

The Enclosed Document Is Provided For Your Convenience.

Please Email ALL Questions:
[MailTo:ContractAdministration@TampaGov.net](mailto:ContractAdministration@TampaGov.net)

City of Tampa
Contract Administration Department
306 E. Jackson St. #280A4N
Tampa, FL 33602
(813)274-8456

CITY OF
TAMPA, FLORIDA

NOTICE TO BIDDERS, INSTRUCTIONS TO BIDDERS
PROPOSAL, BID BOND, FORM OF NOTICE OF AWARD,
AGREEMENT, PERFORMANCE BOND AND
SPECIFICATIONS

FOR

Contract 19-C-00017

D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation

City of Tampa
CONTRACT ADMINISTRATION DEPARTMENT
TAMPA MUNICIPAL OFFICE BUILDING
306 E. JACKSON STREET - 4TH FLOOR NORTH
TAMPA, FLORIDA 33602

AUGUST 2019

CITY OF TAMPA
CONTRACT ADMINISTRATION DEPARTMENT
306 E. Jackson Street 280A4N
Tampa, FL 33602

BID NOTICE MEMO

Bids will be received no later than 1:30 p.m. on the indicated Date(s) for the following Project(s):

CONTRACT NO.: 19-C-00017; D.L. Tippin Tank Rehabilitation – Ferric and Acid Tank Rehabilitation

BID OPENING: 1:30PM, Tuesday, September 24, 2019 **ESTIMATE:** \$700,000 **SCOPE:** The project comprises making improvements to the existing Ferric Sulfate Tank No. 2, Sulfuric Acid Tank No. 1 and associated containment areas including surface preparation and exterior tank coating of both tanks, Ferric Sulfate Tank No.2 repairs, repair and coating of sulfuric acid containment, eye wash station installations and upgrades, air and miscellaneous piping installation, chemical fill station installations, canopy roof repair, with all associated work required for a complete project in accordance with the Contract Documents. **PRE-BID CONFERENCE:** 10:30AM, Tuesday, September 10, 2019. David L. Tippin Water Treatment Facility Building Conference Center 7125 N. 30th Street, Tampa, FL 33604 Attendance is not mandatory, but recommended.

Bids will be opened in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida 33602. Pre-Bid Conference is held at the same location unless otherwise indicated. Plans and Specifications and Addenda for this work may be examined at, and downloaded from, www.demandstar.com. Backup files are available at contractadministration@tampagov.net www.demandstar.com/contract-administration/programs/construction-project-bidding. Email Questions to:

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NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA
Contract 19-C-00017; D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., September 24, 2019, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

The proposed work is to include, but not be limited to, making improvements to the existing Ferric Sulfate Tank No. 2, Sulfuric Acid Tank No. 1 and associated containment areas including surface preparation and exterior tank coating of both tanks, Ferric Sulfate Tank No.2 repairs, repair and coating of sulfuric acid containment, eye wash station installations and upgrades, air and miscellaneous piping installation, chemical fill station installations, canopy roof repair, with all associated work required for a complete project in accordance with the Contract Documents.

The Instructions to Bidders, Proposal, Form of Bid Bond, Agreement, Form of Public Construction Bond, Specifications, Plans and other Contract Documents are posted at DemandStar.com. Backup files may be downloaded from <http://www.tampagov.net/contract-administration/programs/construction-project-bidding>. One set may be available for reference at the office of the Contract Administration Department, Municipal Office Building, Fourth Floor North, City Hall Plaza, Tampa, Florida 33602.

Each Proposal must be submitted on the Proposal form included in the Specifications and must be accompanied by a certified check or cashier's check on a solvent bank or trust company in compliance with Section 255.051, Florida Statutes, made payable to the City of Tampa, in an amount of not less than five per cent of the total bid, or a Bid Bond, of like amount, on the form set forth in the Contract Documents, as a guarantee that, if the Proposal is accepted, the Bidder will execute the Proposed Contract and furnish a Public Construction Bond within twenty (20) days after receipt of Notice of Award of Contract.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. **Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.**

The City of Tampa reserves the right to reject any or all Bids and to waive any informalities in the Bid and/or Bid Bond. Acceptance or rejection of Proposals will be made as soon as practicable after the Proposals are received, but the City reserves the right to hold Proposals for ninety (90) days from the date of Opening.

Bid Protest Procedures: Unless subsequently indicated otherwise, in a revised posting on the Department's web page for Construction Project Bidding, the City of Tampa intends to award the referenced project to the lowest bidder listed in the tabulation posted on or about the date of Bid Opening. A bidder aggrieved by this decision may file a protest not later than 4:30 P.M., five (5) business days from the first posting thereof, pursuant to City of Tampa Code Chapter 2, Article V, Division 3, Section 2-282, Procurement Protest Procedures. Protests not conforming therewith shall not be reviewed.

Pursuant to Section 2-282, City of Tampa Code, during the solicitation period, including any protest and/or appeal, NO CONTACT with City officers or employees is permitted from any bidder or proposer, other than as specifically stated in this solicitation and as follows:
Director of the Contract Administration Department (CAD)
Contracts Management Supervisor, Jim Greiner
Contract Officer, Jody Gray
City legal department

Any Requests For Information must be submitted by email to ContractAdministration@tampagov.net

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list." Refer to Section 287.133, Florida Statutes.

Pursuant to Section 287.087, Florida Statutes, under certain circumstances preference may be given to businesses with a drug-free workplace program that meets the requirements of said Section.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.01 GENERAL:

The proposed work is the D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation in the City of Tampa, as required for a complete project, as shown on the plans and detailed in the specifications. The work is located on land owned or controlled by the City of Tampa.

To be eligible to submit a proposal, a Bidder must hold the required and/or appropriate current license, certificate, or registration (e.g. DBPR license/certificate of authorization, etc.) in good standing at the time of receipt of Bids. Per Section 489.131, Florida Statutes, Proposals submitted for the construction, improvement, remodeling, or repair of public projects must be accompanied by evidence that the Bidder holds the required and/or appropriate current certificate or registration, unless the work to be performed is exempt under Section 489.103, Florida Statutes.

I-1.02 FORM PREPARATION AND PRESENTATION OF PROPOSALS: Replace the second sentence with the following: Submission of the entire specification book is not required.

I-1.03 ADDENDA – Section I-2.03 is replaced with the following: No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the City of Tampa, Contract Administration Department, 306 E. Jackson St., 4th Floor, Tampa, Florida 33602 and then emailed to ContractAdministration@tampagov.net. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be posted on DemandStar.Com and on the Department's web page. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-1.04 INSTRUCTIONS TO BIDDERS

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS is replaced with the following:

Proposals must be signed in ink by the Bidder with signature in full. When firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more partners. When a corporation is a bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office.

If the bidder referred to in Section I-2.07 is a corporation, it must submit; upon request, a copy of its filed Articles of Incorporation. In addition, if the bidder was incorporated in another state, it must establish that it is authorized to do business in the State of Florida. If the bidder is using a fictitious name, it must submit upon request, proof of registration of such name with the Clerk of the Circuit Court of the County where its principal place of business is. Failure to submit what is required is grounds to reject the bid of that bidder.

SECTION 2 – GENERAL INSTRUCTIONS. Section I-2.14 NONDISCRIMINATION IN EMPLOYMENT is changed to add the following to the end of the existing text:

The following provisions are hereby incorporated into any contract executed by or on behalf of the City. Contractor shall comply with the following Statement of Assurance: During the performance of the Contract, the Contractor assures the City, that the Contractor is in compliance with Title VII of the 1964 Civil Rights Act, as amended, the Florida Civil Rights Act of 1992, and the City of Tampa Code of Ordinances, Chapter 12, in that Firm/Contractor does not on the grounds of race, color, national origin, religion, sex, sexual orientation, gender identity or expression, age, disability, familial status, or marital status, discriminate in any form or manner against said Firm's/Contractor's employees or applicants for employment. Contractor understands and agrees that the Contract is conditioned upon the veracity of this Statement of Assurance, and that violation of this condition shall be considered a material breach of the Award/Contract. Furthermore, Contractor herein assures the City that said Contractor will comply with Title VI of the Civil Rights Act of 1964 when federal grant(s) is/are

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

involved. This Statement of Assurance shall be interpreted to include Vietnam-Era Veterans and Disabled Veterans within its protective range of applicability. Firm/Contractor further acknowledges and agrees to provide the City with all information and documentation that may be requested by the City from time to time regarding the solicitation, selection, treatment and payment of subcontractors, suppliers and vendors in connection with this Award/Contract. Firm/Contractor further acknowledges that it must comply with City of Tampa Code of Ordinances, Chapter 26.5, as enacted by Ordinance No. 2008-89.

I-1.05 TIME FOR COMPLETION:

The work shall be arranged to be completed in accordance with a progress schedule approved by the Construction Engineer.

The time for completion of this project, referred in Article 4.01 of the Agreement, shall be 200 consecutive calendar days. The period for performance shall start from the date indicated in the Notice To Proceed.

I-1.06 LIQUIDATED DAMAGES:

The amount of liquidated damages, referred to in Article 4.06 of the Agreement, for completion of this project shall be \$500 per calendar day.

I-1.07 BASIS OF AWARD OF CONTRACT:

The basis of award referred to in Item I-2.11 of Instructions to Bidders shall be the greatest amount of work, which can be accomplished within the funds available as budgeted. The award may be made on the basis of the total bid, base bid, alternates(s) if any, unit bids if any, or any combination thereof deemed to be in the best interest of the City.

Unless all bids are rejected, the award will be made within 90 days after opening proposals.

I-1.08 GROUND BREAKING CEREMONY:

Arrangement may be made by the City in coordination with the Contractor, for construction to commence with a Ground Breaking Ceremony. Details will be discussed at the pre-construction conference.

I-1.09 INSURANCE:

The insurance required for this project shall be as indicated on the attached and incorporated Special Instructions pages beginning with page INS-1 entitled CITY OF TAMPA INSURANCE REQUIREMENTS, which among other things requires the Contractor to provide a Certificate of Insurance to the City prior to commencing work. The City may from time to time use a third party vendor to manage its insurance certificates and related documentation which vendor may periodically initiate contact, requests for information, etc. on the City's behalf.

INSTRUCTIONS TO BIDDERS
SECTION 1 – SPECIAL INSTRUCTIONS

I-1.10 EQUAL BUSINESS OPPORTUNITY PROGRAM (EBO) REQUIREMENTS / PROJECT SUBCONTRACTING GOAL(S)

BIDDERS MUST SUBMIT COMPLETED AND SIGNED CITY OF TAMPA FORMS MBD-10 AND MBD-20 WITH THEIR BIDS. BIDS SUBMITTED WITHOUT THESE COMPLETED FORMS (INCLUDING SIGNATURES) WILL BE DEEMED NON-RESPONSIVE. INSTRUCTIONS ON COMPLETING THE FORMS ARE INCLUDED AFTER EACH FORM IN THIS BID PACKAGE.

THE CHECKED BOX INDICATES SECTION THAT APPLIES TO THIS BID.



SUBCONTRACTING GOAL – (WMBE and SLBE)

In accordance with the City of Tampa's EBO Program, Chapter 26.5, City of Tampa Code, the subcontracting goal(s) has/have been established for subcontracting with City-certified underutilized WMBEs (Women and Minority Business Enterprises) and/or SLBEs (Small Local Business Enterprises) on this project (hereinafter "Goal"). *The Goal is based, in part, upon the availability of City-certified firms to perform the anticipated scope of work (Bid is subject to the subcontracting project goal(s) section for which a corresponding numerical percent is indicated).* Project Industry Category: Construction

Project Goal(s): _____% U-WMBE (Underutilized Woman and Minority Business Enterprise) (EBO Program)
per MBD Form-70 the U-WMBE subcontract Classification for Construction is African American (BBE)
_____% SLBE (Small Local Business Enterprise) (EBO Program) only City-certified SLBEs
22.1% U-WMBE/SLBE Combined (EBO Program)
per MBD Form-70 the U-WMBE subcontract Classification for Construction is African American (BBE)
together with City-certified SLBEs
_____% WMBE/SLBE ASPIRATIONAL (EBO Program) An all-inclusive SLBE/WMBE goal; any City certified firm counts towards goal attainment.

BIDDERS MUST SOLICIT ALL COMPANIES ON THE ATTACHED AVAILABILITY CONTACT LIST at least **five (5) City business days or more prior to bid opening as a first step** to demonstrate Good Faith Efforts to achieve the Goal. Substantive documentation that demonstrates Good Faith Efforts to achieve the Goal **must be submitted with the bid**, including emails, faxes, phone calls, letters, and other communication with City-certified firms. Bidders may explore other potential opportunities for subcontracting by consulting the current directory of all certified firms posted by the City of Tampa at <https://tampa.diversitysoftware.com> as the Availability Contact List may not be inclusive of all firms that could count toward Goal attainment. However, ONLY SUBCONTRACTING with those specific WMBEs designated as "underutilized" by Classification in the appropriate industry category (and, if made applicable by being specifically included in the above Goal, SLBEs) will count toward meeting the Goal. Making Good Faith Efforts through these and other means (not pro-forma) is the responsibility of the Bidder. See the attached Good Faith Effort Compliance Plan (GFCEP) (MBD Form-50) for specific requirements.

GOOD FAITH EFFORT COMPLIANCE PLAN (GFCEP) REQUIRED (MBD FORM-50). When a Goal has been established, the Bidder **must submit** with its bid a Good Faith Effort Compliance Plan (GFCEP) using the attached MBD Form-50 together with supporting documentation as specified therein. **Submittals that do not contain MBD Form-50 when a Goal has been established will be deemed non-responsive.** Additional explanation and documentation is required whenever a City-certified subcontractor's quote is not utilized. Any additional information regarding GFCEP (post-bid) shall be only upon the City's request for clarification of information submitted with bid and not to "cure" omissions or deficiencies of the bid.

NOTE: When U-WMBEs are included in a Goal, only those City-certified subcontractors whose WMBE Classification is designated "underutilized" will count toward Goal attainment. Refer to **MBD Form-70** to identify underutilized WMBEs by subcontract Classification for the applicable project industry category. A prime bidder who is a City-certified WMBE and/or SLBE is not exempt from the **GFCEP MBD Form-50** requirements.



SUBCONTRACTING GOAL – (DBE) FDOT DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

The City of Tampa is required to use the Florida Department of Transportation (FDOT) Disadvantaged Business Enterprise (DBE) program on contracts with Federal Highway Administration (FHWA) funds. Effective October 1, 2017 through to September 30, 2020, the overall FDOT DBE aspirational goal is **10.65%** and is *race neutral*, meaning that FDOT believes the aspirational DBE goal may be achieved entirely through ordinary, competitive procurement methods. Despite the absence of a contract specific DBE goal on this project, the City encourages bidders to seek out and use DBEs and other minority, small businesses. For assistance in identifying certified DBEs, FDOT offers the use of its supportive services program accessed via FDOT's Equal Opportunity Office at <http://www.fdot.gov/equalopportunity/serviceproviders.shtm>. FDOT DBE rules and regulations apply to this solicitation, including the requirement to report bidder opportunity information in the FDOT Equal Opportunity Compliance (EOC) web-based application within three (3) business days of submission of the bid for ALL subcontractors who quoted bidder for this specific project. The five (5) char/digit LAP Agreement Contract Number for this project is G _____. The web address to the EOC system is: <https://fdotwp1.dot.state.fl.us/EqualOpportunityCompliance/Account.aspx/LogIn?ReturnUrl=%2fEqualOpportunityCompliance>

NOTE: Regardless of FDOT DBE program applicability, for data collection purposes bidder still **must submit** City Forms MBD-10 and MBD-20 completed and signed with its bid or the bid will be deemed non-responsive.

DIVERSITY MANAGEMENT INITIATIVE (DMI) DATA REPORTING FORMS REQUIRED FOR ALL CONTRACTS

Bidder **must submit**, with its bid, completed and signed Forms MBD-10 and MBD-20 to be considered a responsive bid. Specifically, the 'Schedule of All Solicited Sub-(Contractors/Consultants/Suppliers) (Form MBD-10)' listing all subcontractors (including non-certified) solicited and 'Schedule of All -To Be Utilized Sub-(Contractors/Consultants/Suppliers) (Form MBD-20)' listing all subcontractors (including non-certified) to be utilized. Supplemental forms, such as 'Form MBD-40 Official Letter Of Intent' (LOI), can be submitted with the bid or once declared lowest-responsive bidder. After an award, 'DMI Sub-(Contractors/Consultants/Suppliers) Payment Form (Form MBD-30)' is to be submitted with payment requests to report payments to subcontractors and using the on-line automated MBD compliance software system available at <https://tampa.diversitysoftware.com>

For additional information about the WMBE and SLBE programs contact the Minority and Small Business Development Office at 813-274-5522. (3-18)

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.11 BID SECURITY:

Surety companies shall have a rating of not less than B+ Class VI as evaluated in the most recently circulated Best KeyRating Guide Property/Casualty.

I-1.12 PUBLIC CONSTRUCTION BOND:

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be issued and executed by (a) surety company(ies) acceptable to the City and licensed to underwrite contracts in the State of Florida. After execution of the Agreement and before commencing work, the Contractor must provide the City a certified copy of the officially recorded Bond.

I-1.13 AGREEMENT

SECTION 2 – POWERS OF THE CITY'S REPRESENTATIVES, new Article 2.05:

Add the following:

Article 2.05 CITY'S TERMINATION FOR CONVENIENCE:

The City may, at any time, terminate the Contract in whole or in part for the City's convenience and without cause. Termination by the City under this Article shall be by a notice of termination delivered to the Contractor, specify the extent of termination and the effective date.

Upon receipt of a notice of termination, the Contractor shall immediately, in accordance with instructions from the City, proceed with performance of the following duties regardless of delay in determining or adjusting amounts due under this Paragraph:

- (a) cease operations as specified in the notice;
- (b) place no further orders and enter into no further subcontracts for materials, labor, services or facilities except as necessary to complete continued portions of the Contract;
- (c) terminate all subcontracts and orders to the extent they relate to the Work terminated;
- (d) proceed to complete the performance of Work not terminated; and
- (e) take actions that may be necessary, or that the City may direct, for the protection and preservation of the terminated Work.

The amount to be paid to the Contractor by the City because of the termination shall consist of:

- (a) for costs related to work performed on the terminated portion of the Work prior to the effective date including termination costs relative to subcontracts that are properly chargeable to the terminated portion of the Work;
- (b) the reasonable costs of settlement of the Work terminated, including accounting, legal, clerical and other expenses reasonable necessary for the preparation of termination settlement proposals and supporting data; additional costs of termination and settlement of subcontracts excluding amounts of such settlements; and storage, transportation, and other costs incurred which are reasonably necessary for the preservation, protection or disposition of the terminated Work; and
- (c) a fair and reasonable profit on the completed Work unless the Contractor would have sustained a loss on the entire Contract had it been completed.

Allowance shall be made for payments previously made to the Contractor for the terminated portion of the Work, and claims which the City has against the Contractor under the Contract, and for the value of materials supplies, equipment or other items that are part of the costs of the Work to be disposed of by the Contractor.

SECTION 5 – SUBCONTRACTS AND ASSIGNMENTS, Article 5.01, Page A-7, last paragraph:

Change "...twenty-five (25) percent..." to "...fifty-one (51) percent..."

SECTION 8 – CONTRACTOR'S EMPLOYEES, Article 8.03, Page A-9, delete Article 8.03 in its entirety and

Replace with the following new article:

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES

The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination and must not maintain, provide or permit facilities that are segregated.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

SECTION 10 – PAYMENTS, Article 10.05, Page A-10, 1st Paragraph, 1st Sentence:

Change "...fair value of the work done, and may apply for..." to "...fair value of the work done, and shall apply for..."

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.02, Page A-12, 1st Paragraph, 2nd Sentence:

Delete the 2nd Sentence in its entirety and replace it with the following new 2nd Sentence:

Without limiting application of Article 11.07, below, whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify, defend, and hold harmless the City Indemnified Parties (as defined below) from any and all Claims (as defined below) for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.03, Page A-12:

Delete Article 11.03 in its entirety and replace with the following new article:

ARTICLE 11.03 INTENTIONALLY OMITTED.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.07, Page A-12:

Delete Article 11.07 in its entirety and replace with the following new article:

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contact Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

Contractor releases and agrees to defend, indemnify and hold harmless the City, its officers, elected and appointed officials, employees, and/or agents (collectively, "City Indemnified Parties") from and against any and all losses, liabilities, damages, penalties, settlements, judgments, charges, or costs (including without limitation attorneys' fees, professional fees, or other expenses) of every kind and character arising out of any and all claims, liens, is entitled to indemnification hereunder. This obligation shall in no way be limited in any nature whatsoever by any limitation on the amount or type of Contractor's insurance coverage.

The parties agree that to the extent the written terms of this indemnification are deemed by a court of competent jurisdiction to be in conflict with any provisions of Florida law, in particular Sections 725.06 and 725.08, Florida Statutes, the written terms of this indemnification shall be deemed by any court of competent jurisdiction to be modified in such a manner as to be in fully and complete compliance with all such laws and to contain such limiting conditions or limitations of liability, or to not contain any unenforceable or prohibited term or terms, such that this indemnification shall be enforceable in accordance with and to the maximum extent permitted by Florida law.

