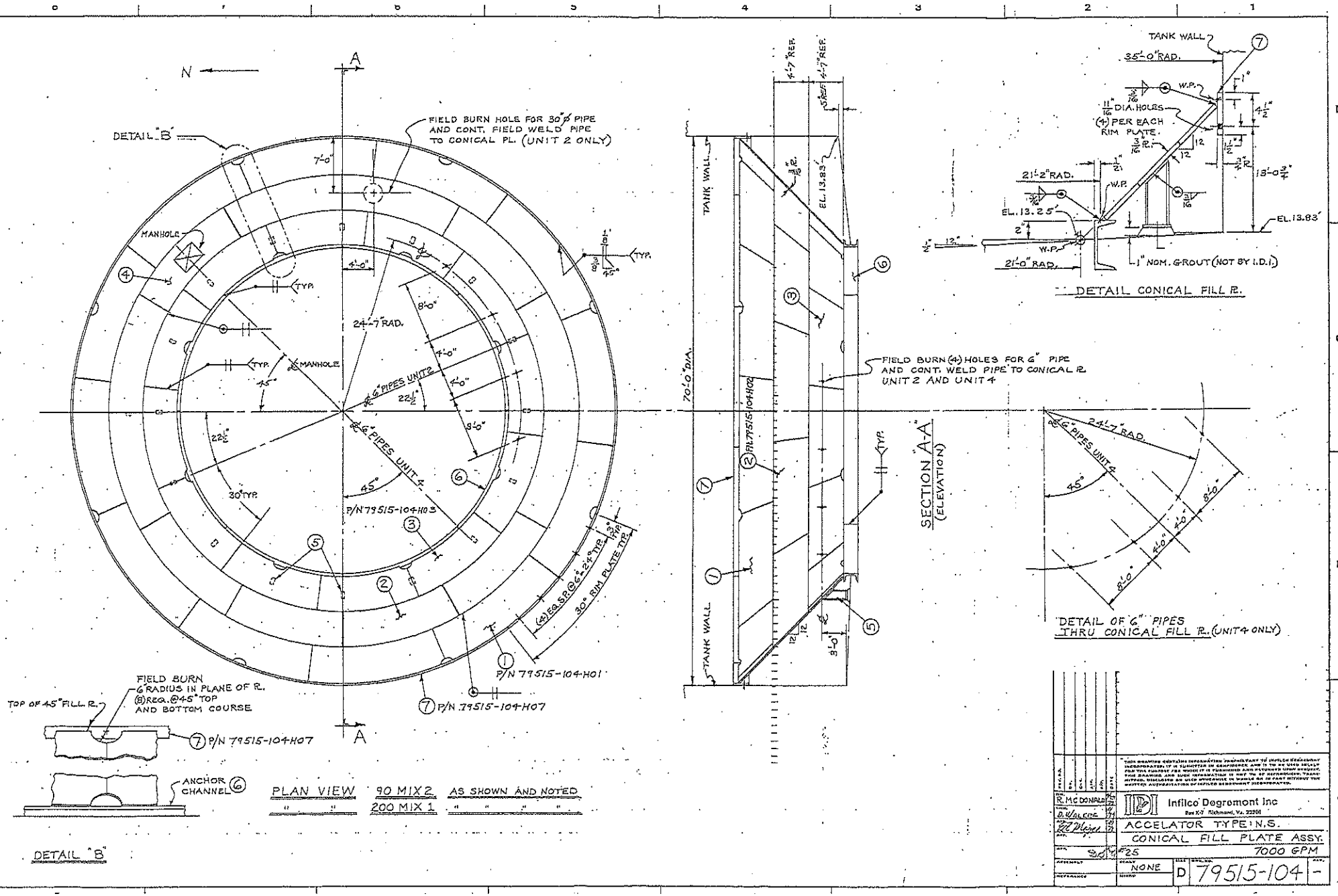

DETAIL "B"
TOP OF WALKWAY EL. 32.67' (REF.)
TOP OF GRATING EL. 33.10'
CUSTOMER WALKWAY (REF.)
C12x20.7
C10x15.3 (REF.)
2" R. SPACER
TOP OF TANK EL. 31.75'
NOT BY I.D.I.
1/2" GROUT
TANK WALL
CHEMICAL PIPING
2" LIME PIPE (PVC)
2" POLYELECTROLITE (PVC)
CAULKING (NOT BY I.D.I.)
HOOD R.
DECK R.
FIELD BURN HOLES
INLET PIPE UNIT 2 ONLY
FIELD BURN HOLE
70'-0" INSIDE DIA.
12'-6"
4'-0"
1 1/2" ALUMINUM HANDRAILING
ALL POINTS OF CONTACT
SEE DETAIL "B"
TOP OF CONCRETE EL. 31.75
CAULK SIDES (NOT BY I.D.I.)
TOP OF GRATING EL. 33.10'
C15x33.9
C12x20.7
3" GROUT
SHAFT
(8) REMOVABLE BAFFLES
(14) RADIAL LAUNDERS
MAX. W.L.
(2) EFFLUENT LAUNDERS
OUTER DRAFT TUBE
TIE ROD
30" INFLUENT EL. 28.0'
CONCENTRATORS
17'-11" SIDE WALL DEPTH
42" EFFLUENT (NOT BY I.D.I.)
RAFTER
1 1/4" CLEARANCE
WALL R.
1" SAMPLE LINE
FIELD BURN HOLE
10'-7" TO TOP OF DECK R.
1" CLEARANCE
2" CLEARANCE
4" SLUDGE FLUSHING LINE EL. 17.82'
1/4" SHIMS
HOOD R. 3/16" R.
IMPELLER/BAND
FIELD BURN HOLES FOR U-BOLTS
FIELD BURN HOLES
(4) 6" SLUDGE BLOW-OFF EL. 16.83' (PIPE NOT BY I.D.I.)
SKIRT R. 3/16" R.
FILL R. 3/16"
W.P.
2" CLEARANCE
3'-0"
EL. 13.83'
DRAIN COVER
SLUDGE FLUSHING SYSTEM (S.S. NOZZLES)
EL. 11.50'
12" DRAIN PIPE (NOT BY I.D.I.)
12" PLUG VALVE (NOT BY I.D.I.)
SECTIONAL ELEVATION UNIT #1 (UNIT #2 SIMILAR)
SEE PLAN VIEW FOR TRUE ORIENTATION · DWG D79515-125
NOTES:
1. WORK THIS SHEET WITH DWG. D79515-125
2. FINISH WELDS PER B/M
3. ITEMS 13 & 15 TO BE CUT TO LENGTH IN FIELD.
4. PIPING SHOWN IN PHANTOM, NOT BY I.D.I.
Infilco Degremont Inc
ACCELATOR TYPE: N.S.
ELEVATION LAYOUT
#25
7000 GPM
NONE
D 79515-100
D79515-007
R. McDONALD
D. WALKER

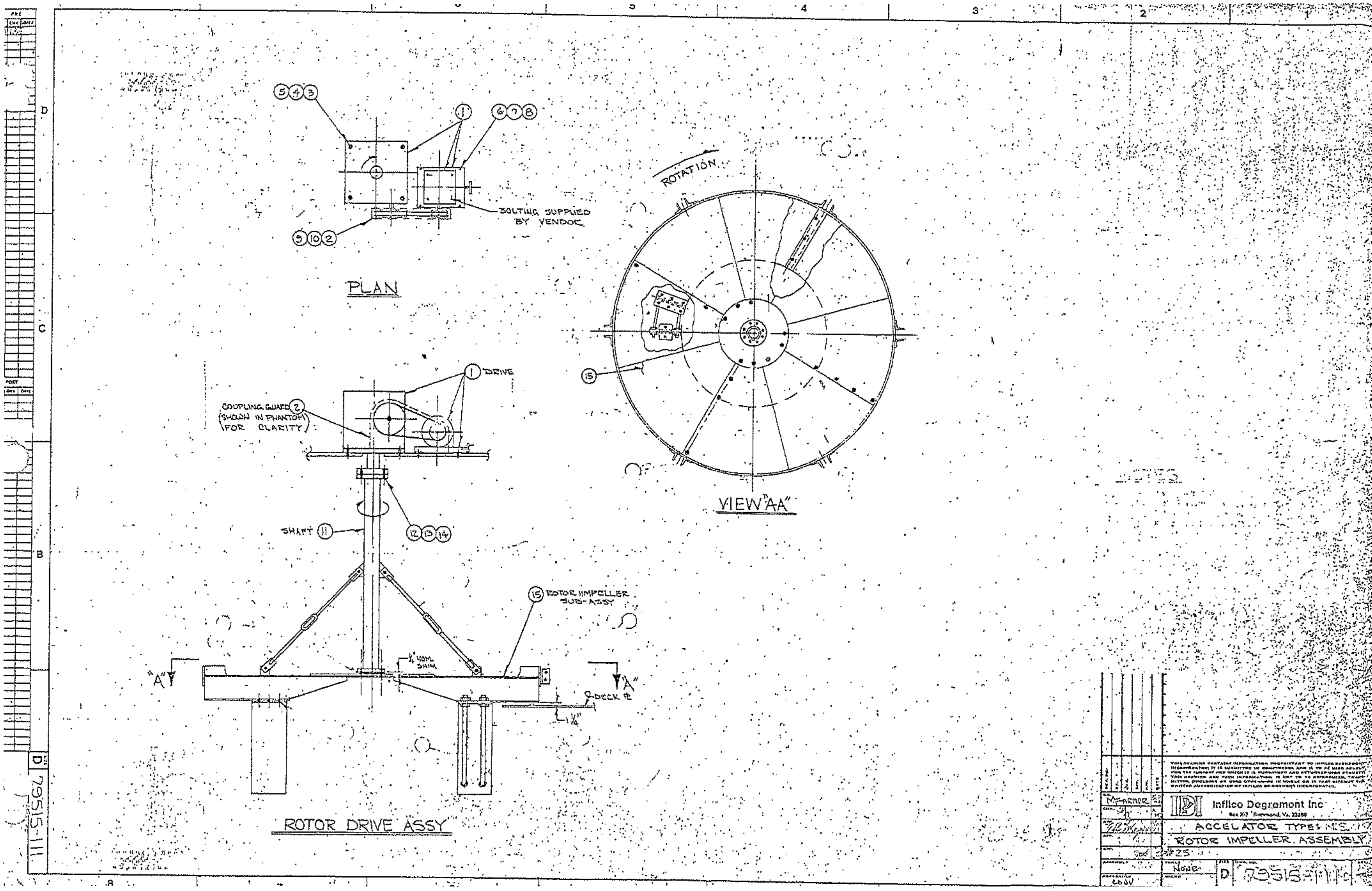

NOTES
INSTALL THE COLLECTOR LAUNDER SUPPORT BRACKETS AND COLLECTOR LAUNDER.