The obligation of Contractor under this Article is absolute and unconditional; it is not conditioned in any way on any attempt by a City Indemnified Party to collect from an insurer any amount under a liability insurance policy, and is not subject to any set-off, defense, deduction, or counterclaim that the Contractor might have against the City Indemnified Party. The duty to defend hereunder is independent and separate from the duty to indemnify, and the duty to defend exists regardless of any ultimate liability of Contractor, the City, and any City Indemnified Party. The duty to defend arises immediately upon presentation of a Claim by any party and written notice of such Claim being provided to Contractor. Contractor's defense and indemnity obligations hereunder will survive the expiration or earlier termination of this Contract.

Contractor agrees and recognizes that the City Indemnified Parties shall not be held liable or responsible for any Claims which may result from any actions or omissions of Contractor in which the City Indemnified Parties participated either through providing data or advice and/or review or concurrence of Contractor's actions. In

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

reviewing, approving or rejecting any submissions by Contractor or other acts of Contractor, the City in no way assumes or shares any responsibility or liability of Contractor or any tier of subcontractor/subconsultant/supplier, under this Contract.

In the event the law is construed to require a specific consideration for such indemnification, the parties agree that the sum of Ten Dollars and 00/100 (\$10.00), receipt of which is hereby acknowledged, is the specific consideration for such indemnification and the providing of such indemnification is deemed to be part of the specifications with respect to the services provided by Contractor.

SECTION 11 – MISCELLANEOUS PROVISIONS, Article 11.12, Page A-13:
Change Article 11.12 to add the following new language after existing text:

The City of Tampa is a public agency subject to Chapter 119, Florida Statutes. In accordance with Florida Statutes, 119.0701, Contractor agrees to comply with Florida's Public Records Law, including the following:

1. Contractor shall keep and maintain public records required by the City to perform the services under this Agreement;
2. Upon request by the City, provide the City with copies of the requested records, having redacted records in total on in part that are exempt from disclosure by law or allow the records to be inspected or copied within a reasonable time (with provision of a copy of such records to the City) on the same terms and conditions that the City would provide the records and at a cost that does not exceed that provided in Chapter 119, Florida Statutes, or as otherwise provided by law;
3. Ensure that records, in part or in total, that are exempt or that are confidential and exempt from disclosure requirements are not disclosed except as authorized by law for the duration of the Agreement term and following completion (or earlier termination) of the Agreement if Contractor does not transfer the records to the City;
4. Upon completion (or earlier termination) of the Agreement, Contractor shall within 30 days after such event either transfer to the City, at no cost, all public records in possession of the Contractor or keep and maintain the public records in compliance with Chapter 119, Florida Statutes. If Contractor transfers all public records to the City upon completion (or earlier termination) of the Agreement, Contractor shall destroy any duplicate records that are exempt or confidential and exempt from public records disclosure requirements. If Contractor keeps and maintains public records upon completion (or earlier termination) of the Agreement, Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the City in a format that is compatible with the information technology systems of the agency.

The failure of Contractor to comply with Chapter 119, Florida Statutes, and/or the provisions set forth in this Article shall be grounds for immediate unilateral termination of the Agreement by the City; the City shall also have the option to withhold compensation due Contractor until records are received as provided herein.

IF CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 813-274-8598, JIM.GREINER@TAMPAGOV.NET, AND CONTRACT ADMINISTRATION DEPARTMENT, TAMPA MUNICIPAL OFFICE BUILDING, 4TH FLOOR, 306 E. JACKSON ST. TAMPA, FLORIDA 33602.

I-1.14 Contractors must utilize the U.S. Department of Homeland Security's E-Verify Systems to verify the employment eligibility of all persons employed during the term of the Contract to perform employment duties within the State of Florida and all persons, including subcontractors, assigned by Contractor to perform work pursuant to the contract.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.15 GENERAL PROVISIONS; G-2.02 Copies Furnished to Contractor: Replace the first paragraph with the following:

The Contractor shall acquire for its use copies of the plans and specifications as needed, which may be downloaded from the City's web site, at <http://www.tampagov.net/contract-administration/programs/construction-project-bidding>.

Bidder as part of the solicitation process (and as Contractor if Bidder is successful) may hold, come into possession of, and/or generate certain building plans, blueprints, schematic drawings, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, facility, or other structure owned or operated by the City or an agency (singularly or collectively "Exempt Plans"), which pursuant to Section 119.071(3), Florida Statutes, are exempt from Section 119.07(1), Florida Statutes and Section 24(a), Art. I of the Florida State Constitution. Contractor certifies it has read and is familiar the exemptions and obligations of Section 119.071(3), Florida Statutes; further that Contractor is and shall remain in compliance with same, including without limitation maintaining the exempt status of such Exempt Plans, for so long as any Exempt Plans are held by or otherwise in its possession.

I-1.16 PAYMENT DISPUTE RESOLUTION

Any dispute pertaining to pay requests must be presented to the City pursuant to Executive Order 2003-1.

I-1.17 SCRUTINIZED COMPANIES CERTIFICATION

Section 287.135, Florida Statutes, prohibits agencies or local governmental entities from contracting for goods or services of any amount with companies that are on the Scrutinized Companies that Boycott Israel List or are engaged in a boycott of Israel, and of \$1 million or more with companies that are on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or are engaged in business operations in Cuba or Syria. Specifically, Section 287.135(2), Florida Statutes, states: "A company is ineligible to, and may not, bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of: (a) Any amount if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to s. 215.4725, or is engaged in a boycott of Israel; or (b) One million dollars or more if, at the time of bidding on, submitting a proposal for, or entering into or renewing such contract, the company: 1. Is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to s. 215.473; or 2. Is engaged in business operations in Cuba or Syria."

Upon submitting its bid or proposal, a bidder/proposer: (i) certifies the company is not in violation of Section 287.135, Florida Statutes, and shall not be in violation at the time the company enters into or renews any resulting contract; and (ii) agrees any such resulting contract shall be deemed to contain a provision that allows the City, at its option, to terminate such contract for cause if the company is found to have submitted a false certification, been placed on one or any of the foregoing Lists, been engaged in a boycott of Israel, or been engaged in business operations in Cuba or Syria.

I-1.18 FLORIDA'S PUBLIC RECORDS LAW; DATA COLLECTION

Pursuant to Section 119.071(5)(a)2a, Florida Statutes, social security numbers shall only be collected from Bidders and/or Contractor by the City should such number be needed for identification, verification, and/or tax reporting purposes. To the extent Bidder and/or Contractor collects an individual's social security number in the course of acting on behalf of the City pursuant to the terms and conditions of its Proposal or, if awarded, the Agreement, Bidder and/or Contractor shall follow the requirements of Florida's Public Records Law.

INSTRUCTIONS TO BIDDERS

SECTION 2 GENERAL INSTRUCTIONS

I-2.01 BIDDER'S RESPONSIBILITY

Before submitting Proposals, Bidders shall carefully examine the entire site of the proposed work and adjacent premises and the various means of approach and access to the site, and make all necessary investigations to inform themselves thoroughly as to the facilities necessary for delivering, placing and operating the necessary construction equipment, and for delivering and handling materials at the site, and inform themselves thoroughly as to all difficulties involved in the completion of all the work in accordance with the Contract Documents.

Bidders must examine the Plans, Specifications, and other Contract Documents and shall exercise their own judgment as to the nature and amount of the whole of the work to be done, and for the bid prices must assume all risk of variance, by whomsoever made, in any computation or statement of amounts or quantities necessary to complete the work in strict compliance with the Contract Documents.

Elevations of the ground are shown on the Plans and are believed to be reasonably correct, but are not guaranteed to be absolutely so and are presented only as an approximation. Bidders shall satisfy themselves as to the correctness of all elevations.

The City may have acquired, for its own use, certain information relating to the character of materials, earth formations, probable profiles of the ground, conditions below ground, and water surfaces to be encountered at the site of the proposed work. This information, if it exists, is on file at the offices of the Department of Public Works and Bidders will be permitted to see and examine this information for whatever value they consider it worth. However, this information is not guaranteed, and Bidders should satisfy themselves by making borings or test pits, or by such other methods as they may prefer, as to the character, location, and amounts of water, peat, clay, sand, quicksand, gravel, boulders, conglomerate, rock, gas or other material to be encountered or work to be performed.

Various underground and overhead structures and utilities are shown on the plans. The location and dimensions of such structures and utilities, where given, are believed to be reasonably correct, but do not purport to be absolutely so. These structures and utilities are plotted on the Plans for the information of the Bidders, but information so given is not to be construed as a representation or assurance that such structures will be found or encountered as plotted, or that such information is complete or accurate.

I-2.02 FORM, PREPARATION AND PRESENTATION OF PROPOSALS

Each Proposal shall be submitted upon the Proposal Form and in accordance with the instructions included herein. The Proposal Form must not be detached herefrom. All blank spaces for bid prices must be filled in, in both words and figures, with the unit or lump sum prices, or both, for which the Proposal is made. The computed total price for each unit price Contract Item shall be determined by multiplying the estimated quantity of the item, as set forth in the Proposal Form, by the corresponding unit price bid for such item. The resulting product shall be entered in the appropriate blank space under the column headed "Computed Total Price for Item". The lump sum price bid for each lump sum price Contract Item shall also be entered in the column headed "Computed Total Price for Item". If a Proposal contains any omissions, erasures, alterations, additions, or items not called for in the itemized Proposal, or contains irregularities of any kind, such may constitute sufficient cause for rejection of the Proposal. In case of any discrepancy in the unit price or amount bid for any item in the Proposal, the price as expressed in written words will govern. In no case is the Agreement Form to be filled out or signed by the Bidder.

In the case of certain jobs bid Lump Sum a "Schedule of Unit Prices" must be filled out as an attachment to the Lump Sum proposal. These prices may be used as a guide for the negotiation of change orders, at the City's option.

The proposal must be signed and certified and be presented on the prescribed form in a sealed envelope on/or before the time and at the place stated in the Notice of Bidders, endorsed with the name of the person, firm or corporation presenting it, the date of presentation, and the title of the work for which the Proposal is made.

Unless the apparent low bidder is now engaged in or has recently completed contract work for the City of Tampa, he, if requested, shall furnish to the City, after the opening of bids and prior to award, a summary statement of record of construction experience over the past three (3) years with proper supporting evidence, and, if required by the City, shall also furnish a list of equipment and other facilities pertinent to and available for the proper execution of the proposed work, and a statement of financial resources to the extent necessary to establish ability to carry on the proposed work. The City may make further investigations as considered necessary with respect to responsibility of the Bidder to whom it appears may be awarded the Contract.

If forwarded by mail, the sealed envelope containing the Proposal, endorsed as directed above, must be enclosed in another envelope addressed as specified in the Notice to Bidders and sent by registered mail.

I-2.03 ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of the Plans, Specifications, or other Contract Documents will be made to any Bidder orally.

Every request for such interpretation must be in writing, addressed to the Contract Administration Department, Tampa Municipal Office Building, 4th Floor North, City Hall Plaza, Tampa, Florida 33602. To be given consideration, such request must be received at least seven (7) days prior to the date fixed for the opening of the Proposals. Any and all such interpretations and any supplemental instructions will be in the form of written addenda which, if issued, will be sent by certified mail, with return receipt requested, to all prospective bidders at the respective addresses furnished, for such purposes, not later than three (3) working days prior to the date fixed for the opening of the Proposals, and if requested, a copy will be delivered to the prospective bidder's representative. Failure of any Bidder to receive any such addenda shall not relieve said Bidder from any obligation under his Proposal as submitted. All addenda so issued shall become part of the Contract Documents.

I-2.04 BID SECURITY

Each Proposal must be accompanied by a certified or cashier's check issued by a solvent bank or trust company and payable at sight to the City of Tampa, in compliance with Section 255.051 Florida Statutes, or a Bid Bond upon the form provided herein, in an amount of not less than five percent of the sum of the computed total amount of the Bidder's Proposal as a guarantee that if the Proposal is accepted, the Bidder will execute and fill in the proposed Contract and Public Construction Bond within twenty (20) days after notice of award of the Contract. Certified checks shall have all necessary documentary revenue stamps attached if required by law. Surety on Bid Bonds shall be a duly authorized surety company authorized to do business in the State of Florida, and all such Bonds shall be issued or countersigned by a local resident producing agent, and satisfactory evidence of the authority of the person or persons executing such Bond to Execute the same shall be submitted with the Bond. Bid Bonds shall be issued by a surety company acceptable to the City.

Within ten (10) days after the opening of Proposals, the bid security of all but the three lowest Bidders will be returned. The bid security of the remaining two Bidders whose Proposals are not accepted will be

returned within ten (10) days after the execution of the Contract, or, if no such Contract has been executed, within ninety (90) days after the date of opening Proposals. The bid security of the Bidder whose Proposal is accepted will be returned only after he has duly executed the Contract and furnished the required Public Construction Bond and insurance.

Should it be necessary for the City to retain the bid security and said bid security is in the form of checks, the checks of these Bidders will be returned if replaced by Bid Bonds in an amount equal to the amount of the checks of such Bidders in such form and issued by a surety company acceptable to the City.

A Bidder may withdraw his Proposal before the time fixed for the opening of Proposals, without prejudice to himself, by communicating his purpose, in writing, to the Mayor and City Council, and when his communication is received, the Proposal will be handed to him or his authorized agent unopened. No Bidder may withdraw his Proposal within ninety (90) days after the day of opening Proposals.

The Bidder whose Proposal is accepted shall enter into a written contract, upon the Agreement form included herein, for the performance of the work and furnish the required Public Construction Bond within twenty (20) days after written notice by the City of Award of Contract has been served on such Bidder personally or after receipt of the written notice by registered mail to such Bidder at the address given in his Proposal.

If the Bidder to whom a Contract is awarded refuses or neglects to execute it or fails to furnish the required Public Construction Bond within twenty (20) days after receipt by him of the Notice of Award of Contract, the amount of his bid security shall be forfeited and shall be retained by the City as liquidated damages, and not as a penalty, it being now agreed that said sum is a fair estimate of the amount of damages that the City will sustain in case said Bidder fails to enter into a Contract and furnish the required Public Construction Bond. If a Bid Bond was furnished, the full amount of the Bond shall become due and payable as liquidated damages caused by such failure. The full amount of the bid security shall be forfeited as liquidated damages without consideration of the fact that an award may be less than the full amount of the Bidder's Proposal, excepting that the award shall be within the conditions of said Proposal relating to the basis of consideration for an award. No plea of mistake in the bid or misunderstanding of the conditions of forfeiture shall be available to the Bidder for the recovery of his deposit or as a defense to any action based upon the neglect or refusal to execute a contract.

I-2.05 LAWS AND REGULATIONS

The Bidder who is awarded the Contract must comply with all laws of the State of Florida, and all applicable Ordinances of the City of Tampa respecting labor and compensation and with all other statutes, ordinances, rules and regulations applicable and having the force of law.

I-2.06 PUBLIC CONSTRUCTION BOND

The Bidder who is awarded the Contract will be required to furnish a Public Construction Bond upon the form provided herein, equal to 100 percent of the Contract price, such Bond to be executed by a surety company acceptable to the City of Tampa and licensed to underwrite contracts in the State of Florida. Surety companies shall have a rating of not less than: B+ Class VI as evaluated in the most recently circulated BEST'S KEY RATING GUIDE PROPERTY-LIABILITY.

I-2.07 SIGNATURE AND QUALIFICATIONS OF BIDDERS

Proposals must be signed in ink by the Bidder with signature in full. When a firm is a Bidder, the Proposal shall be signed in the name of the firm by one or more of the partners. When a corporation is a Bidder the officer signing shall set out the corporate name in full beneath which he shall sign his name and give the title of his office. The Proposal shall also bear the seal of the corporation attested by its secretary. Anyone signing the Proposal as agent must file with it legal evidence of his authority to do so.

Bidders who are nonresident corporations shall furnish to the City a

duly certified copy of their permit to transact business in the State of Florida, signed by the Secretary of State, within ten days of the notice to do so. Such notice will be given to Bidders who are nonresident corporations, to whom it appears an award will be made, and the copy of the permit must be filed with the City before the award will be made. Failure to promptly submit this evidence of qualification to do business in the State of Florida may be basis for rejection of the Proposal.

I-2.08 REJECTION OF PROPOSALS

The City reserves the right to reject any Proposal if investigation of the Bidder fails to satisfy the City that such Bidder is properly qualified to carry out the obligations and to complete the work contemplated therein. Any or all Proposals will be rejected if there is reason to believe that collusion exists among Bidders. Proposals will be considered irregular and may be rejected if they show serious omissions, alterations in form, additions not called for, conditions or unauthorized alternates, or irregularities of any kind. The City reserves the right to reject any or all Proposals and to waive such technical errors as may be deemed best for the interests of the City.

I-2.09 QUANTITIES ESTIMATED ONLY

The estimate of quantities of the various items of work and materials, if set forth in the Proposal Form, is approximate only and is given solely to be used as a uniform basis for the comparison of Proposals.

The quantities actually required to complete the Contract work may be less or more than so estimated, and if awarded a Contract for the work specified, the Contractor agrees that he will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work assumed for comparison of Proposals and quantities of work actually performed. The City further reserves the right to vary the quantities in any amount.

I-2.10 COMPARISON OF PROPOSALS

Except jobs bid on a "One Lump Sum" basis, proposals will be compared on the basis of a total computed price arrived at by taking the sum of the estimated quantity of each item and the corresponding unit price of each item, and including any lump sum prices on individual items.

The computed total prices for individual Contract Items and the total computed price for the entire Contract, as entered by the Bidder in the Proposal Form, are for convenience only and are subject to correction in the tabulation and computation of the Proposals.

I-2.11 BASIS OF AWARD

The Contract will be awarded, if at all, to the lowest responsible Bidder or Bidders, as determined by the City and by the terms and conditions of the Contract Documents. Unless all bids are rejected, the award will be made within ninety (90) days after the opening of Proposals. The successful Bidder will be required to possess, or obtain, a valid City Occupational License.

I-2.12 INSURANCE REQUIRED

The successful Bidder and his subcontractors will be required to procure and pay for insurance covering the work in accordance with the provisions of Article 6.02 of the Agreement as indicated on special instructions pages beginning with INS-1.

I-2.13 NO ASSIGNMENT OF BID

No Bidder shall assign his bid or any rights thereunder.

I-2.14 NONDISCRIMINATION IN EMPLOYMENT

Contracts for work under this Proposal will obligate the contractors and subcontractors not to discriminate in employment practices.

Bidders must, if requested, submit with their initial bid a signed statement as to whether they have previously performed work subject to the President's Executive Order Nos. 11246 and 11375.

Bidders must, if requested, submit a compliance report concerning their employment practices and policies in order to maintain their eligibility to receive the award of the Contract.

Successful Bidders must, if requested, submit a list of all subcontractors who will perform work on the project and written,

signed statement from authorized agents of the labor pools with which they will or may deal for employees on the work together with supporting information to the effect that said labor pools practices and policies are in conformity with Executive Order No. 11246 and that said labor pools will affirmatively cooperate in or offer no hindrance to the recruitment, employment and equal treatment of employees seeking employment and performing work under the Contract, or a certification as to what efforts have been made to secure such statements when such agents or labor pools have failed or refused to furnish them prior to the award of the Contract.

I-2.15 LABOR STANDARDS

The Bidder's attention is directed to the Contract Provisions of the Labor Standards for federally assisted projects which may be attached to and made a part of the Agreement.

I-2.16 NOTICE TO LABOR UNIONS

If applicable, the successful Bidder will be required to provide Labor Unions and other organizations of workers a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers", and such form may be made a part of the Agreement.

I-2.17 NOTICE TO PROSPECTIVE FEDERALLY-ASSISTED CONSTRUCTION CONTRACTORS

A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted to said Secretary prior to the award of a federally-assisted construction and Contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The form of certification may be bound herein following the form of Bid Bond.

Contractors receiving federally-assisted construction Contract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractor for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause:

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

"A Certification of Nonsegregated Facilities, as required by the May 9, 1967, Order (32 F.R. 7439, May 19, 1967) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause."

"Contractors receiving subcontract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide from the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause."

The United States requires a pre-award conference if a proposed construction contract exceeds one million dollars to determine if the the prospective contractor is in compliance with the Equal Employment Opportunity requirements of Executive Order 11246 of September 24, 1965. In such instances, a meeting may be scheduled at which the prospective contractor must specify what affirmative action he has taken or proposed to take to assure equal employment opportunity which must be approved by the United States before award of the contract will be authorized.

Bidders must be prepared to submit an Equal Employment Opportunity (EEO) plan at a pre-award conference. The plan must include bidding opportunities offered by the Bidder to minority subcontractors.

On October 13, 1971, President Nixon issued Executive Order 11246 emphasizing the government's commitment to the promotion of minority business enterprise. Accordingly, the United States is firmly

committed to the utilization of available resources to support this important program. U.S. agencies are most interested in realizing minority participation on the subject. Achieving equal employment opportunity compliance is required through Executive Order 11246. WE cannot emphasize too strongly that minority subcontractors be extended subcontractors bidding opportunities as but one step in your affirmative action policy.

Due to the importance of this contract, U.S. Agencies may conduct an EEO Conference prior to the award of the Contract. It is suggested that the responsive Bidder confirm the minority subcontractors he contacted for bids or quotations in his EEO plan submitted at the conference.