NOTE: SECTIONS MUST BE PROPERLY ORIENTED AND BOTTOM OF THE RADIAL LAUNDER CUTOUTS MUST ALL BE AT THE PROPER ELEVATION SO THAT THE RADIAL LAUNDER ORIFICE TOLERANCES CAN BE MAINTAINED.
WHEN PROPER ORIENTATION AND ELEVATION IS ASSURED, WELD THE DRAFT TUBE JOINTS AND COLLECTOR LAUNDER AS INDICATED ON THE DRAWING.
INSTALL THE OUTFLOW LAUNDERS AS INDICATED.
NOTE: THE LEVEL OF ORIFICES MUST BE WITHIN TOLERANCES INDICATED.
WHEN THE PROPER ORIFICE LEVEL IS ASSURED, WELD THESE LAUNDERS IN PLACE.
INSTALL THE RADIAL LAUNDER WALL BRACKETS AND INSTALL THE RADIAL LAUNDERS. RADIAL LAUNDER ORIFICES MUST BE AT THE SAME ELEVATION AS THE OUTFLOW LAUNDER ORIFICES AND MUST BE WITHIN TOLERANCES INDICATED. LAUNDER ADJUSTMENT MAY BE MADE BY ELEVATING OR LOWERING THE INNER END OF EACH LAUNDER PRIOR TO WELDING. THE OUTER END MAY BE SHIMMED TO ITS PROPER ELEVATION.
NOTE:
END HOLES (ORIFICES) OF RADIAL LAUNDERS MUST BE WITHIN ±1/8" OF A LEVEL PLANE. INDIVIDUAL RADIAL LAUNDERS MUST BE WITHIN THE ABOVE TOLERANCE AND THE RELATIONSHIP OF EACH LAUNDER TO ALL OTHER LAUNDERS IN THE SAME UNIT MUST BE WITHIN THE ABOVE TOLERANCE. LAUNDERS MUST NOT BE WARPED (TWISTED) TO A POINT THAT OPPOSITE HOLES (ORIFICES) WILL NOT REMAIN WITHIN THE ABOVE TOLERANCE. LAUNDERS MAY SAFELY BOW UPWARDS/DOWNWARDS AT THE CENTER WHEN UNITS ARE NOT IN USE. WHEN IN OPERATION AT NORMAL FLOW UPWARD/DOWNWARD BOW WILL BE MINIMIZED DUE TO DIFFERENTIAL BUOYANCY.
TOP OF TANK
OUTER DRAFT TUBE
DRAFT TUBE LAUNDER
MAX. W.L.
TYP. (3) SIDES
SHIM AS REQ'D
TYPICAL - (14) RADIAL LAUNDERS
GROUT (WATERTIGHT)
TANK WALL
TYP. (3) SIDES
TYPICAL - (2) OUTLET LAUNDERS
BURN-OFF FLUSH INSIDE AFTER WELDING (TYP.)
SEAL-TYP @SPLICE
℄ SPLICE
℄ ACCELATOR
PLAN VIEW
END HOLES (ORIFICES) OF ALL LAUNDERS MUST BE WITHIN ±1/8" OF A LEVEL PLANE. (CRITICAL)
TOP OF LAUNDER SUPPORT BRKT
GROUT (WATERTIGHT) (NOT BY IDI)
OUTER DRAFT TUBE
SECTIONAL ELEVATION
SEE PLAN FOR TRUE ORIENTATION
Infilco Degremont Inc.
Box 2118 Richmond, Va 23210
ACCELATOR
TREATING PLANT
#25 LAUNDER ERECTION DIAGRAM
D 79515-102


FLUSHING SUPPLY
TYP UNIT #2 & UNIT #4
PLAN
NOTES:
1. ITEMS (6) CUT & THREADED IN FIELD.
2. ITEM (5) CUT TO SUIT & DRILLED FOR U-BOLTS IN FIELD.
3. FINISH WELD PER B/M.
VIEW "A-A"
TYPICAL
SECTION "D-D"
SECTION C-C OPP HAND
VIEW "B-B"
TYPICAL
SECTION "E-E"
TYPICAL
SECTION "F-F"
TYPICAL
VIEW "C-C"
TYPICAL
HOOD PLATES
RAFTERS
SKIRT PL
TANK
U-BOLT