I-2.18 EEO AFFIRMATIVE ACTION REQUIREMENTS

By the submission of a Proposal, each Bidder acknowledges that he understands and will agree to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under any contract awarded pursuant to solicitation. Each Bidder agrees that if awarded a contract, he will similarly bind contractually each subcontractor. In policies, each Bidder further understands and agrees that if awarded a contract, he must engage in Affirmative Action directed to promoting and ensuring equal employment opportunity in the work force used under the contract (and he must require contractually the same effort of all subcontractors whose subcontracts exceed \$100,000). The Bidder understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the project. ***** END of SECTION *****

CITY OF TAMPA INSURANCE REQUIREMENTS

Prior to commencing any work or services or taking occupancy under that certain written agreement or award (for purposes of this document, Agreement) between the City of Tampa, Florida (City) and Firm/Awardee/Contractor/Consultant/Lessee/non-City party, etc. (for purposes of this document, Firm) to which this document is attached and incorporated as an Exhibit or otherwise, and continuing during the term of said Agreement (or longer if the Agreement and/or this document so requires), Firm shall provide, pay for, and maintain insurance against claims for injuries to persons (including death) or damages to property which may arise from or in connection with the performance of the Agreement (including without limitation occupancy and/or use of certain property/premises) by Firm, its agents, representatives, employees, suppliers, subtenants, or subcontractors (which term includes sub-consultants, as applicable) of any tier subject to the terms and conditions of this document. Firm's maintenance of insurance coverage as required herein is a material element of the Agreement and the failure to maintain or renew coverage or provide evidence of same (defined to include without limitation Firm's affirmative duty to provide from time to time upon City's request certificates of insurance, complete and certified copies of Firm's insurance policies, forms, and endorsements, information on the amount of claims payments or reserves chargeable to the aggregate amount of coverage(s) whether during the term of the Agreement or after as may be requested by the City in response to an issue or potential claim arising out of or related to the Agreement to which Firm's insurance obligations hereunder may apply or possibly help mitigate) may be treated as a material breach of the Agreement. Should at any time Firm not maintain the insurance coverages required, City at its sole option (but without any obligation or waiver of its rights) may (i) terminate the Agreement or (ii) purchase such coverages as City deems necessary to protect itself (charging Firm for same) and at City's option suspending Firm's performance until such coverage is in place. If Firm does not reimburse City for such costs within 10 days after demand, in addition to any other rights, City shall also have the right to offset such costs from amounts due Firm under any agreement with the City. All provisions intended to survive or to be performed subsequent to the expiration or termination of the Agreement shall survive, including without limitation Firm's obligation to maintain or renew coverage, provide evidence of coverage and certified copies of policies, etc. upon City's request and/or in response to a potential claim, litigation, etc.

The City reserves the right from time to time to modify or waive any or all of these insurance requirements (or to reject policies) based on the specific nature of goods/services to be provided, nature of the risk, prior experience, insurer, coverage, financial condition, failure to operate legally, or other special circumstances. If Firm maintains broader coverage and/or higher limits than the minimums shown herein, the City requires and shall be entitled to such broader coverage and/or higher limits maintained by Firm. Any available insurance proceeds in excess of the specified minimum limits of insurance and coverage shall be available to the City. No representation is made that the minimum insurance requirements are sufficient to cover Firm's interests, liabilities, or obligations. Required insurance shall not limit Firm's liability.

Firm acknowledges and agrees Firm and not the City is the party in the best position to determine applicability (e.g. "IF APPLICABLE"), confirm, and/or verify its insurance coverage. Acceptance by the City, or by any of its employees, representatives, agents, etc. of certificates or other documentation of insurance or policies pursuant to the terms of this document and the Agreement evidencing insurance coverages and limits does not constitute approval or agreement that the insurance requirements have been met or that coverages or policies are in compliance. Furthermore, receipt, acceptance, and/or approval of certificates or other documentation of insurance or policies or copies of policies by the City, or by any of its employees, representatives, agents, etc., which indicate less coverage than required does not constitute a waiver of Firm's obligation to fulfill these insurance requirements.

MINIMUM SCOPE AND LIMIT OF INSURANCE ¹

A. Commercial General Liability (CGL) Insurance on the most current Insurance Services Office (ISO) Form CG 00 01 or its equivalent on an "occurrence" basis (Modified Occurrence or Claims Made forms are not acceptable without prior written consent of the City). Coverage must be provided to cover liability contemplated by the Agreement including without limitation premises and operations, independent contractors, contractual liability, products and completed operations, property damage, bodily, personal and advertising injury, contractual liability, explosion, collapse, underground coverages, personal injury liability, death, employees-as-insureds. Products and completed operations liability coverage maintained for at least 3 years after completion of work. Limits shall not be less than \$1M per occurrence and \$2M general aggregate for Agreements valued at \$2M or less; if valued over \$2M, a general aggregate limit that equals or exceeds the Agreement's value. If a general aggregate limit applies; it shall apply separately to the project/location (ISO CG 2S 03 or 2S 04 or equivalent). **(ALWAYS APPLICABLE)**

B. Automobile Liability (AL) Insurance in accordance with Florida law, as to the ownership, maintenance, and use of all owned, non-owned, leased, or hired vehicles. AL insurance shall not be less than: (a) \$500,000 combined single limit each occurrence bodily injury and property damage for Agreements valued at \$100,000 or less or (b) \$1M combined single limit each occurrence bodily injury and property damage for Agreements valued over \$100,000. If transportation of hazardous material involved, the MCS-90 endorsement (or equivalent). **(ALWAYS APPLICABLE)**

C. Worker's Compensation (WC) & Employer's Liability Insurance for all employees engaged under the Agreement, Worker's Compensation as required by Florida law. Employer's Liability with minimum limits of (a) \$500,000 bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each employee for Agreements valued at \$100,000 and under or (b) \$1M bodily injury by accident and each accident, bodily injury by disease policy limit, and bodily injury by disease each for all other Agreements. **(ALWAYS APPLICABLE)**

D. Excess (Umbrella) Liability Insurance for Agreements valued at \$2M or more, at least \$4M per occurrence in excess of underlying limits and no more restrictive than underlying coverage for all work performed by Firm. May also compensate for a deficiency in CGL, AL, or WC. **(ALWAYS APPLICABLE)**

E. Builder's Risk Insurance for property loss exposure associated with construction/renovation/additions to buildings or structures, including materials or fixtures to be incorporated. Must be "All Risk" form with limits of no less than the project's completed value, have no coinsurance penalties, eliminate the "occupancy clause", cover Firm (together with its contractors, subcontractors of every tier, and suppliers), and name City as a Loss Payee. **(IF APPLICABLE)**

F. Installation Floater coverage for property (usually highly valued equipment or materials such as compressors, generators, etc.) during its installation. Coverage must be "All Risk" including installation and transit for no less than 100% of the installed replacement cost value. **(IF APPLICABLE)**

G. Architects & Engineers Liability/ Professional Liability (E&O)/ Contractors Professional Liability (CPL)/ Medical Malpractice Insurance where Agreement involves Florida-regulated professional services (e.g. architect, engineer, design-builder, CM, accountant, appraiser, investment banker medical professional) at any tier, whether employed or independent, vicarious design liability exposure (e.g. construction means & methods, design supervision), value engineering, constructability assessments/reviews, BIM process, and/or performance specifications. Limits of at least \$1M per occurrence and \$2M aggregate; deletion of design/ build liability exclusions, as applicable, and maintained for at least 3 years after completion of work/services and City's acceptance of same. **(IF APPLICABLE)**

H. Railroad Protective Liability CRPL Insurance for construction within 50ft of operated railroad track(s) or where affects any railroad bridge, trestle, tunnel, track(s) roadbed, or over/under pass. Subject to involved rail road's approval prior to commencement of work. **(IF APPLICABLE)**.

I. Pollution and/or Asbestos Legal Liability Insurance where Agreement involves asbestos and/or environmental hazards/contamination risks (defined broadly, e.g. lead, mold, bacteria, fuel storage, underground work, cleanup (owned or non-owned sites), pollutant generation/transportation, marine/natural resource damage, contamination claim, restitution, business interruption, mold, fungus, lead-based paint, 3rd party claims/removal, etc.), with limits of at least \$1M per occurrence and \$2M aggregate, maintained for at least 3 years after Agreement completion. **(IF APPLICABLE)**

J. Cyber Liability Insurance where Agreement involves portals allowing access to obtain, use, or store data; managed dedicated servers; cloud hosting services; software/hardware; programming; and/or other IT services

¹ "M" indicates million(s), for example \$1M is \$1,000,000

and products are involved. Limits of not less than \$2M per occurrence and \$2M aggregate. Coverage sufficiently broad to respond to duties and obligations undertaken by Firm, and shall include, but not be limited to, claims involving infringement of intellectual property/copyright, trademark, trade dress, invasion of privacy violations, damage to or destruction of electronic information, information theft, release of confidential and/or private information, alteration of electronic information, extortion, virus transmission, and network security. Coverage, as applicable and with sufficient limits to respond, for breach response costs, regulatory fines and penalties, credit monitoring expenses. **(IF APPLICABLE)**

K. Drone/UAV Liability Insurance where Agreements involves unmanned aerial vehicles/drones. Coverage to include products and completed operations, property damage, bodily injury with limits no less than \$1M per occurrence, and \$2M aggregate; may be provided by CGL endorsement subject to City's prior written approval. **(IF APPLICABLE)**

L. Longshore & Harbor Workers' Compensation Act/Jones Act for work being conducted near, above, or on "navigable waters" for not less than the above Employer's Liability Insurance limit. **(IF APPLICABLE)**

M. Garagekeeper/Hangerkeeper/Marina Operator Legal Liability Insurance and/or Hull/P&I Insurance where parking lot, valet, dealership, garage services, towing, etc. and/or operation of a hangar, marina, or air

plane/ship repairer, providing safe berth, air/watercraft storage/docking (on land/ in water), fueling, tours, charters, ferries, dredges, tugs, mooring, towing, boat/aircraft equipment/repair/alteration/maintenance, etc.; cover- age against liability for damage to vehicles air/watercraft, their machinery in Firm's care, custody, or control both private & commercial. Limits at least equal to greater of \$1M, value of max number of vehicles that may be in Firm's custody, or of most costly object in Firm's custody. **(IF APPLICABLE)**

N. Property Insurance and Interruption of Business CIOB) Insurance where premises, building, structure, or improved real property is leased, licensed, or otherwise occupied by Firm. Property Insurance against all risks of loss to any occupant/tenant improvements at full replacement cost with no coinsurance penalty, including fire, water, leak damage, and flood, as applicable, vandalism and malicious mischief endorsements. IOB by which minimum monthly rent will be paid to City for up to 1 year if premises are destroyed, rendered inaccessible or untenable, including disruption of utilities, water, or telecommunications. **(IF APPLICABLE)**

O. Liquor Liability/Host Liquor Liability where Firm directly or indirectly provides alcoholic beverages, limits of at least \$1M per occurrence and \$1M aggregate. **(IF APPLICABLE)**

P. Educators Legal Liability Insurance where day care, after school program, recreational activities, etc. limits per G above. **(IF APPLICABLE)**

ADDITIONAL REQUIREMENTS

ACCEPTABILITY OF INSURERS- Insurance is to be placed with insurers admitted in the State of Florida and who have a current A.M. Best rating of no less than **A-:VII** or, if not rated by A.M. Best, as otherwise approved by the City in advance and in writing.

ADDITIONAL INSURED - **City, its elected officials, departments, officers, officials, employees, and volunteers together with, as applicable, any associated lender of the City shall be covered as additional insureds on all liability coverage** (e.g. CGL, AL, and Excess (Umbrella) Liability) as to liability arising out of work or operations performed by or on behalf of Firm including materials, parts, or equipment furnished in connection with such work or operations and automobiles owned, leased, hired, or borrowed by or on behalf of Firm. Coverage can be provided in the form of an endorsement to Firm's insurance (at least as broad as ISO Form CG 20 10 11 85 or **both** CG 10 20, CG 20 26, CG 20 33, or CG 20 38 **and** CG 20 37 if later revisions used).

CANCELLATION/NON-RENEWAL – Each insurance policy shall provide that at least 30 days written notice must be given to City of any cancellation, intent to non-renew, or material reduction in coverage (except aggregate liability limits) and at least 10 days' notice for non-payment of premium. Firm shall also have an independent duty to notify City in like manner, within 5 business days of Firm's receipt from its insurer of any notices of same. If any policy's aggregate limit is reduced, Firm shall directly take steps to have it reinstated. Notice and proof of renewal/continued coverage/certifications, etc. shall be sent to the City's notice (or Award contact) address as stated in the Agreement with a copy to the following:

- Contract Administration Department, 306 E Jackson St, Tampa, FL 33602 Purchasing Department, 306 E Jackson Street, Tampa, FL 33602
 Other: _____

CERTIFICATE OF INSURANCE (COI) – to be provided to City by insurance carrier prior to Firm beginning any work/services or taking occupancy and, if the insurance expires prior to completion of the work or services or Agreement term (as may be extended), a renewal COI at least 30 days before expiration to the above address(es). COIs shall specifically identify the Agreement and its subject (project, lease, etc.), shall be sufficiently comprehensive to insure City (named as additional insured) and Firm and to certify that coverage extends to subcontractors' acts or omissions, and as to permit the City to determine the required coverages are in place without the responsibility of examining individual policies. **Certificate Holder must be The City of Tampa, Florida.**

CLAIMS MADE – If any liability insurance is issued on a claims made form, Firm agrees to maintain such coverage uninterrupted for at least 3 years following completion and acceptance of the work either through purchase of an extended reporting provision or purchase of successive renewals. The Retroactive Date must be shown and be a date not later than the earlier of the Agreement date or the date performance/occupancy began thereunder.

DEDUCTIBLES/ SELF-INSURED RETENTIONS (SIR) – must be disclosed to City and, if over \$500,000, approved by the City in advance and in writing, including at City's option being guaranteed, reduced, or eliminated (additionally if a SIR provides a financial guarantee guaranteeing payment of losses and related investigations, claim administration, and defense expenses). Firm shall be fully responsible for any deductible or SIR (without limiting the foregoing a policy with a SIR shall provide or be endorsed to provide that the SIR may be satisfied by either the City or named insured). In the event of loss which would have been covered but for a deductible or SIR, City may withhold from any payment due Firm, under any agreement with the City, an amount equal to same to cover such loss should full recovery not be obtained under the policy.

PERFORMANCE- All insurance policies shall be fully performable in Hillsborough County, Florida (the County), and construed in accordance with Florida law. Further, all insurance policies must expressly state that the insurance company will accept service of process in the County and that the exclusive venue for any action concerning any matter under those policies shall be in the appropriate state court of the County.

PRIMARY POLICIES - Firm's insurance coverage shall be primary insurance coverage at least as broad as ISO CG 20 01 04 13 as to the City, its elected officials, departments, officers, employees, and volunteers. Any insurance or self-insurance maintained by the City, its elected officials, departments, officers, employees, and volunteers shall be excess of the Firm's insurance and shall not contribute with it.

SUBCONTRACTORS/INDEPENDENT ASSOCIATES/CONSULTANTS/SUBTENANTS/SUBLICENSEE - **Firm shall require and verify that all such entities maintain insurance meeting all requirements stated herein with the City as an additional insured** by endorsement (ISO FORM CG 20 38, or broader) or otherwise include such entities within Firm's insurance policies. Upon City's request, Firm shall furnish complete and certified copies of copies of such entities' insurance policies, forms, and endorsements.

SUBCONTRACTOR DEFAULT INSURANCE CONTROLLED INSURANCE PROGRAM, WRAP-UP. Use requires express prior written consent of City Risk Manager.

UNAVAILABILITY- To the fullest extent permitted by law, if Firm is out of business or otherwise unavailable at the time a claim is presented to City, Firm hereby assigns to the City all of its right, title and interest (but not any liabilities or obligations) under any applicable policies of insurance.

WAIVER OF SUBROGATION – With regard to any policy of insurance that would pay third party losses, Firm hereby grants City a waiver of any right to subrogation which any insurer of Firm may acquire against the City by virtue of the payment of any loss under such insurance. Firm agrees to obtain any endorsement that may be necessary to affect such waiver, but this provision shall apply to such policies regardless.

WAIVER/RELEASE AGREEMENT – Where Firm has a defined group of persons who might be exposed to harm (e.g. participants in an athletic event/program, volunteers) any waiver or release agreement used by Firm whereby such persons (and their parent/guardian as applicable) discharge Firm from claims and liabilities, shall include the City, its elected officials, departments, officers, officials, employees, and volunteers to the same extent as Firm.

Procurement Guidelines To Implement Minority & Small Business Participation

Underutilized WMBE Primes by Industry Category

FORMAL PROCUREMENT	Construction	Construction-Related	Professional	Non-Professional	Goods
	Black	Asian	Black	Black	Black
	Hispanic	Native Am.	Hispanic	Asian	Hispanic
	Native Am.	Woman	Asian	Native Am.	Asian
	Woman		Native Am.		Native Am.
			Woman		Woman

Underutilized WMBE Sub-Contractors / Sub-Consultants

SUB WORK	Construction	Construction-Related	Professional	Non-Professional	Goods
	Black	Black	Black	Black	Black
		Asian	Hispanic	Asian	Asian
		Native Am.	Asian	Native Am.	Native Am.
		Woman	Native Am.		Woman
			Woman		

Policy

The Guidelines apply to formal procurements and solicitations. WMBE participation will be narrowly-tailored.

Index

- Black = Black/African-American Business Enterprise
- Hispanic = Hispanic Business Enterprise
- Asian = Asian Business Enterprise
- Native Am. = Native American Business Enterprise
- Woman = Woman Business Enterprise (Caucasian)

Industry Categories

Construction is defined as: new construction, renovation, restoration, maintenance of public improvements and underground utilities.

Construction-Related Services are defined as: architecture, professional engineering, landscape architecture, design build, construction management services, or registered surveying and mapping.

Professional Services are defined as: attorney, accountant, medical doctor, veterinarian, miscellaneous consultant, etc.

Non-Professional Services are defined as: lawn maintenance, painting, janitorial, printing, hauling, security guard, etc.

Goods are defined as: all supplies, materials, pipes, equipment, machinery, appliances, and other commodities.

MBD Form-70

D. L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation

FY 19 Project 19-C-00017

U-WMBE Availability Contact List

(The Underutilized WMBE Industry Category for Construction Subcontracts is BBE)

#	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	BBE Type	Ethnicity
1	DRD Enterprises LLC	813-476-9933	866-850-1332	ddeenah@drdententerprise.com	4104 Yellowwood Dr.,	Valrico	FL	33594	Pipe Supply	204675317	BBE	African American
1	MANZI METALS INC	352-799-8211	352-754-9735	bmanzi@manzimetals.com	15293 Flight Path Dr	Brooksville	FL	34604	Pipe Supply	993245008	BBE	African American
1	Suca Pipe Supply, Inc.	813-249-7902		slmau4@yahoo.com	4910 Lowell Rd	Tampa	FL	33624	Pipe Supply	992499571	BBE	African American
1	Suca Pipe Supply, Inc. One	813-249-7902		mactwinau1@yahoo.com	4910 Lowell Road	Tampa	FL	33624	Pipe Supply	263669556	BBE	African American
1	Terrell Industries, Inc.	727-823-4424	727-823-3977	gradyterrell@terrellindustries.com	2067 1st Ave N.	St. Petersburg	FL	33713	Pipe Supply	850530148	BBE	African American
2	Fletcher Painting, Inc.	407-290-1188	407-290-9309	stacy@fletcherenterprise.com	4355 Fairmont Street Suite 8	Orlando	FL	32808	Painting Contractor	993587717	BBE	African American
2	Obi Global, LLC	813-400-8562		obiglobal@gmail.com	11507 Dr. MLK Blvd	Mango	FL	33550	Painting Contractor	71881723	BBE	African American
2	Pro Construct Services LLC	813-445-4840	813-749-9383	roberta.warren@pro-constructllc.com	6601 Memorial Hwy	Tampa, Fl	FL	33615	Painting Contractor	64782775	BBE	African American
5	All In One Electric Inc	813-849-6331	813-514-0473	rjones@atoelectric.com	1201 W. Waters Ave	Tampa	FL	33604	Electrical Contractor	043689273	BBE	African American
5	Brown & Brown Electric, Inc.	954-938-8986	954-938-9272	Herrmine.Brown@brownandbrownelectric.com	1150 SW 30th Avenue	Pompano Beach	FL	33069	Electrical Contractor	992283934	BBE	African American
5	Fennell Electric, Inc.	407-466-9408	866-514-3716	fennellelectric@yahoo.com	604 Glenfield Ct	Apopka	FL	32712	Electrical Contractor	10557754	BBE	African American
5	MDH Enterprises, Inc.	386-789-2672	866-681-5026	matize@my-es.com	281 East C Street	Orange City	FL	32763	Electrical Contractor	550849332	BBE	African American
	Kerrick Williams Photography, LLC	813-571-3768	866-571-7149	kerrick@kerrickwilliams.com	811 Hickory Glen Drive	Seffner	FL	33584	Video Production	993225186	BBE	African American
	Uborra Films LLC	813-220-2051		uborafilms@gmail.com	24940 Hyde Park Boulevard	Land o Lakes	FL	34639	Video Production	21230551	BBE	African American