Infilco Degremont Inc.
ACCELATOR
SLUDGE FLUSHING SYSTEM
STD #25
79515-103

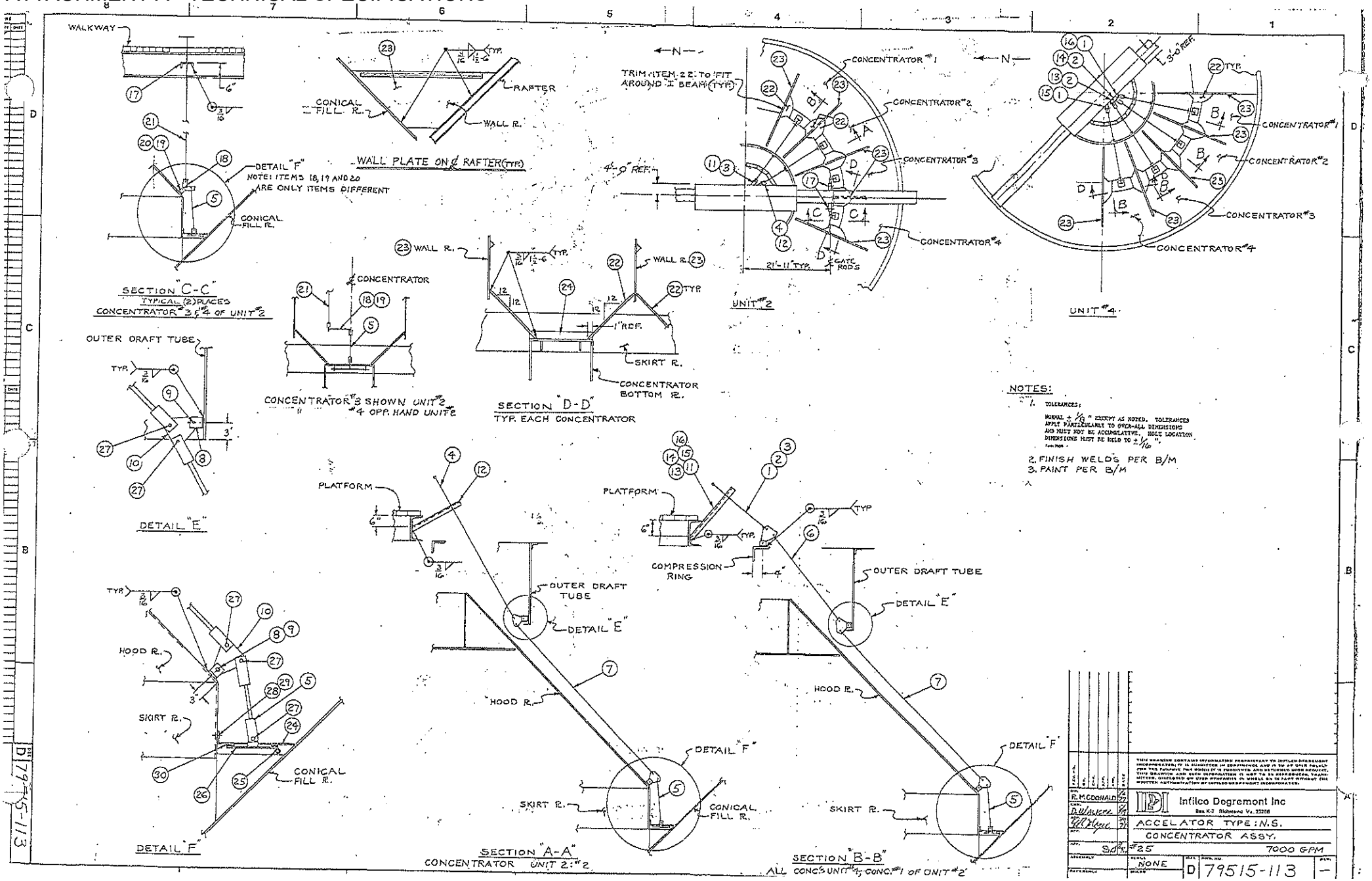

PLAN
SECTION E-E
DECK R. CONNECTION
VIEW A-A
TYPICAL (8) PLACES
VIEW B-B
SECTIONAL ELEVATION
SEE PLAN FOR ORIENTATION
SECTION C-C
SECTION D-D
DETAIL G
TYP. (16) PLACES
COMPRESSION RING
RAFTER
DECK R.
INFLUENT PIPE
INLET PIPE
HOOD R. (TYP.)
SKIRT R.
TIE ROD
BAFFLE ROD
CLIPS
NOTE:
1. FINISH WELDS PER SPEC D
DWG. NO. A364G2
Infilco Degremont Inc
ACCELATOR TYPE: N.S.
STEEL ASSY.
NONE
D 79515-10.1

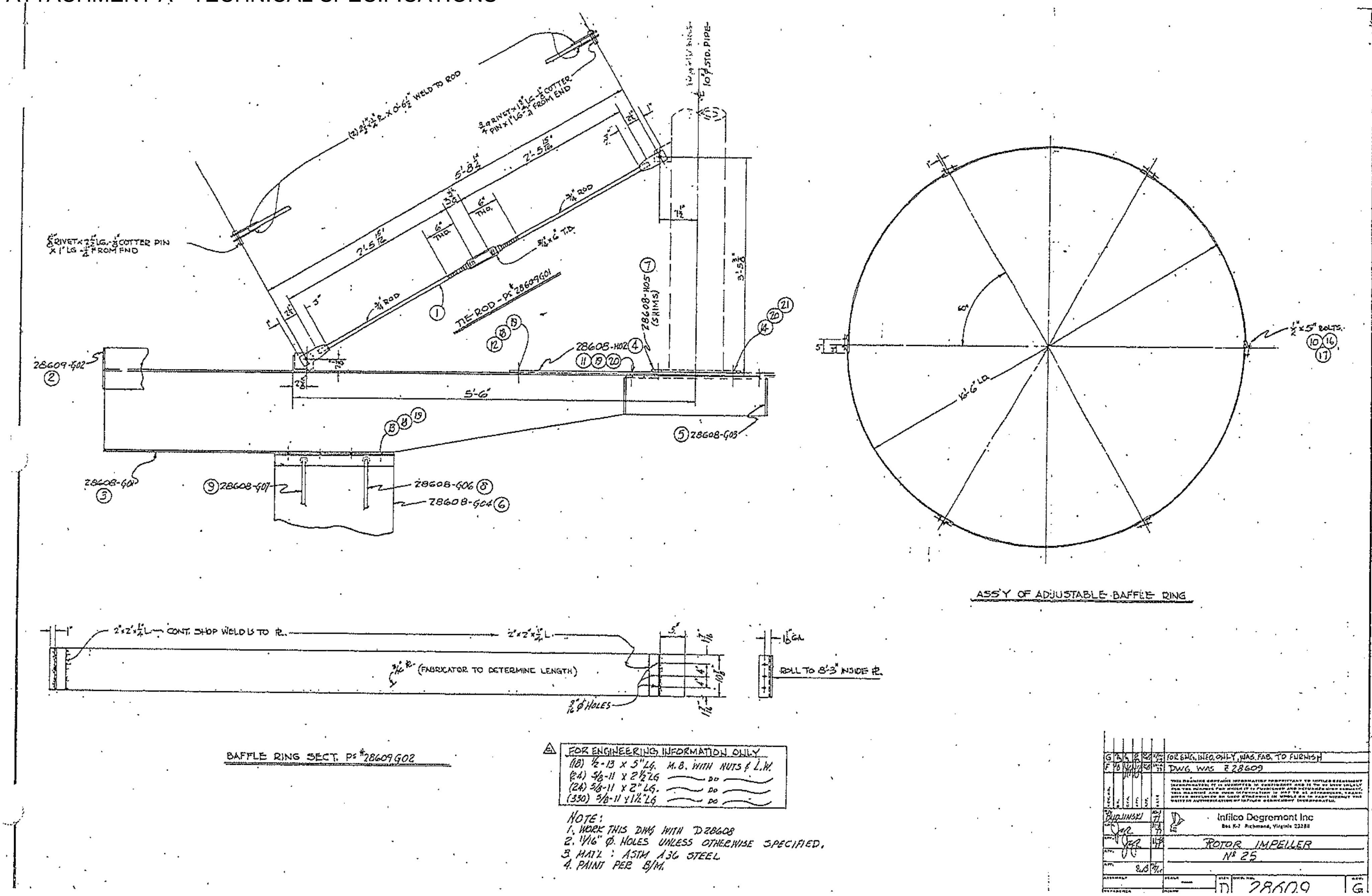

24'-3½" WALKWAY-②
29'-5" DRIVE PLATFORM-①
24'-3½" WALKWAY-②
PLAN
UNIT #2
SECTION "E-E"
DETAIL "D"
SECTION "C-C"
VIEW "B-B"
DETAIL "A"
DETAIL OF CONSTRUCTION
HANDRAIL ASSYS
NOTES
1. FINISH WELD PER SPEC "B" DWG A36462.
2. FOR DRIVE PLATFORM & WALKWAYS SEE DWGS. D79515-109 & D79515-110.
3. ALL HOLES 11/16 Ø UNLESS NOTED OTHERWISE.
4 THIS DWG. IS TO BE USED IN CONJUNCTION WITH THE DRIVE PLATFORM & WALKWAY DWGS (SEE NOTE #2) FOR TEMPLATING & DRILLING OF HANDRAIL ASSY BOLTING TO THE DRIVE PLATFORM & WALKWAY STRUCTURAL MEMBERS.
5. ISOLATE ALUM. FROM STL W/ BITUMASTIC. PAINT AT TIME OF ERECTION. (NOT BY IDI)
6. TOLERANCES: NORMAL ± 1/8" EXCEPT AS NOTED. TOLERANCES APPLY PARTICULARLY TO OVER-ALL DIMENSIONS AND MUST NOT BE ACCUMULATIVE. HOLE LOCATION DIMENSIONS MUST BE HELD TO ± 1/16".
7 FABRICATOR TO FURNISH ALL NECESSARY ALUM. FITTING & S. STL. FASTENER TO SECURE FIELD SPICES OF HANDRAIL ASSYS.
8 ALL ALUM. PIPE, ELBOWS & FITTING SHALL BE PACKED & SHIPPED IN INDIVIDUAL PLASTIC FILM TO PROTECT THE ANODIZED FINISH, IN SO FAR AS POSSIBLE FILM IS TO BE LEFT INTACT UNTIL INSPECTED & ACCEPTED BY OWNERS AND/OR ENGINEER.
Infilco Degremont Inc
Box K-7 Richmond, Va. 23288
ACCELATOR TYPE I.N.S.
PLATFORM, WALKWAY & HANDRAIL ASSY
(HANDRAIL DETAIL) UNIT #2
NONE
D 79515-108.