D. L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation
FY 19 Project 19-C-00017
SLBE Availability Contact List

#	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Type	Ethnicity
1	2 Meyer Corp.	813-210-4864	813-645-5634	Renatonjr@aol.com	6308 Lake Sunrise Dr.	Apollo Beach	FL	33572	Pipe Supply	862384669	SLBE	Caucasian
1	1 Alfonso Communications, Inc.	813-957-3208	813-957-3208	darren@alfonsocommunications.com	3959 Van Dyke Road	Lutz	FL	33558	Pipe Supply	74659688	SLBE	Hispanic American
1	1 DRD Enterprises LLC	813-476-9933	866-850-1332	ddeenah@drdententerprise.com	4104 Yellowwood Dr.,	Valrico	FL	33594	Pipe Supply	204675317	SLBE	African American
1	1 Mar Supply Co.	941-286-3240	941-761-6500	info@marupplyco.com	1660 63rd Avenue East	Bradenton	FL	34203	Pipe Supply	270206845	SLBE	Hispanic American
1	1 IMBE Supply of Florida, Inc.	813-781-6583		mbsupplyoffrda@gmail.com	4306 W. Osborne Avenue	Tampa	FL	33613	Pipe Supply	863284565	SLBE	Caucasian
1	1 Suca Pipe Supply, Inc.	813-249-7902		slmau44@yahoo.com	4910 Lowell Rd	Tampa	FL	33624	Pipe Supply	992499571	SLBE	African American
1	1 Suca Pipe Supply, Inc. One	813-249-7902		mactwinai1@yahoo.com	4910 Lowell Road	Tampa	FL	33624	Pipe Supply	263669556	SLBE	African American
2	2 C&C Painting Contractors Inc.	813-886-7100	813-886-7102	carlos@ccpainting.com	8372 Standish Bend Dr.	Tampa	FL	33615	Painting / Coating	993617521	SLBE	Hispanic American
2	2 COLORS PAINTING CONTRACTORS LLC	813-855-7424		JimmyG@colorspaintingcontractors.com	12036 ABBYWOOD LANE	TAMPA	FL	33626	Painting / Coating	862331210	SLBE	Hispanic American
2	2 Diversified Coatings & Finishes, Inc.	813-494-5543	352-567-1718	bobcookct@gmail.com	12540 Green Oak Lane	Dade City	FL	33525	Painting / Coating	993460053	SLBE	Caucasian
2	2 Elite Industrial Painting, Inc.	727-940-6001	727-279-2827	Tula@elpainting.com	621 Hibiscus St #3	Tarpon Springs	FL	34689	Painting / Coating	900658000	SLBE	Caucasian
2	2 Federico's Painting Corp	813-908-1404	813-908-1404	federico_de_la_pava@hotmail.com	6615 Winding Oak Dr.	Tampa	FL	33625	Painting / Coating	203279278	SLBE	Hispanic American
2	2 Harry's Painting Enterprises, Inc.	727-848-1950	727-847-3474	kathryn@harryspainting.com	5250 Avery Road	New Port Rich	FL	34652	Painting / Coating	992820441	SLBE	Caucasian
2	2 Island Painting & Waterproofing, Inc.	813-500-3869	813-500-4001	info@islandpaintingtb.com	5608 N Church Avenue	Tampa	FL	33614	Painting / Coating	204840500	SLBE	Hispanic American
2	2 Obi Global, LLC	813-400-8562		obigloballlc@gmail.com	11507 Dr. MLK Blvd	Mango	FL	33550	Painting / Coating	71881723	SLBE	African American
2	2 Pro Construct Services LLC	813-445-4840	813-749-9383	roberta.warren@pro-constructllc.com	6601 Memorial Hwy	TAMPA, FL	FL	33615	Painting / Coating	64782775	SLBE	African American
2	2 Shepard Contractors Inc	813-855-1115	813-513-3281	shepardcontractors@hotmail.com	Piney Lane Dr	Tampa	FL	33625	Painting / Coating	993708146	SLBE	Caucasian
2	2 Sunstate Coatings, Inc.	813-598-0802	813-672-6172	sunstatecoatings@msn.com	11501 Mellowood Drive	Riverview	FL	33569	Painting / Coating	202618835	SLBE	Caucasian
5	5 Above Electric LLC	727-726-5484	801-894-3084	aboveelec@gmail.com	13529 Prestige Pl #105	Tampa	FL	33635	Electrical Contracting	853611228	SLBE	Hispanic American
5	5 Aguilia Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguiliaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	Electrical Contracting	200818128	SLBE	Hispanic American
5	5 All In One Electric Inc	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W WATERS AVENUE	TAMPA	FL	33604	Electrical Contracting	043689273	SLBE	African American
5	5 Crevello Electric, Inc.	813-986-6106	813-986-9633	crevelloelectric@gmail.com	2401 Proccchi St	Plant City	FL	33563	Electrical Contracting	993559003	SLBE	Caucasian
5	5 Dolphin Constructors LLC	813-925-9609	813-510-4946	matt@dolphinllc.com	13966 W Hillsborough Ave.	Tampa	FL	33635	Electrical Contracting	912193468	SLBE	Caucasian
5	5 Electric World Corp	813-785-5265	866-593-5921	Electricworldcorp@gmail.com	5708 N 56th St	tampa	FL	33610	Electrical Contracting	831112415	SLBE	Hispanic American
5	5 ELECTRICAL HANDYMAN SERVICES INC	813-901-8185	813-884-5060	eh5915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	Electrical Contracting	272406369	SLBE	Hispanic American
5	5 Manatee Electric, Inc.	813-645-7000	813-645-7568	john@reliableelectricusa.com	845 Thompson Rd.	Lithia	FL	33547	Electrical Contracting	993454485	SLBE	Caucasian
5	5 Reliability Consulting Services, Inc.	813-298-2617	813-645-2272	bwoolbright@reliabilityconsulting.net	748 Kingston Ct.	Apollo Beach	FL	33572	Electrical Contracting	201126584	SLBE	Caucasian
5	5 ROB MICHAEL INC	813-323-0304	813-968-1036	RJMICHAEL74@AOL.COM	16204 SAGEBRUSH RD	TAMPA	FL	33618	Electrical Contracting	264389755	SLBE	Caucasian
6	6 TAMCO Electric, Inc.	813-918-8489	813-986-5979	atruijill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	Electrical Contracting	991396630	SLBE	Hispanic American
6	6 A Business Forms & Pegboard Systems, Inc.	813-933-2788		social@amediamarketing.com	3104 North Armenia Avenue, Ste. 2	Tampa	FL	33607	Video Production	991559977	SLBE	Caucasian
6	6 Florida Contractors Video Service, Inc	813-737-1774	813-737-6151	FCVSinc@aol.com	4412 Hollway Meadow Lane	Plant City	FL	33567	Video Production	850373535	SLBE	Caucasian
6	6 Frederick Communications & Consulting LLC	813-758-9149	813-281-2006	Frederick.Communications@gmail.com	3853 Northdale Blvd #112	Tampa	FL	33624	Video Production	800240902	SLBE	Hispanic American
6	6 Kerrick Williams Photography, LLC	813-571-3768	866-571-7149	kerrick@kerrickwilliams.com	811 Hickory Glen Drive	Seffner	FL	33584	Video Production	993225186	SLBE	African American
6	6 Renker Eich Parks Architects Inc.	727-821-2986	727-896-4911	rheadland@reparch.com	1609 Dr MLK Jr Street North	St. Petersburg	FL	33704	Video Production	992755330	SLBE	Caucasian
6	6 Uborra Films LLC	813-220-2051		uborafilms@gmail.com	24940 Hyde Park Boulevard	LAND O LAKES	FL	34639	Video Production	821230551	SLBE	African American
6	6 Uppercase, Inc.	813-226-3096		matt@uppercasincorporated.com	905 North Tampa Street	Tampa	FL	33602	Video Production	262817255	SLBE	Caucasian

Instructions Regarding Use of the WMBE/SLBE Availability Contact List

Bidders must solicit a subcontracting bid from ALL of the firms listed on the WMBE/SLBEs list provided within the Specifications, and provide documentation of emails, faxes, phone calls, letters, or other communication with the firms as a first step in demonstrating Good-Faith Efforts to achieve the goal set for WMBE/SLBE participation on this contract.

The list is formatted to facilitate e-mailing of a solicitation to the listed firms by copying and pasting the email addresses.

The WMBE/SLBE participation Goal is based upon the availability of the certified firms indicated on the contact list. The Goal and Requirements of the City's Equal Business Opportunity Program are stated in the Bid/Contract Document, Specifications.

PROPOSAL

To the Mayor and City Council of the City of Tampa, Florida:

Legal Name of Bidder: _____

Bidder's Fictitious Name, *if applicable*: _____

Bidder is a/an: Individual Partnership* Joint Venture* LLC Corp. Other:

Bidder is organized under the laws of: State of Florida Other:

Bidder Mailing Address: _____

Bidder's Federal Employee Identification No. (FEI/EIN): _____

Bidder's License No.: _____ Bidder's FDOS (SUNBIZ) Doc. No.: _____
(See Ch. 489. FS; use entity's, individual's only if applicable)

Bidder Contact Name**: _____ Email: _____ Phone: (____) _____

Bidder's own initial application for employment has criminal history screening practices similar in nature to the practices contained in Chapter 12, Article VI, City of Tampa Code (*Responses, whether "Yes" or "No", are for informational purposes only and will not be used as a basis of award or denial, nor as a basis for any protest*): Yes No

The below named person, appearing before the undersigned authority and after being first duly sworn, for him/herself and on behalf of the entity submitting this Proposal does hereby affirm and declare as follows:

- (1) He/She is of lawful age and is authorized to act on behalf of Bidder (the individual, partnership, corporation, entity, etc. submitting this Proposal) and that all statements made in this document are true and correct to the best of my knowledge.
- (2) If Bidder is operating under a fictitious name, Bidder has currently complied with any and all laws and procedures governing the operation of businesses under fictitious names in the State of Florida
- (3) No person or entity other than Bidder has any interest in this Proposal or in the Contract proposed to be entered into.
- (4) This Proposal is made without any understanding, agreement, or connection with any person or entity making Proposal for the same purposes, and is in all respects fair and without collusion or fraud.
- (5) Bidder is not in arrears to the City of Tampa, upon debt or contract, and is not a defaulter, as surety or otherwise, upon any obligation to the City of Tampa.
- (6) That no officer or employee or person whose salary is payable in whole or in part from the City Treasury is, shall be or become interested, directly or indirectly, as a contracting party, partner, stockholder, surety or otherwise, in this Proposal, or in the performance of the Contract, or in the supplies, materials, or equipment and work or labor to which it relates, or in any portion of the profits thereof.
- (7) Bidder has carefully examined and fully understands the Solicitation and has full knowledge of the scope, nature, and quality of the work to be performed; furthermore, Bidder has carefully examined the site of the work and that, from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality, and quantity of materials and the kinds and extent of equipment and other facilities needed for the performance of the work, the general and local conditions and all difficulties to be encountered, and all other items which may, in any way, affect the work or its performance.
- (8) Bidder (including its principals) has | has NOT been debarred or suspended from contracting with a public entity.
- (9) Bidder has | has NOT implemented a drug-free workplace program that meets the requirements of Section 287.087, Florida Statutes.
- (10) Bidder has carefully examined and fully understands all the component parts of the Contract Documents and agrees Bidder will execute the Contract, provide the required Public Construction Bond, and will fully perform the work in strict accordance with the terms of the Contract and Contract Documents therein referred to for the following prices, to wit:

* If a Partnership or Joint Venture, attach Partnership or Joint Venture Agreement.

** Someone the City may contact with questions/correspondence regarding this Solicitation and/or permits.

Contract 19-C-00017; D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation

Contract Item No.	Unit	Estimated Quantity	Description and Price in Words	Computed Total Price for Item in Figures
-------------------	------	--------------------	--------------------------------	--

BASE BID	LS	1	The work includes the furnishing of all labor, equipment, and material for making improvements to the existing Ferric Sulfate Tank No. 2, Sulfuric Acid Tank No. 1 and associated containment areas including surface preparation and exterior tank coating of both tanks, Ferric Sulfate Tank No.2 repairs, repair and coating of sulfuric acid containment, eye wash station installations and upgrades, air and miscellaneous piping installation, chemical fill station installations, canopy roof repair and all associated work required for a complete project in accordance with the Contract Documents.	
----------	----	---	--	--

_____ dollars
and _____ cents

			Base Bid	LS	\$ _____
ITEM 2	LS	1	Contingency		\$ <u>70,000</u>
			Total		\$ _____

Computed Total Price in Words: _____
 _____ dollars and _____ cents.

Computed Total Price in Figures: \$ _____

Bidder acknowledges that the following addenda have been received and that the changes covered by the addendum(s) have been taken into account in this proposal: #1 ____ #2 ____ #3 ____ #4 ____ #5 ____ #6 ____ #7 ____ #8 ____.

Bidder acknowledges the requirements of the City of Tampa's Equal Business Opportunity Program.

Bidder acknowledges that it is aware of Florida's Trench Safety Act (Sections 553.60-553.64, Florida Statutes), and agrees that Bidder together with any involved subcontractors will comply with all applicable trench safety standards. Bidder further acknowledges that included in the various items of this Proposal and the total bid price (as applicable) are costs for complying with the Trench Safety Act. Bidder further identifies the costs and methods summarized below:

	Trench Safety Measure (Description)	Unit of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
A.	_____	_____	_____	_____	_____
B.	_____	_____	_____	_____	_____
C.	_____	_____	_____	_____	_____
Total Cost: \$				_____	

Accompanying this Proposal is a certified check, cashier's check or Tampa Bid Bond (form included herein must be used) for at least five percent (5%) of the total amount of the Proposal which check shall become the property of the City, or which bond shall become forthwith due and payable to the City, if this Proposal shall be accepted by the City and the Bidder shall fail to enter into a legally binding contract with and to furnish the required Public Construction Bond to the City within twenty (20) days after the date of its receipt of written Notice of Award by the City so to do.

FAILURE TO COMPLETE THE ABOVE MAY RESULT IN THE PROPOSAL BEING DECLARED NON-RESPONSIVE.

[SEAL] Name of Bidder: _____
 Authorized Signature: _____
 Signer's Printed Name: _____
 Signer's Title: _____

STATE OF _____
 COUNTY OF _____

For an entity: The forgoing instrument was sworn (or affirmed) before me this ____ day of _____, 20____ by _____ as _____ of _____, a/n Partnership Joint Venture LLC Corp Other: _____, on behalf of such entity. Such individual is personally known to me or produced a/n _____ state driver's license as identification.

For an individual: The forgoing instrument was sworn (or affirmed) before me this ____ day of _____, 20____ by _____, who is personally known to me or produced a/n _____ state driver's license as identification.

[NOTARY SEAL] _____
 Notary Public, State of _____
 Notary Printed Name: _____
 Commission No.: _____
 My Commission Expires: _____



Good Faith Effort Compliance Plan Guidelines

for Women/Minority Business Enterprise/Small Local Business Enterprise Participation
City of Tampa - Equal Business Opportunity Program
(MBD Form 50 – detailed instructions on page 2 of 2)

Contract Name _____ Bid Date _____

Bidder/Proposer _____

Signature _____ Date _____

Name _____ Title _____

The Compliance Plan with attachments is a true account of Good Faith Efforts (GFE) made to achieve the participation goals as specified for Women/Minority Business Enterprises/Small Local Business Enterprises (WMBE/SLBE) on the referenced contract:

The WMBE/SLBE participation **Goal is Met or Exceeded**. See DMI Forms 10 and 20 which accurately report all subcontractors solicited and all subcontractors to-be-utilized.

The WMBE/SLBE participation Goal is **Not Achieved**. The following list is an overview of the baseline GFE action steps already performed. Furthermore, it is understood that these GFE requirements are weighted in the compliance evaluation based on the veracity and demonstrable degree of documentation provided with the bid/proposal:

(Check applicable boxes below. Must enclose supporting documents accordingly with remarks)

- (1) Solicited through reasonable and available means the interest of WMBE/SLBEs that have the capability to perform the work of the contract. The Bidder or Proposer must solicit this interest within sufficient time to allow the WMBE/SLBEs to respond. The Bidder or Proposer must take appropriate steps to follow up initial solicitations with interested WMBE/SLBEs. See DMI report forms for subcontractors solicited. See enclosed supplemental data on solicitation efforts. Qualifying Remarks:
- (2) Provided interested WMBE/SLBEs with adequate, specific scope information about the plans, specifications, and requirements of the contract, including addenda, in a timely manner to assist them in responding to the requested-scope identified by bidder/proposer for the solicitation. See enclosed actual solicitations used. Qualifying Remarks:
- (3) Negotiated in good faith with interested WMBE/SLBEs that have submitted bids (e.g. adjusted quantities or scale). Documentation of negotiation must include the names, addresses, and telephone numbers of WMBE/SLBEs that were solicited; the date of each such solicitation; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why agreements could not be reached with WMBE/SLBEs to perform the work. Additional costs involved in soliciting and using subcontractors is not a sufficient reason for a bidder/proposer's failure to meet goals or achieve participation, as long as such costs are reasonable. Bidders are not required to accept excessive quotes in order to meet the goal. DMI Utilized Forms for sub-(contractor/consultant) reflect genuine negotiations This project is an RFO/RFP in nature and negotiations are limited to clarifications of scope/specifications and qualifications. See enclosed documentation. Qualifying Remarks:
- (4) Not rejecting WMBE/SLBEs as being unqualified without justification based on a thorough investigation of their capabilities. The WMBE/SLBEs standing within its industry, membership in specific groups, organizations / associations and political or social affiliations are not legitimate causes for rejecting or not soliciting bids to meet the goals. Not applicable. See attached justification for rejection of a subcontractor's bid or proposal. Qualifying Remarks:
- (5) Made scope(s) of work available to WMBE/SLBE subcontractors and suppliers; and, segmented portions of the work or material consistent with the available WMBE/SLBE subcontractors and suppliers, so as to facilitate meeting the goal. Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. See enclosed comments. Qualifying Remarks:
- (6) Made good faith efforts, despite the ability or desire of Bidder/Proposer to perform the work of a contract with its own forces/organization. A Bidder/Proposer who desires to self-perform the work of a contract must demonstrate good faith efforts if the goal has not been met. Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime. Qualifying Remarks:
- (7) Segmented portions of the work to be performed by WMBE/SLBEs in order to increase the likelihood that the goals will be met. This includes, where appropriate, breaking out contract work items into economically feasible units (quantities/scale) to facilitate WMBE/SLBE participation, even when the Bidder/Proposer might otherwise prefer to perform these work items with its own forces. Sub-Contractors were allowed to bid on their own choice of work or trade without restriction to a pre-determined portion. Sub-Contractors were not prohibited from submitting bids/proposals and were solicited on work typically self-performed by the prime. See enclosed comments. Qualifying Remarks:
- (8) Made efforts to assist interested WMBE/SLBEs in obtaining bonding, lines of credit, or insurance as required by the city or contractor. See enclosed documentation on initiatives undertaken and methods to accomplish. Qualifying Remarks:
- (9) Made efforts to assist interested WMBE/SLBEs in obtaining necessary equipment, supplies, materials, or related assistance or services, including participation in an acceptable mentor-protégé program. See enclosed documentation of initiatives and/or agreements. Qualifying Remarks:
- (10) Effectively used the services of the City and other organizations that provide assistance in the recruitment and placement of WMBE/SLBEs. See enclosed documentation. The following services were used:

Note: Provide any unsolicited information that will support the Bid/RFP Compliance Evaluation. Named Documents Are:



Participation Plan: Guidance for Complying with Good Faith Efforts Outreach
(page 2 of 2)

1. All firms on the WMBE/SLBE Goal Setting List must be solicited and documentation provided for email, fax, letters, phone calls, and other methods of outreach/communication with the listed firms. The DMI Solicited and DMI-Utilized forms must be completed for all firms solicited or utilized. Other opportunities for subcontracting may be explored by consulting the City of Tampa MBD Office and/or researching the on-line Diversity Management Business System Directory for Tampa certified WMBE/SLBE firms.
2. Solicitation of WMBE/SLBEs, via written or electronic notification, should provide specific information on the services needed, where plans can be reviewed and assistance offered in obtaining these, if required. Solicitations should be sent a minimum of a week (i.e. 5 business days or more) before the bid/proposal date. Actual copies of the bidder's solicitation containing their scope specific instructions should be provided.
3. With any quotes received, a follow-up should be made when needed to confirm detail scope of work. For any WMBE/SLBE low quotes rejected, an explanation shall be provided detailing negotiation efforts.
4. If a low bid WMBE/SLBE is rejected or deemed unqualified the contractor must provide an explanation and supporting documentation for this decision.
5. Prime shall break down portions of work into economical feasible opportunities for subcontracting. The WMBE/SLBE directory may be useful in identifying additional subcontracting opportunities and firms not listed in the "WMBE/SLBE Goal Setting Firms List."
6. Contractor shall not preclude WMBE/SLBEs from bidding on any part of work, even if the Contractor may desire to self-perform the work.
7. Contractor shall avoid relying solely on subcontracting out work-scope where WMBE/SLBE availability is not sufficient to attain the pre-determined subcontract goal set for the Bid or when targeted sub-consultant participation is stated within the RFP/RFQ.
8. In its solicitations, the Bidder should offer assistance to WMBE/SLBEs in obtaining bonding, insurance, et cetera, if required of subcontractors by the City or Prime Contractor.
9. In its solicitation, the Bidder should offer assistance in obtaining equipment for a specific job to WMBE/SLBEs, if needed.
10. Contractor should use the services offered by such agencies as the City of Tampa Minority and Small Business Development Office, Hillsborough County Entrepreneur Collaborative Center, Hillsborough County Economic Development Department's MBE/SBE Program and the NAACP Empowerment Center to name a few for the recruitment and placement of WMBEs/SLBEs.



Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive

**Page 1 of 4 – DMI Solicited/Utilized Schedules
 City of Tampa – Schedule of **All Solicited** Sub-(Contractors/Consultants/Suppliers)
 (FORM MBD-10)**

Contract No.: _____ Contract Name: _____
 Company Name: _____ Address: _____
 Federal ID: _____ Phone: _____ Fax: _____ Email: _____

Check applicable box(es). Detailed Instructions for completing this form are on page 2 of 4.

- No Firms were contacted or solicited for this contract.
- No Firms were contacted because: _____
- See attached list of additional Firms solicited and all supplemental information (List must comply to this form)
Note: Form MBD-10 must list ALL subcontractors solicited including Non-minority/small businesses

NIGP Code Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

S = SLBE W=WMBE O = Neither	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade or Services NIGP Code (listed above)	Contact Method L=Letter F=Fax E=Email P=Phone	Quote or Response Received Y/N

Failure to Complete, Sign and Submit
 this form with your Bid or Proposal
 Shall render the Bid Non-Responsive
 (Do Not Modify This Form)

It is hereby certified that the information provided is an accurate and true account of contacts and solicitations for sub-contracting opportunities on this contract.

Signed: _____ Name/Title: _____ Date: _____

**Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive
 Forms must be included with Bid / Proposal**



Instructions for completing **The Sub-(Contractors/Consultants/ Suppliers) Solicited Form (Form MBD-10)**

This form must be submitted with all bids or proposals. **All** subcontractors (regardless of ownership or size) solicited and subcontractors from whom unsolicited quotations were received must be included on this form. The instructions that follow correspond to the headings on the form required to be completed. **Note:** Ability or desire to self-perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID.** FIN. A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Firms were contacted or solicited for this contract.** Checking the box indicates that a pre-determined Subcontract Goal or Participation Plan Requirement was not set by the City resulting in your business not using subcontractors and will self-perform all work. If during the performance of the contract you employ subcontractors, the City must pre-approve subcontractors. Use of the “Sub-(Contractors/Consultants/Suppliers) Payments” form (MBD Form-30) must be submitted with every pay application and invoice. **Note:** Certified **SLBE or WMBE firms** bidding as Primes **are not exempt** from outreach and solicitation of subcontractors.
- **No Firms were contacted because.** Provide brief explanation why no firms were contacted or solicited.
- **See attached documents.** Check box, if after you have completed the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the form. All DMI data not submitted on the MBD Form-10 must be in the same format and have all requested data from MBD Form-10 included.

The following instructions are for information of any and all subcontractors solicited.

- **“S” = SLBE, “W” = WMBE.** Enter “S” for firms Certified by the City as Small Local Business Enterprises and/or “W” for firms Certified by the City as either Women/Minority Business Enterprise; **“O” = Non-certified others.**
- **Federal ID.** FIN. A number assigned to a business for tax reporting purposes. This information is critical in proper identification and payment of the contractor/subcontractor.
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials** indicate the trade, service, or materials provided by the subcontractor. NIGP codes aka “National Institute of Governmental Purchasing” are listed at top section of document.
- **Contact Method L=letter, F=fax, E=Email, P=Phone.** Indicate with letter the method(s) of soliciting for bid.
- **Quote or Resp. (response) Rec’d (received) Y/N.** Indicate “Y” Yes if you received a quotation or if you received a response to your solicitation. Indicate “N” No if you received no response to your solicitation from the subcontractor. Must keep records: log, ledger, documentation, etc. that can validate/verify.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Minority and Small Business Development Office at (813) 274-5522.



Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive

**Page 3 of 4 – DMI Solicited/Utilized Schedules
City of Tampa – Schedule of All To-Be-Utilized Sub-(Contractors/Consultants/Suppliers)
(FORM MBD-20)**

Contract No.: _____ Contract Name: _____
Company Name: _____ Address: _____
Federal ID: _____ Phone: _____ Fax: _____ Email: _____

Check applicable box(es). Detailed Instructions for completing this form are on page 4 of 4.

See attached list of additional Firms Utilized and all supplemental information (List must comply to this form)

Note: Form MBD-20 must list ALL subcontractors To-Be-Utilized including Non-minority/small businesses

No Subcontracting/consulting (of any kind) will be performed on this contract.

No Firms are listed to be utilized because: _____

NIGP Code General Categories: Buildings = 909, General = 912, Heavy = 913, Trades = 914, Architects = 906, Engineers & Surveyors = 925, Supplier = 912-77

Enter "S" for firms Certified as Small Local Business Enterprises, "W" for firms Certified as Women/Minority Business Enterprise, "O" for Other Non-Certified

S = SLBE W=WMBE O =Neither	Company Name Address Phone, Fax, Email	Type of Ownership (F=Female M=Male) BF BM = African Am. HF HM = Hispanic Am. AF AM = Asian Am. NF NM = Native Am. CF CM = Caucasian	Trade, Services, or Materials NIGP Code Listed above	\$ Amount of Quote. Letter of Intent (LOI) if available	Percent of Scope or Contract %

Failure to Complete, Sign and Submit
this form with your Bid or Proposal
Shall render the Bid Non-Responsive.
(Do Not Modify This Form)

Total ALL Subcontract / Supplier Utilization \$ _____
Total SLBE Utilization \$ _____
Total WMBE Utilization \$ _____
Percent SLBE Utilization of Total Bid/Proposal Amt. _____% Percent WMBE Utilization of Total Bid/Proposal Amt. _____%

It is hereby certified that the following information is a true and accurate account of utilization for sub-contracting opportunities on this Contract.

Signed: _____ Name/Title: _____ Date: _____

**Failure to Complete, Sign and Submit Both Forms 10 & 20 SHALL render the Bid or Proposal Non-Responsive
Forms must be included with Bid / Proposal**



Page 4 of 4 DMI – Solicited/**Utilized**

Instructions for completing **The Sub-(Contractors/Consultants/ Suppliers) to be Utilized Form (Form MBD-20)**

This form must be submitted with all bids or proposals. All subcontractors (regardless of ownership or size) projected to be utilized must be included on this form. Note: Ability or desire to self-perform all work shall not exempt the prime from Good Faith Efforts to achieve participation.

Contract No. This is the number assigned by the City of Tampa for the bid or proposal.

- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business and/or doing business as (dba) if applicable.
- **Address.** The physical address of your business.
- **Federal ID. FIN.** A number assigned to your business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **No Subcontracting/consulting (of any kind) will be performed on this contract.** Checking box indicates your business will not use subcontractors when no Subcontract Goal or Participation Plan Requirement was set by the City, but will self-perform all work. When subcontractors are utilized during the performance of the contract, the “Sub-(Contractors/Consultants/Suppliers) Payments” form (MBD Form-30) must be submitted with every pay application and invoice. Note: certified **SLBE or WMBE firms** bidding as Primes **are not exempt** from outreach and solicitation of subcontractors, including completion and submitting Form-10 and Form-20.
- **No Firms listed To-Be-Utilized.** Check box; provide brief explanation why no firms were retained when a goal or participation plan requirement was set on the contract. Note: mandatory compliance with Good Faith Effort outreach (GFECF) requirements applies (MBD Form-50) and supporting documentation must accompany the bid.
- **See attached documents.** Check box, if after completing the DMI Form in its entirety, you need more space to list additional firms and/or if you have supplemental information/documentation relating to the scope/value/percent utilization of subcontractors. Reproduce copies of MBD-20 and attach. All data not submitted on duplicate forms must be in the same format and content as specified in these instructions.

The following instructions are for information of Any and All subcontractors To Be Utilized.

- **Federal ID. FIN.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **“S” = SLBE, “W” = WMBE.** Enter “S” for firms Certified by the City as Small Local Business Enterprises and/or “W” for firms Certified by the City as Women/Minority Business Enterprise; **“O” = Non-certified others.**
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Type of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business.
- **Trade, Services, or Materials (NIGP code if Known)** Indicate the trade, service, or material provided by the subcontractor. Abbreviated list of NIGP is available at <http://www.tampagov.net/mbd> “Information Resources”.
- **Amount of Quote, Letters of Intent** (required for both SLBEs and WMBEs).
- **Percent of Work/Contract.** Indicate the percent of the total contract price the subcontract(s) represent. For CCNA only (i.e. Consultant A/E Services) you must indicate subcontracts as percent of total scope/contract.
- **Total Subcontract/Supplier Utilization.** – Provide total dollar amount of all subcontractors/suppliers projected to be used for the contract. (Dollar amounts may be optional in CCNA depending on solicitation format).
- **Total SLBE Utilization.** Provide total dollar amount for all projected SLBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Total WMBE Utilization.** Provide total dollar amount for all projected WMBE subcontractors/Suppliers used for this contract. (Dollar amounts may be optional in CCNA proposals depending on the solicitation format).
- **Percent SLBE Utilization.** Total amount allocated to SLBEs divided by the total bid/proposal amount.
- **Percent WMBE Utilization.** Total amount allocated to WMBEs divided by the total bid/proposal amount.

If additional information is required or you have questions, please contact the Equal Business Opportunity Program - Minority and Small Business Development Office at (813) 274-5522.

TAMPA BID BOND

Contract 19-C-00017; D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation

KNOW ALL MEN BY THESE PRESENTS, that we, _____

_____ (hereinafter called the Principal) and _____

(hereinafter called the Surety) a Corporation chartered and existing under the laws of the State of _____, with its principal offices in the City of _____, and authorized to do business in the State of Florida, are held and firmly bound unto the City of Tampa, a Municipal Corporation of Hillsborough County, Florida, in the full and just sum of 5% of the amount of the (Bid) (Proposal) good and lawful money of the United States of America, to be paid upon demand of the City of Tampa, Florida, to which payment will and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally and firmly these presents.

WHEREAS, the Principal is about to submit, or has submitted to the City of Tampa, Florida, a Proposal for the construction of certain facilities for the City designated Contract 19-C-00017, D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation.

WHEREAS, the Principal desires to file this Bond in accordance with law, in lieu of a certified Bidder's check otherwise required to accompany this Proposal.

NOW, THEREFORE: The conditions of this obligation are such that if the Proposal be accepted, the Principal shall, within twenty (20) days after the date of receipt of written Notice of Award, execute a contract in accordance with the Proposal and upon the terms, conditions and price set forth therein, in the form and manner required by the City of Tampa, Florida and execute a sufficient and satisfactory Public Construction Bond payable to the City of Tampa, Florida in an amount of one hundred percent (100%) of the total contract price, in form and with security satisfactory to said City, then this Bid Bond obligation is to be void; otherwise to be and remain in full force and virtue in law, and the Surety shall, upon failure of the Principal to comply with any or all of the foregoing requirements within the time specified above, immediately pay to the aforesaid City, upon demand, the amount thereof, in good and lawful money of the United States of America, not as a penalty, but as liquidated damages.

IN TESTIMONY THEREOF, the Principal and Surety have caused these presents to be duly signed and sealed this _____ day of _____, 20____.

Principal

BY _____

TITLE _____

BY _____

TITLE _____

(SEAL)

Producing Agent

Producing Agent's Address

Name of Agency

The addition of such phrases as "not to exceed" or like import shall render the (Bid) (Proposal) non-responsive.

AGREEMENT

For furnishing all labor, materials and equipment, together with all work incidental thereto, necessary and required for the performance of the work for the construction of Contract 19-C-00017 in accordance with your Proposal dated _____, amounting to a total of \$ _____ as completed in accordance with subsections I-2.09 and I-2.10 of the Instruction to Bidders.

This AGREEMENT, made and entered into in triplicate, between the City of Tampa, Florida, hereinafter called the City, and _____ hereinafter called the Contractor, as of the _____ day of _____, 20__ when the City Council of the City of Tampa, Florida adopted a Resolution authorizing, among other things, the Mayor's execution of this Agreement.

WITNESSETH that, in consideration of the mutual stipulations, agreements, and covenants herein contained, the parties hereto have agreed and hereby agree with each other, the Party of the First Part for itself, its successors and assigns, and the Party of the Second Part for itself, or himself, or themselves, and its successors and assigns, or his or their executors, administrators and assigns, as follows:

Contract 19-C-00017; D.L. Tippin Tank Rehabilitation - Ferric and Acid Tank Rehabilitation, shall include, but not be limited to, making improvements to the existing Ferric Sulfate Tank No. 2, Sulfuric Acid Tank No. 1 and associated containment areas including surface preparation and exterior tank coating of both tanks, Ferric Sulfate Tank No.2 repairs, repair and coating of sulfuric acid containment, eye wash station installations and upgrades, air and miscellaneous piping installation, chemical fill station installations, canopy roof repair, with all associated work required for a complete project in accordance with the Contract Documents.

Contract Documents referred to in Article 1.01 of this Agreement also includes this volume, applicable standard drawings, the plans and any provisions referred to whether actually attached or not.

TAMPA AGREEMENT

SECTION 1 GENERAL

ARTICLE 1.01 THE CONTRACT

Except for titles, subtitles, headings, running headlines, and tables of contents (all of which are printed herein merely for convenience), the following, except for such portions thereof as may be specifically excluded, constitute the Contract:

The Notice to Bidders;
The Instructions to Bidders, including Special Instructions and General Instructions;
The Proposal;
The Bid Bond;
The Certification of Nonsegregated Facilities;
The Notice of Award;
The Agreement;
The Performance Bond;
The Notice To Proceed;
The Specifications, including the General Provisions, the Workmanship and Materials, the Specific Provisions or the Contract Items
The Plans;
All Supplementary Drawings Issued after award of the Contract;
All Addenda issued by the City prior to the receipt of proposals;
All provisions required by law to be inserted in this Contract, whether actually inserted or not.

ARTICLE 1.02 DEFINITIONS

The following words and terms, or pronouns used in their stead, shall, wherever they appear in this Contract, be construed as follows, unless different meaning is clear from the context:

(a)"City" shall mean the City of Tampa, Florida, represented by its Mayor and City Council, Party of the First Part, or such other City official as shall be duly empowered to act for the City on matters relating to this Contract.

(b)"Contractor" shall mean the Party of the Second Part hereto, whether corporation, firm or individual, or any combination thereof, and its, their, or his successors, personal representatives, executors, administrators, and assigns, and any person, firm or corporation who or which shall at any time be substituted in the place of the Party of the Second Part under this Contract.

(c)"Engineer" shall mean the Director of the Department or his duly authorized representative.

(d)"Consultant" shall mean the engineering or architectural firm or individual employed by the City to consult with and advise the City in the construction of the project.

(e)"Surety" shall mean any person, firm or corporation that has executed as Surety the Contractor's Performance Bond securing the performance of this Contract.

(f)"The Work" shall mean everything expressly or implied required to be furnished and done by the Contractor under the Contract, and shall include both Contract Work

and Extra Work.

(g)"Contract Work" shall mean everything expressly or implied required to be furnished and done by the Contractor by any one or more of the Contract parts referred to in Article 1.01 hereof, except Extra Work, as hereinafter defined; it being understood that, in case of any inconsistency in or between any part or parts of this Contract, the Engineer shall determine which shall prevail.

(h)"Contract" or "Contract Documents" shall mean each of the various part of the Contract referred to in Article 1.01 hereof, both as a whole and severally.

(i)"Extra Work" shall mean work other than that required either expressly or implied by the contract in its present form.

(j)"Plans" shall mean only those drawings specifically referred to as such in these documents, or in any Addendum. Drawings issued after the execution of the Contract to explain further, or to illustrate, or to show changes in the work, will be known as "Supplementary Drawings" and shall be binding upon the Contractor with the same force as the Plans.

(k)"Specifications" shall mean all of the directions, requirements, and standards of performance applying to the work, as hereinafter detailed and designated as such, or which may be issued in an addendum.

(l)"Addendum or Addenda" shall mean the additional contract provisions issued in writing prior to the receipt of bids.

(m)"Notice" shall mean written notice. Notice shall be served upon the Contractor, either personally or by leaving the said notice at his residence or with any employee found on the work, or addressed to the Contractor at the residence or place of business given in his proposal and deposited in a postpaid wrapper in any post office box regularly maintained by the United States Post Office.

(n)"Project" shall mean the entire improvement package or related work. The "project" may consist of several different, but related, contracts.

(o)"Site" shall mean, and be limited to, the area upon or in which the Contractor's operations are carried on and such other appropriate areas as may be designed as such by the Engineer.

(p)"Subcontractor" shall mean any person, firm, or corporation, other than employees of the Contractor, who or which contracts with the Contractor to furnish, or actually furnishes labor, or labor and materials, or labor and equipment or labor, materials, and equipment at the site.

(q)Whenever in the Contract the words "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import are used, they shall imply the direction, requirement, permission, order, designation, or prescription of the Engineer; and "approved", "acceptable", "satisfactory", "in the judgement of", and words of like import shall mean approved by, or acceptable to, or satisfactory to, or in the judgment of the Engineer.

(r)Whenever in the Contract the word "day" is used, it shall mean calendar day.

(s)"Final Acceptance" shall mean acceptance of the

work as evidenced by an official resolution of the City. Such acceptance shall be deemed to have taken place only if and when an approving resolution has been adopted by the City Council. The final acceptance shall be signed only after the City has assured itself by tests, inspection, or otherwise, that all of the provisions of the Contract have been carried out to its satisfaction.

(t)"Eastern Standard Time" shall be construed as the time being observed in the City on the day proposals are received or other documents issued or signed.

SECTION 2 POWERS OF THE CITY'S REPRESENTATIVES

ARTICLE 2.01 THE ENGINEER

It is covenanted and agreed that the Engineer, in addition to those matters elsewhere herein expressly made subject to his determination, direction, or approval, shall have the power, subject to such express provisions and limitations herein contained as are not in conflict herewith, and subject to review by the Mayor and City Council:

(a)To monitor the performance of the work.

(b)To determine the amount, kind, quality, sequence, and location of the work to be paid for hereunder and, when completed, to measure such work for payment.

(c)To determine all questions of an engineering character in relation to the work, to interpret the Plans, Specifications and Addenda.

(d)To determine how the work of this Contract shall be coordinated with the work of other contractors engaged simultaneously on this project.

(e)To make minor changes in the work as he deems necessary, provided such changes do not result in a net increase in the cost to the City or to the Contractor of the work to be done under the Contract.

(f)To amplify the Plans, add explanatory information and furnish additional Specifications and Drawings consistent with the intent of the Contract Documents.

The power of the Engineer shall not be limited to the foregoing enumeration, for it is the intent of this Contract that all of the work shall be subject to his determinations and approval, except where the determination or approval of someone other than the Engineer is expressly called for herein and except as subject to review by the Mayor and City Council. All orders of the Engineer requiring the Contractor to perform work as Contract work shall be promptly obeyed by the Contractor.

The Engineer shall not, however, have the power to issue an extra work order, and the performance of such work on the order of the Engineer without previously obtaining written confirmation thereof from the Mayor in accordance with Article 7.02 hereof may constitute a waiver of any right to extra compensation therefor. The Contractor is warned that the Engineer has no power to change the terms and provisions of this Contract, except minor changes where such change results in no net increase in the Contract Price.

ARTICLE 2.02 DIRECTOR

The Director of the Department in addition to those matters

expressly made subject to his determination, direction or approval in his capacity as "Engineer", shall also have the power:

(a)To review any and all questions in relation to this Contract and its performance, except as herein otherwise specifically provided, and his determination upon such review shall be final and conclusive upon the Contractor.

(b)With the approval of the Mayor and City Council to authorize modifications or changes in the Contract so as to require: (1) the performance of extra work, or (2) the omission of Contract work whenever he deems it in the interest of the City to do so, or both.

(c)To suspend the whole or any part of the work whenever, in his judgment, such suspension is required: (1) in the interest of the City generally, or (2) to coordinate the work of the various Contractors engaged on this project, or (3) to expedite the completion of the entire project, even though the completion of this particular Contract may be thereby delayed, without compensation to the Contractor for such suspension other than extending the time for the completion of the work, as much as it may have been, in the opinion of the City, delayed by such a suspension.

(d)If, before the final acceptance of all the work contemplated herein, it shall be deemed necessary to take over, use, occupy, or operate any part of the completed or partly completed work, the Engineer shall have the right to do so and the Contractor will not, in any way, interfere with or object to the use, occupation, or operation of such work by the City after receipt of notice in writing from the Engineer that such work or part thereof will be used by the City on and after the date specified in such notice. Such taking over, use, occupancy or operation of any part of the completed or partially completed work shall not constitute final acceptance or approval of any such part of the work.

ARTICLE 2.03 NO ESTOPPEL

The City shall not, nor shall any department, officer, agent, or employee thereof, be bound, precluded, or estopped by any determination, decision, acceptance, return, certificate, or payment made or given under or in connection with this Contract by any officer, agent or employee of the City at any time either before or after final completion and acceptance of the work and payment therefor: (a) from showing the true and correct classification, amount, quality, or character of the work done, or that any determination, decision, acceptance, return certificate or payment is untrue, incorrect or improperly made in any particular, or that the work or any part thereof does not in fact conform to the requirements of the Contract Documents, and (b) from demanding and recovering from the Contractor any overpayments made to him or such damages as it may sustain by reason his failure to comply with the requirements of the Contract of Documents, or both.

ARTICLE 2.04 NO WAIVER OF RIGHTS

Neither the inspection, nor any order, measurements or certificate of the City or its employees, officers, or agents, nor by any order of the City for payment of money, nor any money, nor payments for or acceptance of the whole or any part of the work by the City, nor any extension of time, nor any changes in the Contract, Specifications or Plans, nor any possession by the City or its employees shall operate as a

waiver of any provisions of this Contract, nor any power herein provided nor shall any waiver of any breach of this Contract be held as a waiver of any other subsequent breach.

Any remedy provided in this Contract shall be taken and construed as cumulative, namely, in addition to each and every other suit, action, or legal proceeding. The City shall be entitled as of right to an injunction against any breach of the provisions of this Contract.