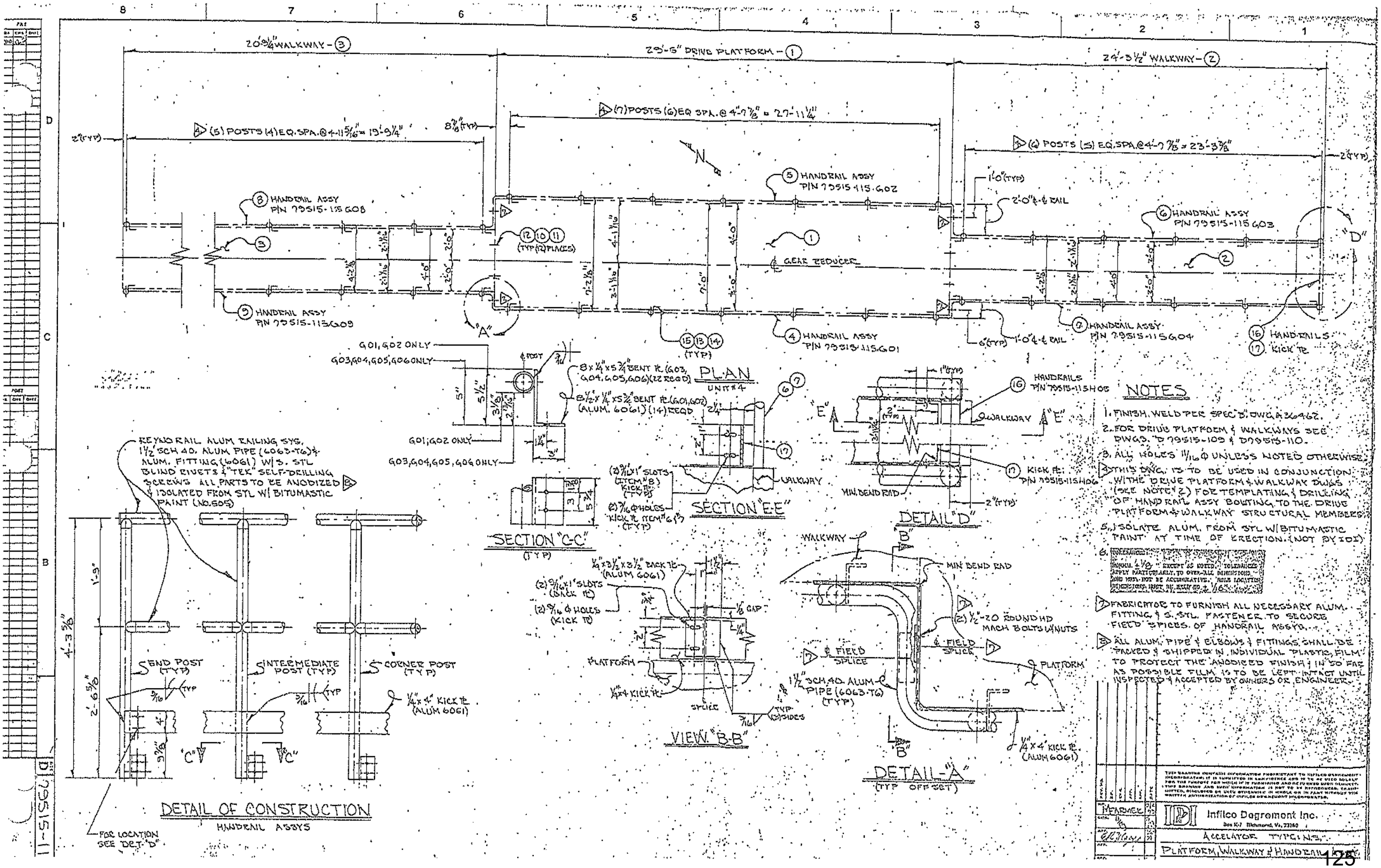

N
A
DETAIL "B"
FIELD BURN HOLE FOR 30"ø PIPE AND CONT. FIELD WELD PIPE TO CONICAL PL. (UNIT 2 ONLY)
MANHOLE
MANHOLE
TYP.
24'-7" RAD.
6" PIPES UNIT 2
6" PIPES UNIT 4
45°
22½°
30° TYP
P/N 79515-104-H03
P/N 79515-104-H01
P/N 79515-104-H07
(4) EQ. SP. @ 6'-2¾" TYP.
30° RIM PLATE TYP.
TANK WALL
70'-0" DIA.
EL. 13.83'
4'-7" REF.
FIELD BURN (4) HOLES FOR 6" PIPE AND CONT. WELD PIPE TO CONICAL PL. UNIT 2 AND UNIT 4
SECTION A-A (ELEVATION)
TANK WALL
35'-0" RAD.
W.P.
11/16" DIA. HOLES (4) PER EACH RIM PLATE.
21'-2" RAD.
EL. 13.25'
21'-0" RAD.
EL. 13.83'
1" NOM. GROUT (NOT BY I.D.I.)
DETAIL CONICAL FILL PL.
24'-7" RAD.
6" PIPES UNIT 4
45°
DETAIL OF 6" PIPES THRU CONICAL FILL PL. (UNIT 4 ONLY)
TOP OF 45° FILL PL.