SECTION 3 PERFORMANCE OF WORK

ARTICLE 3.01 CONTRACTOR'S RESPONSIBILITY

The Contractor shall do all the work and furnish, at his own cost and expense, all labor, materials, equipment, and other facilities, except as herein otherwise provided, as may be necessary and proper for performing and completing the work under this Contract. The Contractor shall be responsible for the entire work until completed and finally accepted by the City.

The work shall be performed in accordance with the true intent and meaning of the Contract Documents. Unless otherwise expressly provided, the work must be performed in accordance with the best modern practice, with materials as specified and workmanship of the highest quality, all as determined by and entirely to the satisfaction of the Engineer.

Unless otherwise expressly provided, the means and methods of construction shall be such as the Contractor may choose, subject, however, to the approval of the Engineer. Only adequate and safe procedure, methods, structures and equipment shall be used. The Engineer's approval or the Engineer's failure to exercise his right thereon shall not relieve the Contractor of obligations to accomplish the result intended by the Contract, nor shall such create a cause of action for damages.

ARTICLE 3.02 COMPLIANCE WITH LAWS

The Contractor must comply with all local, State and Federal laws, rules, ordinances and regulations applicable to this Contract and to the work done hereunder, and must obtain, at his own expense, all permits, licenses or other authorization necessary for the prosecution of the work.

No work shall be performed under this Contract on Sundays, legal holidays or after regular working hours without the express permission of the Engineer. Where such permission is granted, the Engineer may require that such work be performed without additional expense to the City.

ARTICLE 3.03 INSPECTION

During the progress of the work and up to the date of final acceptance, the Contractor shall, at all times, afford the representatives of the City, the Florida Department of Environmental Regulation, and if applicable, the Federal Environmental Protection Agency and the Federal Department of Labor every reasonable, safe and proper facility for inspecting the work done or being done at the

site. The inspection of any work shall not relieve the Contractor of any of his obligations to perform proper and satisfactory work as herein specified. Finished or unfinished work found not to be in strict accordance with the Contract shall be replaced as directed by the Engineer, even though such work may have been previously approved and payment made therefor.

The City shall have the right to reject materials and workmanship which are defective or require their correction. Rejected work and materials must be promptly removed from the site, which must at all times be kept in a reasonably clean and neat condition.

Failure or neglect on the part of the City to condemn or reject bad or inferior work or materials shall not be construed to imply an acceptance of such work or materials, if it becomes evident at any time prior to the final acceptance of the work by the City. Neither shall it be construed as barring the City at any subsequent time from the recovery of damages of such a sum of money as may be needed to build anew all portions of the work in which inferior work or improper materials were used, wherever found.

Should it be considered necessary or advisable by the City at any time before final acceptance of the entire work to make examinations of work already completed, by removing or tearing out all or portions of such work, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material for that purpose. If such work is found to be defective in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the work shall be considered an item of extra work to be paid for in accordance with the provisions of Article 7.02 hereof.

ARTICLE 3.04 PROTECTION

During performance and until final acceptance, the Contractor shall be under an absolute obligation to protect the finished and unfinished work against any damage, loss, or injury. The Contractor shall take proper precaution to protect the finished work from loss or damage, pending completion and the final acceptance of all the work included in the entire Contract, provided that such precaution shall not relieve the Contractor from any and all liability and responsibility for loss or damage to the work occurring before final acceptance by the City. Such loss or damage shall be at the risk of and borne by the Contractor, whether arising from acts or omissions of the Contractor or others. In the event of any such loss or damage, the Contractor shall forthwith repair, replace, and make good the work without extension of time therefor, except as may be otherwise provided herein.

The provisions of this Article shall not be deemed to create any new right of action in favor of third parties against the Contractor or the City.

ARTICLE 3.05 PRESERVATION OF PROPERTY

The Contractor shall preserve from damage all property along the line of the work, or which is in the vicinity of or is in anywise affected by the work, the removal or destruction of which is not called for by the Plans. This applies, but is not limited, to the public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, public streets (except natural wear and tear of streets resulting from legitimate use thereof by the Contractor), and wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor and at his own expense.

In case of failure on the part of the Contractor to restore such property, or make good such damage or injury, the City may, upon forty-eight (48) hour written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any monies due or which may become due the Contractor under this Contract. Nothing in this clause shall prevent the Contractor from receiving proper compensation for the removal, damage, or replacement of any public or private property not shown on the Plans, when this is made necessary by alteration of grade or alignment authorized by the Engineer, provided that such property has not been damaged through fault of the Contractor, his employees or agents.

ARTICLE 3.06 BOUNDARIES

The Contractor shall confine his equipment, apparatus, the storage of materials, supplies and apparatus of his workmen to the limits indicated on the plans, by law, ordinances, permits or direction of the Engineer.

ARTICLE 3.07 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL91-54).

ARTICLE 3.08 TAXES

All taxes of any kind and character payable on account of the work done and materials furnished under this Contract shall be paid by the Contractor and shall be deemed to have been included in his bid. The laws of the State of Florida provide that sales and use taxes are payable by the Contractor upon the tangible personal property incorporated in the work and such taxes shall be paid by the Contractor and shall be deemed to have been included in his bid.

ARTICLE 3.09 ENVIRONMENTAL CONSIDERATIONS

The Contractor, in the performance of the work under this Contract, shall comply with all Local, State and Federal laws, statutes, ordinances, rules and regulations applicable to protection of the environment; and, in the event he violates any of the provisions of same, he shall be answerable to the Local, State and Federal agencies designated by law to protect the environment. In the event the City receives, from any of the environmental agencies, a citation which is occasioned by an act or omission of the Contractor or his

subcontractor or any officers, employees or agents of either, it is understood and agreed that the Contractor shall automatically become a party-respondent under said citation; and the City immediately shall notify the Contractor and provide him with a copy of said citation.

The Contractor shall comply with the requirements of the citation and correct the offending conditions(s) within the time stated in said citation and further shall be held fully responsible for all fines and/or penalties.

**SECTION 4
TIME PROVISIONS**

ARTICLE 4.01 TIME OF START AND COMPLETION

The Contractor must commence work within thirty (30) days subsequent to the date of the receipt of the "Notice to Proceed" by the City unless otherwise provided in the Specific Provisions and Special Instructions. Time being of the essence of this Contract, the Contractor shall thereafter prosecute the work diligently, using such means and methods of construction as well as secure its full completion in accordance with the requirements of the Contract Documents no later than the date specified therefor, or on the date to which the time for completion may be extended.

The Contractor must complete the work covered by this Contract in the number of consecutive calendar days set forth in the Instructions to Bidders, unless the date of completion is extended pursuant to the provisions of Article 4.05 hereof.

The period for performance shall start from the date of signing of this Agreement by the City.

The actual date of completion will be established after a final inspection as provided in Article 4.07 hereof.

ARTICLE 4.02 PROGRESS SCHEDULE

To enable the work to be laid out and prosecuted in an orderly and expeditious manner, the Contractor shall submit to the Engineer a proposed progress schedule within fifteen (15) days after the award of this Contract.

The schedule shall state the Contract starting date, time for completion and date of completion and shall show the anticipated time of starting and completion of each of the various operations to be performed under this Contract, together with all necessary and appropriate information regarding sequence and correlation of work and an estimated time required for the delivery of all materials and equipment required for the work. The proposed schedule shall be revised as directed by the Engineer until finally approved by him, and, after such approval, shall be strictly adhered to by the Contractor. The approved progress schedule may be changed only with the written permission of the Engineer.

If the Contractor shall fail to adhere to the approved progress schedule or the schedule as revised, he shall promptly adopt such other or additional means and methods of construction as will make up for the time lost, and will assure completion in accordance with the contract time.

ARTICLE 4.03 APPROVAL REQUESTS

From time to time, as the work progresses and in the sequence indicated by the approved schedule, the Contractor must submit to the Engineer a specific request, in writing, for each item of information or approval required of him by the Contract. These requests must be submitted sufficiently in advance of the date upon which the information or approval is actually required by the Contractor to allow for the time the Engineer may take to act upon such submissions or resubmissions. The Contractor shall not have any right to an extension of time on account of delays due to his failure to submit his requests for the required information or the required approval in accordance with these requirements.

ARTICLE 4.04 COORDINATION WITH OTHER CONTRACTORS

During progress of the work, other Contractors may be engaged in performing other work on this project or on other projects on the site. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other Contractors in such manner as the Engineer may direct.

ARTICLE 4.05 EXTENSION OF TIME

If such an application is made, the Contractor shall be entitled to an extension of time for delay in completion of the work should the Contractor be obstructed or delayed in the commencement, prosecution or completion of any part of said work by any act or delay of the City, or by acts or omissions of other Contractors on this project, or by a riot, insurrection, war, pestilence, acts of public authorities, fire, lightning, hurricanes, earthquakes, tornadoes, floods, extremely abnormal and excessive inclement weather as indicated by the records of the local weather bureau for a five-year period preceding the date of the Contract, or by strikes, or other causes, which causes of delay mentioned in this Article, in the opinion of the City, are entirely beyond the expectation and control of the Contractor.

The Contractor shall, however, be entitled to an extension of time for such causes only for the number of days of delay which the City may determine to be due solely to such causes and only to the extent that such occurrences actually delay the completion of the project and then only if the Contractor shall have strictly complied with all of the requirements of Articles 4.01, 4.02, 4.03 and 4.04 hereof. It is hereby understood that the determination by the Engineer as to the order and sequence of the work shall not in itself constitute a basis for extension of time.

The determination made by the City on an application for an extension of time shall be binding and conclusive on the Contractor.

Delays caused by failure of the Contractor's materialmen, manufacturers, and dealers to furnish approved working drawings, materials, fixtures, equipment, appliances, or other fittings on time or failure of subcontractors to perform their work shall not constitute a basis of extension of time.

The Contractor agrees to make no claim for damages for delay in the performance of this Contract occasioned by any

act or omission to act of the City or any of its representatives or because of any injunction which may be brought against the City or its representatives and agrees that any such claim shall be fully compensated for by an extension of time to complete performance of the work as provided herein.

ARTICLE 4.06 LIQUIDATED DAMAGES

It is mutually agreed between the parties that time is the essence of this Contract and that there will be on the part of the City considerable monetary damage in the event the Contractor should fail to complete the work within the time fixed for completion in the Contract or within the time to which such completion may have been extended.

The amount per day set forth in the Instructions to Bidders is hereby agreed upon as the liquidated damages for each and every calendar day that the time consumed in completing the work under this Contract exceeds the time allowed.

This amount shall, in no event, be considered as a penalty or otherwise than as the liquidated and adjusted damages to the City because of the delay and the Contractor and his Surety agree that the stated sum per day for each such day of delay shall be deducted and retained out of the monies which may become due hereunder and if not so deductible, the Contractor and his Surety shall be liable therefor.

ARTICLE 4.07 FINAL INSPECTION

When the work has been completed in accordance with the requirements of the Contract and final cleaning up performed, a date for final inspection of the work by the Engineer shall be set by the Contractor in a written request therefor, which date shall be not less than ten (10) days after the date of such request. The work will be deemed complete as of the date so set by the Contractor if, upon such inspection, the Engineer determines that no further work remains to be done at the site.

If such inspection reveals interms of work still to be performed, however, the Contractor shall promptly perform them and then request a reinspection. If, upon such inspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection.

**SECTION 5
SUBCONTRACTS AND ASSIGNMENTS**

ARTICLE 5.01 LIMITATIONS AND CONSENT

The Contractor shall not assign, transfer, convey, sublet or otherwise dispose of this Contract or of his right, title, or interest therein, or his power to execute such Contract, or to assign any monies due or to become due thereunder to any other person, firm or corporation unless the previous written consent of the City shall first be obtained thereto and the giving of any such consent to a particular subcontract or assignment shall not dispense with the necessity of such consent to any further or other assignment.

Before making any subcontract, the Contractor must submit a

written statement to the Engineer, giving the name and address of the proposed contractor, the portion of the work and materials which he is to perform and furnish and any other information tending to prove that the proposed subcontractor has the necessary facilities, skill, integrity, past experience and financial resources to perform the work in accordance with the terms and conditions of this Contract.

If the City finds that the proposed subcontractor is qualified, the Contractor will be notified in writing. The City may revoke approval of any subcontractor when such subcontractor evidences an unwillingness or inability to perform his work in strict accordance with these Contract Documents. Notice of such revocation of approval will be given in writing to the Contractor.

The Contractor will promptly, upon request, file with the City a conformed copy of the subcontract. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of these Contract Documents, insofar as applicable to the work of subcontractors, and to give the Contractor the same power as regards terminating any subcontracts that the City may exercise over the Contractor under provisions of these Contract Documents.

The Contractor shall be required to perform with his own forces at least twenty-five (25) percent of the work, unless written consent to subcontract a greater percentage of the work is first obtained from the City.

ARTICLE 5.02 RESPONSIBILITY

The approval by the City of a subcontractor shall not relieve the Contractor of any of his responsibilities, duties, and liabilities hereunder. The Contractor shall be solely responsible to the City for the acts or defaults or omissions of his subcontractor and of such subcontractor's officers, agents, and employees, each of whom shall for all purposes be deemed to be the agent or employee of the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the City.

SECTION 6 SECURITY AND GUARANTY

ARTICLE 6.01 CONTRACT SECURITY

The Contractor shall execute and deliver to the City a Performance Bond on the form as provided herein, in an amount at least equal to one hundred (100) percent of the full Contract price, such Bond to be executed by a surety company acceptable to the City. The surety on such Performance Bond shall be a surety company duly authorized to do business in the State of Florida, and the Bond shall be issued or countersigned by a local resident producing agent of such surety company who is a resident of the State of Florida, regularly commissioned and licensed in said State, and satisfactory evidence of the authority of the person or persons executing such Bond shall be submitted with the Bond. The Performance Bond shall serve as security for the faithful performance of this Contract, including

maintenance and guaranty provisions, and for the payment of all persons performing labor and furnishing materials in connection with the Contract. The premiums on the Performance Bond shall be paid by the Contractor.

If, at any time, the City shall become dissatisfied with any surety or sureties then upon the Performance Bond, or if for any other reason such bond shall cease to be adequate security for the City, the Contractor shall, within five days after notice so to do, substitute an acceptable Bond in such form and sum and signed by such other sureties as may be satisfactory to the City. The premiums on such Bond shall be paid by the Contractor. No further partial payments shall be deemed due or shall be made until the new sureties have qualified.

ARTICLE 6.02 CONTRACTORS INSURANCE

Insurance required shall be as indicated on Special Instructions pages beginning with "INS-1"

ARTICLE 6.03 AGAINST CLAIMS AND LIENS

The City may withhold from the Contractor as much as any approved payments to him as may, in the opinion of the City, be necessary to secure (a) just claims of any persons supplying labor or materials to the Contractor or any of his subcontractors for the work then due and unpaid; (b) loss due to defective work not remedied, or (c) liability, damage, or loss due to injury to persons or damages to the work or property of other contractors, subcontractors, or others, caused by the act or neglect of the Contractor or of any of his subcontractors. The City shall have the right, as agent for the Contractor, to apply any such amounts so withheld in such manner as the City may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments for the account of the Contractor.

ARTICLE 6.04 MAINTENANCE AND GUARANTY

The Contractor hereby guarantees all the work furnished under this Contract against any defects in workmanship and materials for a period of one year following the date of final acceptance of the work by the City. Under this guarantee, the Contractor hereby agrees to make good, without delay, at his own expense, any failure of any part of the work due to faulty materials or manufacture, construction, or installation, or the failure of any equipment to perform satisfactorily all the work put upon it within the limits of the Contract Documents, and further, shall make good any damage to any part of the work caused by such failure. It is hereby agreed that the Performance Bond shall fully cover all guarantees contained in this Article.

It is also agreed that all warranties, expressed or implied, inure to the benefit of the City and are enforceable by the City.

SECTION 7 CHANGES

ARTICLE 7.01 MINOR CHANGES

The City reserves the right to make such additions, deductions, or changes to this Contract from time to time as

it deems necessary and in a manner not materially affecting the substance thereof or materially changing the price to be paid in order to carry out and complete more fully and perfectly the work herein agreed to be done and performed. This Contract shall in no way be invalidated by any such additions, deductions, or changes, and no claim by the Contractor shall be made for any loss of anticipated profits thereby.

Construction conditions may require that minor changes be made in the location and installation of the work and equipment to be furnished and other work to be performed hereunder, and the Contractor when ordered by the Engineer, shall make such adjustments and changes in said locations and work as may be necessary, without additional cost to the City, provided such adjustments and changes do not alter the character, quantity of cost of the work as a whole, and provided further that Plans and Specifications showing such adjustments and changes are furnished to the Contractor by the City within a reasonable time before any work involving such adjustment and changes is begun. The Engineer shall be the sole judge of what constitutes a minor change for which no additional compensation shall be allowed.

ARTICLE 7.02 EXTRA WORK

The City may at any time by a written order and without notice to the sureties require the performance of such extra work as it may find necessary or desirable. An order for extra work shall be valid only if issued in writing and signed by the Mayor and the work so ordered must be performed by the Contractor.

The amount of compensation to be paid to the Contractor for any extra work as so ordered shall be determined as follows:

(a) By such applicable unit prices, if any, as are set forth in the Proposal; or

(b) If no such unit prices are set forth then by a lump sum or other unit prices mutually agreed upon by the City and the Contractor; or

(c) If no such unit prices are set forth in the Proposal and if the parties cannot agree upon a lump sum or other unit prices then by the actual net cost in money to the Contractor of the extra work performed, which cost shall be determined as follows:

(1) For all labor and foreman in direct charge of the authorized operations, the Contractor shall receive the current local rate of wages to be agreed upon, in writing, before starting such work for each hour that said labor and foremen are actually engaged thereon, to which shall be added an amount equal to 25 percent of the sum thereof which shall be considered and accepted as full compensation for general supervision, FICA taxes, contributions under the Florida Unemployment Compensation Act, insurance, bond, subcontractor's profit and overhead, the furnishing of small tools and miscellaneous equipment used, such as picks, shovels, hand pumps, and similar items.

(2) For all materials used, the Contractor shall receive the actual cost of such materials delivered at the site or previously approved delivery point as established by original receipted bills. No percentage shall be added to this cost.

(3) For special equipment and machinery such as power-driven pumps, concrete mixers, trucks, and tractors, or other equipment, required for the economical performance of the authorized work, the Contractor shall receive payment based on the average local area rental price for each item of equipment and the actual time of its use on the work. No percentage shall be added to this sum.

(4) Records of extra work done under this procedure shall be reviewed at the end of each day by the Contractor or his representative and the Engineer. Duplicate copies of accepted records shall be made and signed by both Contractor or his representative and the Engineer, and one copy retained by each.

Request for payment for approved and duly authorized extra work shall be submitted in the same form as Contract work or in the case of work performed under paragraph (c) (1) above upon a certified statement supported by receipted bills. Such statement shall be submitted for the current Contract payment for the month in which the work was done.

ARTICLE 7.03 DISPUTED WORK

If the Contractor is of the opinion that any work required, necessitated, or ordered violates the terms and provisions of this Contract, he must promptly notify the Engineer, in writing, of his contentions with respect thereto and request a final determination thereof. If the Engineer determines that the work in question is Contract work and not extra work or that the order complained of is proper, he will direct the Contractor to proceed and the Contractor shall promptly comply. In order, however, to reserve his right to claim compensation for such work or damages resulting from such compliance, the Contractor must, within five (5) days after receiving notice of the Engineer's determination and direction, notify the City in writing that the work is being performed or that the determination and direction is being complied with under protest. Failure of the Contractor to notify shall be deemed as a waiver of claim for extra compensation or damages therefor.

Before final acceptance by the City, all matters of dispute must be adjusted to the mutual satisfaction of the parties thereto. Final determinations and decisions, in case any questions shall arise, shall constitute a condition precedent to the right of the Contractor to receive the money therefor until the matter in question has been adjusted.

ARTICLE 7.04 OMITTED WORK

The City may at any time by a written order and without notice to the sureties require the omission of such Contract work as it may find necessary or desirable.

An order for omission of work shall be valid only if signed by the Mayor and the work so ordered must be omitted by the Contractor. The amount by which the Contract price shall be reduced shall be determined as follows:

(a) By such applicable unit prices, if any, as are set forth in the Contract; or

(b) By the appropriate lump sum price set forth in the Contract; or

(c) By the fair and reasonable estimated cost to the City

of such omitted work as determined by the Engineer and approved by the City.

SECTION 8 CONTRACTOR'S EMPLOYEES

ARTICLE 8.01 CHARACTER AND COMPETENCY

The Contractor and his subcontractors shall employ upon all parts of the work herein contracted for only competent, skillful, and trustworthy workers. Should the Engineer at any time give notice, in writing, to the Contractor or his duly authorized representative on the work that any employee in his opinion is incompetent, unfaithful, disorderly, careless, unobservant of instructions, or in any way a detriment to the satisfactory progress of the work, such employee shall immediately be dismissed and not again allowed upon the site.

ARTICLE 8.02 SUPERINTENDENCE

The Contractor shall give his personal supervision to the faithful prosecution of the work and in case of his absence shall have a competent, experienced, and reliable supervisor or superintendent, acceptable to the Engineer on the site who shall follow without delay all instructions of the Engineer in the prosecution and completion of the work and every part thereof, in full authority to supply workers, material, and equipment immediately. He shall keep on hand at all times copies of the Contract Documents.

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES

The Contractor shall, in the performance of the work required to be done under this Contract, employ all workers without discrimination regarding race, creed, color, sex or national origin and must not maintain or provide facilities that are segregated on the basis of race, color, creed or national origin.

ARTICLE 8.04 RATES OF WAGES

On federally assisted projects, the rates of wages to be paid under this Contract shall not be less than the rates of wages set forth in Section 12 of this Agreement.

On other projects, no wage rate determination is included. Florida's Prevailing Wage Law (Section 215.19, Florida Statutes) was repealed effective April 25, 1979.

ARTICLE 8.05 PAYROLL REPORTS

The Contractor and each subcontractor shall, if requested to do so, furnish to the Engineer a duly certified copy of his payroll and also any other information required by the Engineer to satisfy him that the provisions of the law as to the hours of employment and rate of wages are being observed.

Payrolls shall be prepared in accordance with instructions furnished by the City and on approved forms. The Contractor shall not carry on his payroll any persons not employed by him. Subcontractor's employees shall be carried only on the payrolls of the employing subcontractor.

SECTION 9 CONTRACTOR'S DEFAULT

ARTICLE 9.01 CITY'S RIGHT AND NOTICE

It is mutually agreed that: (a) if the Contractor fails to begin work when required to do so, or (b) if at any time during the progress of the work it shall appear to the Engineer that the Contractor is not prosecuting the work with reasonable speed, or is delaying the work unreasonably and unnecessarily, or (c) if the force of workmen or quality or quantity of material furnished are not sufficient to insure completion of the work within the specified time and in accordance with the Specifications hereto attached, or (d) if the Contractor shall fail to make prompt payments for materials or labor or to subcontractors for work performed under the Contract, or (e) if legal proceedings have been instituted by others than the City in such manner as to interfere with the progress of the work and may subject the City to peril of litigation or outside claims of (f) if the Contractor shall be adjudged a bankrupt or make an assignment for the benefit of creditors, or (g) if in any proceeding instituted by or against the Contractor an order shall be made or entered granting an extension of time of payment, composition, adjustment, modification, settlement or satisfaction of his debts or liabilities, or (h) if a receiver or trustee shall be appointed for the Contractor or the Contractor's property, or (i) if the Contract or any part thereof shall be sublet without the consent of the City being first obtained in writing, or (j) if this Contract or any right, monies, or claim thereunder shall be assigned by the Contractor, otherwise than as herein specified, or (k) if the Contractor shall fail in any manner of substance to observe the provisions of this Contract, or (l) if any of the work, machinery, or equipment shall be defective, and shall not be replaced as herein provided, or (m) if the work to be done under this Contract shall be abandoned, then such fact or conditions shall be certified by the Engineer and thereupon the City without prejudice to any other rights or remedies of the City, shall have the right to declare the Contractor in default and so notify the Contractor by a written notice, setting forth the ground or grounds upon which such default is declared and the Contractor must discontinue the work, either as a portion of the work or the whole thereof, as directed.

ARTICLE 9.02 CONTRACTOR'S DUTY UPON DEFAULT

Upon receipt of notice that his Contract is in default, the Contractor shall immediately discontinue all further operations on the work or such part thereof, and shall immediately quit the site or such part thereof, leaving untouched all plant, materials, equipment, tools, and supplies.

ARTICLE 9.03 COMPLETION OF DEFAULTED WORK

The City, after declaring the Contractor in default, may then have the work completed or the defective equipment or machinery replaced or anything else done to complete the work in strict accordance with the Contract Documents by such means and in such manner, by Contract with or without public letting, or otherwise, as it may deem advisable,

utilizing for such purpose without additional cost to the City such of the Contractor's plant, materials, equipment, tools, and supplies remaining on the site, and also such subcontractors as it may deem advisable.

The City shall reimburse all parties, including itself, for the expense of such completion, including liquidated damages, if any, and the cost of reletting. The City shall deduct this expense from monies due or to become due to the Contractor under this Contract, or any part thereof, and in case such expense is more than the sum remaining unpaid of the original contract price, the Contractor and his sureties shall pay the amount of such deficiency to the City.

ARTICLE 9.04 PARTIAL DEFAULT

In case the City shall declare the Contractor in default as to a part of the work only, the Contractor shall discontinue such part, shall continue performing the remainder of the work in strict conformity with the terms of the Contract, and shall in no way hinder or interfere with any other contractor or person whom the City may engage to complete the work as to which the Contractor was declared in default.

SECTION 10 PAYMENTS

ARTICLE 10.01 PRICES

For the Contractor's complete performance of the work, the City will pay and the Contractor agrees to accept, subject to the terms and conditions hereof, the lump sum prices or unit prices in the Contractor's Proposal and the award made therein, plus the amount required to be paid for any extra work ordered under Article 7.02 hereof, less credit for any work omitted pursuant to Article 7.04 hereof. Under unit price items, the number of units actually required to complete the work under the Contract may be more than stated in the Proposal. The Contractor agrees that no claim will be made for any damages or for loss of profits because of a difference between the quantities of the various classes of work assumed and stated in the Proposal Form as a basis for comparing Proposals and the quantities of work actually performed.

The sum as awarded for any lump sum Contract or lump sum Contract Item shall represent payment in full for all of the various classes of work, including materials, equipment, and labor necessary or required to complete, in conformity with the Contract Document, the entire work shown, indicated or specified under the lump sum Contract or lump sum Contract Item.

The amount as awarded as a unit price for any unit price Contract Item shall represent payment in full for all the materials, equipment, and labor necessary to complete, in conformity with the Contract Documents, each unit of work shown, specified, or required under the said unit price Contract Item.

No payment other than the amount as awarded will be made for any class of work included in a lump sum Contract Item or a unit price Contract Item, unless specific provision is

made therefor in the Contract Documents.

ARTICLE 10.02 SUBMISSION OF BID BREAKDOWN

Within fifteen (15) days after the execution of this Contract, the Contractor must submit to the Engineer in duplicate an acceptable breakdown of the lump sums and unit prices bid for items of the Contract, showing the various operations to be performed under the Contract, as described in the progress schedule required under Article 4.02 hereof, and the value of each of such operations, the total of such items to equal the total price bid. The Contractor shall also submit such other information relating to the bid prices as may be required and shall revise the bid breakdown as directed. Thereafter, the breakdown may be used for checking the Contractor's applications for partial payments hereunder but shall not be binding upon the City or the Engineer for any purpose whatsoever.

ARTICLE 10.03 REPORTS, RECORDS AND DATA

The Contractor shall furnish to the Engineer such schedules of quantities and costs, progress schedules, reports, invoices, delivery tickets, estimates, records, and other data as the Engineer may request concerning work performed or to be performed and the materials furnished under the Contract.

ARTICLE 10.04 PAYMENTS BY CONTRACTOR

The Contractor shall pay (a) for all transportation and utility services not later than the 20th day of the calendar month following that in which such services are rendered, (b) for all materials, tools, and equipment delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools, and equipment are incorporated or used, and (c) to each of his subcontractors, not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor on account of the work performed by his subcontractors, to the extent of each subcontractor's interest therein; and proof of such payments or releases therefor shall be submitted to the Engineer upon request.

ARTICLE 10.05 PARTIAL PAYMENTS

On or about the first of each month, the Contractor shall make and certify an estimate, on forms prescribed by the City, of the amount and fair value of the work done, and may apply for partial payment therefor. The Contractor shall revise the estimate as the Engineer may direct. When satisfactory progress has been made, and shows that the value of the work completed since the last payment exceeds one percent (1%) of the total Contract price in amount, the Engineer will issue a certificate that such work has been completed and the value thereof. The City will then issue a voucher to the Contractor in accordance with the following schedule:

FOR CONTRACT AMOUNTS UNDER \$250,000

(A) In the amount of ninety percent (90%) of the value of the work completed as certified until construction is one hundred percent (100%) complete (operational or beneficial occupancy), the withheld amount may be reduced below ten percent (10%), at the Engineer's option, to only that amount necessary to assure completion.

FOR CONTRACT AMOUNTS OVER \$250,000

(A) In the amount of ninety percent (90%) of the value of the work completed as certified until construction is fifty percent (50%) complete.

(B) When the dollar value, as determined by the Engineer, of satisfactorily completed work in place is greater than fifty percent (50%) of the original contract price, vouchers for partial payment will be issued by the City to the Contractor in the amount of one hundred percent (100%) of the value of the work, above 50%, completed as certified for that payment period.

(C) If the Contractor has performed satisfactorily and the work is substantially complete (operational or beneficial occupancy) the withheld amount may be reduced, at the Engineer's option, to only that amount necessary to assure completion.

In addition to the Conditions set forth in (A), (B), and (C) above, payments will always be less any sums that may be retained or deducted by the City under the terms of any of the contract documents and less any sums that may be retained to cover monetary guarantees for equipment, materials or progress performance.

Payment on estimates made on or about the first of the month may be expected on or about the 20th of the month.

Unless specified otherwise in the Contract Items, the delivered cost of equipment and nonperishable materials suitably stored at the site of the work and tested for adequacy may be included in the Contractor's application for partial payment provided, however, that the Contractor shall furnish evidence satisfactory to the City that the Contractor is the unconditional owner and in possession of such materials or equipment. The amount to be paid will be 90 percent of the invoice cost to the Contractor which cost shall be supported by receipted bills within 30 days of the date of payment by the City to the Contractor. Such payment shall not relieve the Contractor from full responsibility for completion of the work and for protection of such materials and equipment until incorporated in the work in a permanent manner as required by the Contract Documents.

Before any payment will be made under this Contract, the Contractor and every subcontractor, if required, shall deliver to the Engineer a written, verified statement, in satisfactory form, showing in detail all amounts then due and unpaid by such Contractor or subcontractor to all laborers, workmen, and mechanics, employed by him under the Contract for the performance of the work at the site thereof, for daily or weekly wages, or to other persons for materials, equipment, or supplies delivered at the site of the work during the period covered by the payment under consideration.

ARTICLE 10.06 FINAL PAYMENT

Under determination of satisfactory completion of the work under this Contract as provided in Article 4.07 hereof, the Engineer will prepare the final estimate showing the value of the completed work. This estimate will be prepared within 30 days after the date of completion or as soon thereafter as the necessary measurements and computations can be made.

All prior certificates and estimates, being approximate only, are subject to correction in the final estimate and payment.

When the final estimate has been prepared and certified by Engineer, he will submit to the Mayor and City Council the final certificate stating that the work has been completed and the amount based on the final estimate remaining due to the Contractor. The City will then accept the work as fully completed and will, not later than 30 days after the final acceptance, as defined in Article 1.02, of the work done under this Contract, pay the Contractor the entire amount so found due thereunder after deduction of all previous payments and all percentages and amounts to be kept and retained under provisions of this Contract; provided, however, and it is understood and agreed that, as a precedent to receiving final payment, the Contractor shall submit to the City a sworn affidavit that all bills for labor, service, materials, and subcontractors have been paid and that there are no suits pending in connection with this work. The City, at its option, may permit the Contractor to execute a separate surety bond in a form satisfactory to the City. The surety bond shall be in the full amount of the suit or suits.

Neither the final payment nor any part of the retained percentage shall be paid until the Contractor, if required, shall furnish the City with a complete release from any should remain unsatisfied after all payments are made, the Contractor shall refund to the City all monies which the City may be compelled to pay in discharging such claim, including incidental costs and attorney's fees.

ARTICLE 10.07 ACCEPTANCE OF FINAL PAYMENT

The acceptance by the Contractor, or by anyone claiming by or through him, of the final payment shall operate as and shall be a release to the City and every officer and agent thereof from any and all claims and liability to the Contractor for anything done or furnished in connection with the work or project and for any act or neglect of the Contractor or of any others relating to or affecting the work. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance Bond.

SECTION 11 MISCELLANEOUS PROVISIONS

ARTICLE 11.01 CONTRACTOR'S WARRANTIES

In consideration of, and to induce the award of this contract to him, the Contractor represents and warrants:

- (a) That he is not in arrears to the City upon debt or contract, and he is not a defaulter, as surety, contractor, or otherwise.
- (b) That he is financially solvent and sufficiently experienced and competent to perform the work.
- (c) That the work can be performed as called for by the Contract Documents.
- (d) That the facts stated in his proposal and the information given by him are true and correct in all respects.
- (e) That he is fully informed regarding all the conditions affecting the work to be done and labor and materials to be

furnished for the completion of this Contract, and that his information was secured by personal investigation and research.

ARTICLE 11.02 PATENTED DEVICES, MATERIAL AND PROCESSES

It is mutually understood and agreed that Contract prices include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. Whenever the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall indemnify and save harmless the City, its officers, agents and employees from any and all claims for infringement by reason of the use of any such patented design, device, tool, material, equipment, or process, to be performed under the Contract, and shall indemnify the said City, its officers, agents, and employees for any costs, expenses, and damages which may be incurred by reason of such infringement at any time during the prosecution or after completion of the work.

ARTICLE 11.03 SUITS AT LAW

In case any action at law or suit in equity may or shall be brought against the City or any of its officers, agents, or employees for or on account of the failure, omission, or neglect of the Contractor or his subcontractors, employees, or agents, to do or perform any of the covenants, acts, matters, or things by this Contract undertaken to be done or performed by the Contractor or his subcontractors, employees, or agents, or from any injuries done to property or persons and caused by the negligence or alleged negligence of the Contractor or his subcontractors, employees, or agents, or in any other manner arising out of the performance of this Contract, then the Contractor shall immediately assume and take charge of the defense of such actions or suits in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor, and the Contractor shall also indemnify and save harmless the City, its officers, agents, and employees from any and all loss, cost or damage whatever arising out of such actions or suits, in like manner and to all intents and purposes as if said actions or suits have been brought directly against the Contractor.

The Contractor shall and does hereby assume all liability for and agrees to indemnify the City or its Engineer against any or all loss, costs, damages, and liability for any or by reason of any lien, claims or demands, either for materials purchased or for work performed by laborers, mechanics, and others and from any damages, costs, actions, or causes of action and judgement arising from injuries sustained by mechanics, laborers, or other persons by reason of accidents or otherwise, whether caused by the carelessness or inefficiency or neglect of said Contractor, his subcontractors, agents, employees, workmen or otherwise.

ARTICLE 11.04 CLAIMS FOR DAMAGES

If the Contractor shall claim compensation for any damage sustained, other than for extra or disputed work covered by Article 7.02 and 7.03 hereof, by reason of any act or omission of the City, its agents, or any persons, he shall, within five days after sustaining such damage, make and

deliver to the Engineer a written statement of the nature of the damage sustained and of the basis of the claim against the City. On or before the 15th of the month succeeding that in which any damage shall have been sustained, the Contractor shall make and deliver to the Engineer an itemized statement of the details and amounts of such damage, duly verified by the Contractor. Unless such statements shall be made delivered within the times aforesaid, it is stipulated that and all claims for such compensation shall be forfeited and invalidated, and the Contractor shall not be entitled to payment on account of such claims.

ARTICLE 11.05 NO CLAIMS AGAINST INDIVIDUALS

No claim whatsoever shall be made by the Contractor against any officer, agent, employee of the City for, or on account of, anything done or omitted to be done in connection with this Contract.

ARTICLE 11.06 LIABILITY UNAFFECTED

Nothing herein contained shall in any manner create any liability against the City on behalf of any claim for labor, services, or materials, or of subcontractors, and nothing herein contained shall affect the liability of the Contractor or his sureties to the City or to any workmen or materialsmen upon bond given in connection with this Contract.

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

Whenever there appears in this Agreement, or in the other Contract Documents made a part hereof, an indemnification provision within the purview of Chapter 725.06, Laws of Florida, the monetary limitation on the extent of the indemnification under each such provision shall be One Million Dollars or a sum equal to the total Contract price, whichever shall be the greater.

ARTICLE 11.08 UNLAWFUL PROVISIONS DEEMED STRICKEN

If this contract contains any unlawful provisions not an essential part of the Contract and which shall not appear to have a controlling or material inducement to the making thereof, such provisions shall be deemed of no effect and shall, upon notice by either party, be deemed stricken from the Contract without affecting the binding force of the remainder.

ARTICLE 11.09 LEGAL PROVISIONS DEEMED INCLUDED

Each and every provision of any law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein and if, through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon application of either party the Contract shall forthwith be physically amended to make such insertion.

ARTICLE 11.10 DEATH OR INCOMPETENCY OF CONTRACTOR

In the event of death or legal incompetency of a Contractor who shall be an individual or surviving member of a contracting firm, such death or adjudication of incompetency

shall not terminate the Contract, but shall act as default hereunder to the effect provided in Article 9.01 hereof and the estate of the Contractor and his surety shall remain liable hereunder to the same extent as though the Contractor had lived. Notice of default, as provided in Article 9.01 hereof, shall not be required to be given in the event of such death or adjudication of incompetency.

ARTICLE 11.11 NUMBER AND GENDER OF WORDS

Whenever the context so admits or requires, all references herein in one number shall be deemed extended to and including the other number, whether singular or plural, and the use of any gender shall be applicable to all genders.

ARTICLE 11.12 ACCESS TO RECORDS

Representatives of Federal Agencies, if applicable, and the State of Florida shall have access to the work whenever it is in preparation of progress. On federally assisted projects the Federal Agency, the Comptroller General of the United States, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcription thereof.

**SECTION 12
LABOR STANDARDS**

ARTICLE 12.01 LABOR STANDARDS

The Contractor shall comply with all of the regulations set forth in "Labor Standards Provisions for Federally Assisted Construction Contracts", which may be attached, and any applicable Florida Statutes.

ARTICLE 12.02 NOTICE TO LABOR UNIONS

If required, the Contractor shall provide Labor Unions and other organizations of workers, and shall post, in a conspicuous place available to employees or applicants for employment, a completed copy of the form entitled "Notice to Labor Unions or Other Organizations of Workers" attached to and made a part of this Agreement.

ARTICLE 12.03 SAFETY AND HEALTH REGULATIONS

The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91- 596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54). Nothing in these Acts shall be construed to supersede or in any manner affect any worker's compensation law or statutory rights, duties, or liabilities of employers and employees under any law with respect to injuries, diseases, or death of employees arising out of, or in the course of, employment.

ARTICLE 12.04 EEO AFFIRMATIVE ACTION REQUIREMENTS

The Contractor understands and agrees to be bound by the equal opportunity requirements of Federal regulations which shall be applicable throughout the performance of work under this Contract. The Contractor also agrees to similarly

bind contractually each subcontractor. In policies, the Contractor agrees to engage in Affirmative Action directed at promoting and ensuring equal employment opportunity in the work force used under the Contract (and the Contractor agrees to require contractually the same effort of all subcontractors whose subcontractors exceed \$100,000). The Contractor understands and agrees that "Affirmative Action" as used herein shall constitute a good faith effort to achieve and maintain minority employment in each trade in the on-site work force used on the Contract.

ARTICLE 12.05 PREVAILING RATES OF WAGES

Florida's prevailing wage law was repealed effective April 25, 1979.

For Federally assisted projects, appropriate prevailing wage rate determinations are indicated on pages beginning with WR-1.

* * * * *

IN WITNESS THEREOF, the parties have hereunto set their hands and seals, and such of them as are corporation have caused these present to be signed by their duly authorized officers.

CITY OF TAMPA, FLORIDA

Jane Castor, Mayor
(SEAL)

ATTEST:

City Clerk

Approved as to Form:
The execution of this document was authorized
by Resolution No. _____

Justin R. Vaske, Assistant City Attorney

Contractor

By: _____
(SEAL)

Title:

ATTEST:

Witness

TAMPA AGREEMENT (ACKNOWLEDGMENT OF PRINCIPAL)

STATE OF _____)
) SS:
COUNTY OF _____)

For a Corporation:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ of _____, 20__ by _____ of _____, a _____ corporation, on behalf of the corporation. He/she is ____ personally known or has ____ produced _____ as identification.

Notary

My Commission Expires:

For an Individual:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ of _____, 20__ by _____ who is ____ personally known to me or has ____ produced _____ as identification.

Notary

My Commission Expires:

For a Firm:

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ of _____, 20__ by _____ who signed on behalf of the said firm. He/she is ____ personally known or has ____ produced _____ as identification.

Notary

My Commission Expires:

PUBLIC CONSTRUCTION BOND

Bond No. (enter bond number) _____

Name of Contractor: _____

Principal Business Address of Contractor: _____

Telephone Number of Contractor: _____

Name of Surety (if more than one list each): _____

Principal Business Address of Surety: _____

Telephone Number of Surety: _____

Owner is The City of Tampa, Florida

Principal Business Address of Owner: _____ 306 E Jackson St, Tampa, FL 33602

_____ Contract Administration Department (280A4N)

Telephone Number of Owner: _____ 813/274-8456

Contract Number Assigned by City to contract which is the subject of this bond: _____

Legal Description or Address of Property Improved or Contract Number is: _____

General Description of Work and Services: _____

KNOW ALL MEN BY THESE PRESENTS That we, _____

(Name of Contractor)

as Principal, hereinafter called CONTRACTOR, of the State of _____, and

(Name of Surety)

a corporation organized and existing under and by virtue of the laws of the State of _____, and regularly authorized to do business in the State of Florida, as SURETY, are held and firmly bound unto the City of Tampa, a municipal corporation organized and existing under the laws of the State of Florida, hereinafter called Owner, in the penal sum of _____ Dollars and _____ Cents (\$ _____), lawful money of the United States of America, for the payment whereof well and truly to be made, we bind ourselves, our heirs, executors, and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the contract dated _____, _____, 20____, between Principal and Owner for construction of _____, the contract being made a part of this bond by reference, in the time and in the manner prescribed in the contract; and
2. Promptly makes payments to all claimants, as defined in Section 255.05(1) (Section 713.01), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the contract; and
3. Pays Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and
4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.
5. Contractor and Surety acknowledge that the Work for which this bond has been issued may be one of several such contract documents for a group of projects. This bond does not secure covenants to pay for or to perform design services survey or program management services. The Owner/Obligee is expected to reasonably account for damages that are caused to Owner with respect to Principal's (Contractor's) default in performance of the scope of the Work incorporated by reference into the bond, and notwithstanding any contractual or common law remedy permitted to Owner as against Contractor, the obligation of Surety for any damages under this bond shall be determined by the cost of completion of the Work less the contract balance unpaid upon default of Contractor for the Work plus liquidated damages at the rate of \$500.00 per day for delays by the Contractor and/or Surety in reaching substantial completion.
6. The notice requirements for claimants and conditions for entitlement to payment set forth in Section 255.05, Fla. Stat. and the limitations period to actions upon Section 255.05, Fla. Stat. bonds apply to claimants seeking payment from surety under this bond. Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05, Florida Statutes.
7. The Surety, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the contract documents or other Work to be performed hereunder, or the specifications referred to therein shall in any way affect its obligations under this bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to Work or to the specifications.