FIELD BURN 6" RADIUS IN PLANE OF PL. (8) REQ. @ 45° TOP AND BOTTOM COURSE
P/N 79515-104-H07
ANCHOR CHANNEL
DETAIL "B"
PLAN VIEW 90 MIX 2 AS SHOWN AND NOTED
" " 200 MIX 1 " " " "
Infilco Degremont Inc
ACCELATOR TYPE: N.S.
CONICAL FILL PLATE ASSY.
7000 GPM
NONE
D
79515-104
-



PLAN
BOLTING SUPPLIED BY VENDOR
ROTATION
VIEW "AA"
DRIVE
COUPLING GUARD (2) SHOWN IN PHANTOM FOR CLARITY
SHAFT (11)
ROTOR IMPELLER SUB-ASSY
¼" NOM. SHIM
DECK
1¼"
"A"
ROTOR DRIVE ASSY
Infilco Degremont Inc
ACCELATOR TYPE N.S.
ROTOR IMPELLER ASSEMBLY
79515-111


WALKWAY
DETAIL "F"
NOTE: ITEMS 18, 19 AND 20 ARE ONLY ITEMS DIFFERENT
CONICAL FILL R.
SECTION "C-C"
TYPICAL (2) PLACES
CONCENTRATOR #3 & #4 OF UNIT #2
OUTER DRAFT TUBE
DETAIL "E"
CONICAL FILL R.
RAFTER
WALL R.
WALL PLATE ON ℄ RAFTER (TYP)
CONCENTRATOR
CONCENTRATOR #3 SHOWN UNIT #2
#4 OPP. HAND UNITS
WALL R.
SKIRT R.
CONCENTRATOR BOTTOM R.
SECTION "D-D"
TYP. EACH CONCENTRATOR
TRIM ITEM 22 TO FIT AROUND "I" BEAM (TYP)
CONCENTRATOR #1
CONCENTRATOR #2
CONCENTRATOR #3
CONCENTRATOR #4
4'-0" REF.
21'-11" TYP.
GATE RODS
UNIT #2
L 3'-0" REF.
UNIT #4
NOTES:
1. TOLERANCES:
NORMAL ± 1/8" EXCEPT AS NOTED. TOLERANCES APPLY PARTICULARLY TO OVER-ALL DIMENSIONS AND MUST NOT BE ACCUMULATIVE. HOLE LOCATION DIMENSIONS MUST BE HELD TO ± 1/16".
2. FINISH WELDS PER B/M
3. PAINT PER B/M
PLATFORM
OUTER DRAFT TUBE
DETAIL "E"
HOOD R.
SKIRT R.
DETAIL "F"
CONICAL FILL R.
SECTION "A-A"
CONCENTRATOR UNIT 2: #2
COMPRESSION RING
SECTION "B-B"
ALL CONC'S UNIT #2 CONC. #1 OF UNIT #2
Infilco Degremont Inc
ACCELATOR TYPE: N.S.
CONCENTRATOR ASSY.
7000 GPM
NONE
D 79515-113


10" STD. PIPE
TIE-ROD - Pc # 28609G01
28609-G02
28608-H02
28608-H05 (SHIMS)
5'-6"
28608-G03
28608-G01
28608-G07
28608-G06
28608-G04
ASS'Y OF ADJUSTABLE BAFFLE RING
16'-6" LG.
BAFFLE RING SECT. Pc #28609G02
(FABRICATOR TO DETERMINE LENGTH)
ROLL TO 8'-3" INSIDE R.
FOR ENGINEERING INFORMATION ONLY
(18) 1/2-13 x 5" LG. M.B. WITH NUTS & L.W.
(24) 5/8-11 x 2 1/2" LG
(24) 5/8-11 x 2" LG.
(330) 5/8-11 x 1 1/2" LG
NOTE:
1. WORK THIS DWG WITH D28608
2. 11/16" Ø. HOLES UNLESS OTHERWISE SPECIFIED.
3. MAT'L : ASTM A36 STEEL
4. PAINT PER B/M.
FOR ENG. INFO. ONLY, WAS FAB. TO FURNISH
DWG. WAS Z28609
Infilco Degremont Inc
ROTOR IMPELLER
Nº 25
D 28609
G



PLAN
DETAIL OF CONSTRUCTION
HANDRAIL ASSYS
SECTION "C-C"
SECTION "E-E"
VIEW "B-B"
DETAIL "A"
DETAIL "D"
NOTES
Infilco Degremont Inc.
ACCELATOR
PLATFORM, WALKWAY & HANDRAIL
D 79515-11