8. The above SURETY states that it has read all of the Contract Documents made by the CONTRACTOR with the CITY, hereto attached, and the terms and conditions of the contract and work, and is familiar therewith and in particular those portions of the Agreement concerning the guaranty of such CONTRACTOR for a period of one year following the date of the final acceptance of the completed work under the Contract by the CITY, all of which this BOND includes.

DATED ON _____, 20__

(Name of Principal)

(Name of Surety)

(Principal Business Address)

(Surety Address)

By _____

By _____
(As Attorney in Fact)*

Title _____

Telephone Number of Surety

Telephone Number of Principal

Approved as to legal sufficiency:

Countersignature:

By _____
Assistant City Attorney

(Name of Local Agency)

(Address of Resident Agent)

By _____

Title _____

Telephone Number of Local Agency

*(As Attorney in Fact) attach Power of Attorney and Current Certificate with Original Signature

SPECIFICATIONS GENERAL PROVISIONS

SECTION 1 SCOPE AND INTENT

G-1.01 DESCRIPTION

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

G-1.02 WORK INCLUDED

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

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

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

G-1.03 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

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

The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself

fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.

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

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

Where public utility installations or structures owned or controlled by the City or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction or such work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided for in Article 7.02 of the Agreement.

The Contractor shall, at all times in performance of the work, employ approved methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage or destruction of public utility installations and structures; and shall, at all times in the performance of the work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.

All City and other governmental utility departments and other owners of public utilities, which may be affected by the work, will be informed in writing by the Engineer within two weeks after the execution of the Contract or Contracts covering the work. Such notice will set out, in general, and direct attention to, the responsibilities of the City and other governmental

utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Plans and Specifications covering the work under such Contract or Contracts.

In addition to the general notice given by the Engineer, the Contractor shall give written notice to all City and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight (48) hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Underground Utility Notification Center for Excavators (Call Candy)".

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

SECTION 2 PLANS AND SPECIFICATIONS

G-2.01 PLANS

The Plans referred to in the Contract Documents bear the general project name and number as shown in the Notice To Bidders.

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

G-2.02 COPIES FURNISHED TO CONTRACTOR

After the Contract has been executed, the Contractor will be furnished with five sets of paper prints, the same size as the original drawings, of each sheet of the Plans and five copies of the Specifications. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for his work.

G-2.03 SUPPLEMENTARY DRAWINGS

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

The Supplementary Drawings shall be binding upon the Contractor with the same force as the Plans. Where such Supplementary Drawings require either less or more than the estimated quantities of work, credit to the City or compensation therefor to the Contractor shall be subject to the terms of the Agreement.

G-2.04 CONTRACTOR TO CHECK PLANS AND DATA

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

G-2.05 SPECIFICATIONS

The specifications consist of four parts, the General Provisions, the Technical Specifications, the Special Provisions and the Contract Items. The General Provisions and Technical Specifications contain general requirements which govern the work. The Special Provisions and the Contract Items modify and supplement these by detailed requirements for the work and shall always govern, whenever there appears to be conflict.

G-2.06 INTENT

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

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

SECTION 3 WORKING DRAWINGS

G-3.01 SCOPE

The Contractor shall promptly prepare and submit layout, detail and shop drawings to insure proper construction, assembly, and installation of the work using those materials and methods as hereafter specified under the Technical Specifications, Special Provisions and Contract Items.

These drawings shall accurately and distinctly present the following:

- a. All working and erection dimensions.
- b. Arrangements and sectional views.
- c. Necessary details, including complete information for making connections between work under this Contract and work under other Contracts.
- d. Kinds of materials and finishes.
- e. Parts listed and description thereof.

Drawings for mechanical equipment shall present, where applicable, such data as dimensions, weight and performance characteristics. These data shall show conformance with the performance characteristics and other criteria incorporated in the Plans and Specifications.

Each drawing shall be dated and shall contain the name of the project, Division number and description, the technical specifications section number, names of equipment or materials and the location at which the equipment or materials are to be installed. Location shall mean both physical location and location relative to other connected or attached material. The Engineer will return unchecked any submittal which does not contain complete data on the work and full information on related matters.

Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.

The Contractor shall review all working drawing submittals before transmitting them to the Engineer to determine that they comply with requirements of the Specifications. Drawings which are incomplete or are not in compliance with the Contract Documents shall not be submitted for processing by the Engineer. The Contractor shall place his stamp of approval on all working drawings submitted to the Engineer to indicate compliance with the above.

G-3.02 APPROVAL

If the working drawings show departures from the Contract requirements, the Contractor shall make specific mention thereof in his letter of submittal; otherwise approval of such submittals shall not constitute approval of the departure. Approval of the drawings shall constitute approval of the subject matter thereof only and not of any structure, material, equipment, or apparatus shown or indicated.

The approval of drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the Contract and not indicated on the drawings. No work called for by working drawings shall be done until such drawings have been approved by the Engineer.

The procedure in seeking approval of the working drawings shall be as follows:

1. The Contractor shall submit four complete sets of drawings

and other descriptive data together with one copy of a letter of transmittal to the Engineer for approval. The letter of transmittal shall contain the name of the project, contract number, technical specifications section number, the name of the Contractor, a list of drawings with numbers and titles, and any other pertinent information.

2. Drawings or descriptive data will be stamped "Approved", "Approved Subject to Corrections Marked", or "Examined and Returned for Correction" and one copy with a letter of transmittal will be returned to the Contractor.

3. If a drawing or other data is stamped "Approved", the Contractor shall insert the date of approval on five additional copies of the document and transmit the five copies to the Engineer together with one copy of a letter of transmittal containing substantially the same information as described in Instruction 1. above.

4. If a drawing or other data is stamped "Approved Subject to Corrections Marked", the Contractor shall make the corrections indicated and proceed as in Instruction 3., above.

5. If a drawing or data is stamped "Examined and Returned for Correction", the Contractor shall make the necessary corrections and resubmit the documents as set forth in Instruction 1., above. The letter of transmittal shall indicate that this is a resubmittal.

The Contractor shall revise and resubmit the working drawings as required by the Engineer, until approval thereof is obtained.

SECTION 4 MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS

All materials, appliances, and types or methods of construction shall be in accordance with the Specifications and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

All materials and equipment shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert personnel, and intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified, or required will not be accepted.

The quality of Workmanship and Materials entering into the work under this Contract shall conform to the requirements of the pertinent sections, clauses, paragraphs, and sentences, both directly and indirectly applicable thereto, of that part of the Technical Specifications, whether or not direct reference to such occurs in the Contract Items.

Equipment and appurtenances shall be designed in conformity with ANSI, ASME, IEEE, NEMA and other

generally accepted standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers, and the like, shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

Equipment shall be of the approximate dimensions as indicated on the Plans or as specified, shall fit the spaces shown on the Plans with adequate clearances, and shall be capable of being handled through openings provided in the structure for this purpose. The equipment shall be of such design that piping and electrical connections, ductwork, and auxiliary equipment can be assembled and installed without causing major revisions to the location or arrangement of any of the facilities.

Machinery parts shall conform exactly to the dimensions shown on the working drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of a uniform type. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI and applicable state and local codes.

G-4.02 MANUFACTURER

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

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

Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.

G-4.03 REFERENCE TO STANDARDS

Whenever reference is made to the furnishing of materials or

testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for proposals, even though reference has been made to an earlier standard, and such standards are made a part hereof to the extent which is indicated or intended.

Reference to a technical society, organization or body may be made in the Specifications by abbreviations, in accordance with the following list:

AASHTO for American Association of State Highway and Transportation Officials (formerly AASHO)
ACI for American Concrete Institute
AGMA for American Gear Manufacturer's Association
AFBMA for Anti-Friction Bearing Manufacturer's Association
AISC for American Institute of Steel Construction
AISI for American Iron and Steel Institute
ANSI for American National Standards Institute
ASCE for American Society of Civil Engineers
ASTM for American Society for Testing and Materials
ASME for American Society of Mechanical Engineers
AWS for American Welding Society
AWWA for American Water Works Association
AWPA for American Wood Preservers Association
CEMA for Conveyor Equipment Manufacturers Association
CIPRA for Cast Iron Pipe Research Association
IEEE for Institute of Electrical and Electronic Engineers
IPCEA for Insulated Power Cable Engineers Association
NEC for National Electrical Code
NEMA for National Electrical Manufacturers Association
SAE for Society of Automotive Engineers
SHBI for Steel Heating Boiler Institute
Fed.Spec. for Federal Specifications
Navy Spec. for Navy Department Specifications
U.L.,Inc. for Underwriters' Laboratories, Inc.

When no reference is made to a code, standard or specification, the Standard Specifications of the ANSI, the ASME, the ASTM, the IEEE, or the NEMA shall govern.

G-4.04 SAMPLES

The Contractor shall, when required, submit to the Engineer for approval typical samples of materials and equipment. The samples shall be properly identified by tags and shall be submitted sufficiently in advance of the time when they are to be incorporated into the work, so that rejections thereof will not cause delay. A letter of transmittal, in duplicate, from the Contractor requesting approval must accompany all such samples.

G-4.05 EQUIVALENT QUALITY

Whenever, in the Contract Documents, an article, material, apparatus, equipment, or process is called for by trade name or by the name of a patentee, manufacturer, or dealer or by reference to catalogs of a manufacturer or dealer, it shall be understood as intending to mean and specify the article, material, apparatus, equipment or process designated, or any

equal thereto in quality, finish, design, efficiency, and durability and equally serviceable for the purposes for which it is intended.

Whenever material or equipment is submitted for approval as being equal to that specified, the decision as to whether or not such material or equipment is equal to that specified shall be made by the Engineer.

Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the designated material or equipment.

Neither the approval by the Engineer of alternate material or equipment as being equivalent to that specified nor the furnishing of the material or equipment specified, shall in any way relieve the Contractor of responsibility for failure of the material or equipment, due to faulty design, material, or workmanship, to perform the functions required of them by the Specifications.

G-4.06 DELIVERY

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

G-4.07 CARE AND PROTECTION

The Contractor shall be solely responsible for properly storing and protecting all materials, equipment, and work furnished under the Contract from the time such materials and equipment are delivered at the site of the work until final acceptance thereof. He shall, at all times, take necessary precautions to prevent injury or damage by water, freezing, or by inclemencies of the weather to such materials, equipment and work. All injury or damage to materials, equipment, or work resulting from any cause whatsoever shall be made good by the Contractor.

The Engineer shall, in all cases, determine the portion of the site to be used by the Contractor for storage, plant or for other purposes. If, however, it becomes necessary to remove and restack materials to avoid impeding the progress of any part of the work or interference with the work to be done by any other Contractor, the Contractor shall remove and restack such materials at his own expense.

G-4.08 TOOLS AND ACCESSORIES

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

Spare parts shall be furnished as specified.

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

G-4.09 INSTALLATION OF EQUIPMENT

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

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

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

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

G-4.10 OPERATING INSTRUCTIONS

The Contractor, through qualified individuals, shall adequately instruct designated employees of the City in the operation and care of all equipment installed hereunder, except for equipment that may be furnished by the City.

The Contractor shall also furnish and deliver to the Engineer three complete sets for permanent files, identified in accordance with Subsection G-3.01 hereof, of instructions, technical bulletins and any other printed matter, such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair, of the equipment installed and the ordering of spare parts, except for equipment that may be furnished by the City.

In addition to the above three copies, the Contractor shall furnish any additional copies that may be required for use during construction and start-up operations.

G-4.11 SERVICE OF MANUFACTURER'S ENGINEER

The Contract prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in

permanent operation by the City, such engineer or superintendent shall make all adjustments and tests required by the Engineer to provide that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the City in the proper operation and maintenance of such equipment.

SECTION 5 INSPECTION AND TESTING

G-5.01 GENERAL

The Contractor's attention is hereby directed to Article 3.03 of the Agreement.

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

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

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

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

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

G-5.02 COSTS

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

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

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the City for compliance. The Contractor shall reimburse the City for the expenditures incurred in making

such tests on materials and equipment which are rejected for noncompliance.

G-5.03 INSPECTIONS OF MATERIALS

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

G-5.04 CERTIFICATE OF MANUFACTURE

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

G-5.05 SHOP TESTS OF OPERATING EQUIPMENT

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

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

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

G-5.06 PRELIMINARY FIELD TESTS

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

TEMPORARY STRUCTURES

G-5.07 FINAL FIELD TESTS

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

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment, and instruments necessary for all acceptance tests, at no additional cost to the City.

G-5.08 FAILURE OF TESTS

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

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

The City agrees to obtain other equipment within a reasonable time and the Contractor agrees that the City may use the equipment furnished by him without rental or other charges until the new equipment is obtained.

Materials or work in place that fails to pass acceptability tests shall be retested at the direction of the construction engineer all such retests shall be at the Contractor's expense. The rates charged shall be in accordance with the Department of Public Works current annual inspection contract which is available for inspection at the offices of the Department of Public Works.

G-5.09 FINAL INSPECTION

The procedures for final inspection shall be in accordance with the provisions of Article 4.07 of the Agreement. During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all the requirements set forth and the Engineer has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

SECTION 6

G-6.01 GENERAL

All false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the work and which are not herein described or specified in detail, must be furnished, maintained and removed by the Contractor, and he shall be responsible for the safety and efficiency of such works and for any damages that may result from their failure or from their improper construction, maintenance, or operation.

G-6.02 PUBLIC ACCESS

At all points in the work where public access to any building, house, place of business, public road, or sidewalk would be obstructed by any action of the Contractor in executing the work required by this Contract, the Contractor shall provide such temporary structure, bridges or roadway as may be necessary to maintain public access at all times. At least one lane for vehicular traffic shall be maintained in streets in which the Contractor is working. Street closure permits are required from the Department of Public Works.

The Contractor shall provide suitable temporary bridges, as directed by the Engineer, at street intersections when necessary for the maintenance of vehicular and pedestrian traffic.

Prior to temporarily cutting of access to driveways and garages, the Contractor shall give twelve (12) hours notice to affected property owners. Interruptions to use of private driveways shall be kept to a minimum.

G-6.03 CONTRACTOR'S FIELD OFFICE

The Contractor shall erect, furnish and maintain a field office with a telephone at the site during the entire period of construction. He or an authorized agent shall be present at this office at all times while his work is in progress. Readily accessible copies of both the Contract Documents and the latest approved working drawings shall be kept at this field office.

G-6.04 TEMPORARY FENCE

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

G-6.05 RESPONSIBILITY FOR TEMPORARY STRUCTURES

In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance, or operation and will indemnify and save harmless the City from

all claims, suits or actions and damages or costs of every description arising by reason of failure to comply with the above provisions.

SECTION 7 TEMPORARY SERVICES

G-7.01 WATER

The Contractor shall provide the necessary water supply at his own expense. He shall, if necessary, provide and lay necessary waterlines from existing mains to the place of using, shall secure all necessary permits and pay for all taps to water mains or hydrants and for all water used at the established rates.

G-7.02 LIGHT AND POWER

The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution and inspection of the work. If, in the opinion of the Engineer, these facilities are inadequate, the Contractor will not be permitted to proceed with any portion of the work affected thereby.

G-7.03 SANITARY REGULATIONS

The Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining property and shall discharge any employee who violates this rule.

Ample washrooms and toilet facilities and a drinking water supply shall be furnished and maintained in strict conformity with the law by the Contractor for use by his employees.

G-7.04 ACCIDENT PREVENTION

Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall comply with the U. S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Section 107 of the Contract Work. Hours and Safety Standards Act (PL 91-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act.

G-7.05 FIRST AID

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

G-7.06 HEATING

The Contractor shall provide temporary heat, at his own expense, whenever required on account of work being carried on during cold weather and to prevent freezing of water pipes and other damage to the work.

SECTION 8

LINES AND GRADES

G-8.01 GENERAL

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

The Engineer will establish bench marks and base line controlling points. Reference remarks for lines and grades as the work progresses will be located to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

G-8.02 SURVEYS

The Contractor shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the Engineer for setting reference marks. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review of the Engineer.

The Contractor shall keep the Engineer informed a reasonable time in advance as to his need for line and grade reference marks, in order that they may be furnished and all necessary measurements made for record and payment with the minimum of inconvenience to the Engineer or of delay to the Contractor.

It is the intention not to delay the work for the establishment of reference marks but, when necessary, working operations shall be suspended for such reasonable time as the Engineer may require for this purpose.

G-8.03 SAFEGUARDING MARKS

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

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

G-8.04 DATUM PLANE

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

Corps of Engineers.

SECTION 9 ADJACENT STRUCTURES AND LANDSCAPING

G-9.01 RESPONSIBILITY

The responsibility for removal, replacement, relocation, repair, rebuilding or protection of all public utility installations, including poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes, sewers, traffic control and fire alarm signal circuit installations and other appurtenances and facilities shall be in accordance with G-1.02 and G-1.03.

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation, and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payment will be made therefor. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the Engineer, removal or relocation and reconstruction is necessary to avoid interference with the work, payment therefor will be made as provided for extra work in Article 7.02 of the Agreement.

G-9.02 PROTECTION OF TREES

All trees and shrubs shall be adequately protected by the Contractor with boxes or otherwise and, within the City of Tampa, in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season, and at the sole expense of the Contractor.

Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.

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

G-9.03 LAWN AREAS

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

manner described in the Technical Specifications section.

G-9.04 RESTORATION OF FENCES

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

SECTION 10 PROTECTION OF WORK AND PUBLIC

G-10.01 TRAFFIC REGULATIONS

The Contractor shall arrange his work to comply with Article G-6.02. The work shall be done with the least possible inconvenience to the public and to that end the work may be confined by the Engineer to one block at a time.

G-10.02 BARRIERS AND LIGHTS

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers, and lights, as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public. Such barriers and signs shall be constructed to State of Florida Department of Transportation standards and placed as recommended by the Traffic Division of the City's Department of Public Works.

No open fires will be permitted.

G-10.03 SMOKE PREVENTIONS

The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required.

G-10.04 NOISE

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

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

**SECTION 13
CLEANING**

G-10.05 ACCESS TO PUBLIC SERVICES

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

G-10.06 DUST PREVENTION

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the streets sprinkled with water at all times.

G-10.07 PRIVATE PROPERTY

The Contractor shall so conduct the work that no equipment, material, or debris will be placed or allowed to fall upon private property in the vicinity of the work unless he shall have obtained the owner's written consent thereto and shall have shown this consent to the Engineer.

**SECTION 11
SLEEVES AND INSERTS**

G-11.01 COORDINATION

When the Contract requires the placing of conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors, and other like work in floors, roofs, or walls of buildings and structures, they shall be promptly installed in conformity with the construction program. The Contractor who erects the floors, roofs, and walls shall facilitate such work by fully cooperating with the Contractors responsible for installing such appurtenances. The Contractor responsible for installing such appurtenances shall arrange the work in strict conformity with the construction schedule and avoid interference with the work of other contractors.

G-11.02 OPENINGS TO BE PROVIDED

In the event timely delivery of sleeves and other materials cannot be made and to avoid delay, the affected Contractor may arrange to have boxes or other forms set at the locations where the appurtenances are to pass through or into the floors, roofs, walls, or other work. Upon the subsequent installation of these appurtenances, the Contractor erecting the structure shall fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in shall be borne by the Contractor or Contractors required to furnish the sleeves and inserts. Formed openings and later installation of sleeves will not be permitted at locations subject to hydrostatic pressure.

**SECTION 12
CUTTING AND PATCHING**

G-12.01 GENERAL

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

G-13.01 DURING CONSTRUCTION

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

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

G-13.02 FINAL CLEANING

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

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

**SECTION 14
MISCELLANEOUS**

G-14.01 PROTECTION AGAINST SILTATION AND BANK EROSION

The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed watercourses and drainage ditches.

G-14.02 EXISTING FACILITIES

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

G-14.03 USE OF CHEMICALS

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

SPECIFIC PROVISIONS

SP-1 Scope and Contractor Qualifications

The Work included under these Contract Documents includes, but is not limited to the following:

Furnishing all labor, materials, equipment, services and incidentals for the improvements to the existing Ferric Sulfate Tank No. 2, Sulfuric Acid Tank No. 1 and associated containment areas, as shown on the Drawings and specified herein. Work consists of, but not limited the following: exterior tank coating and surface preparation for both tanks, Ferric Sulfate Tank No.2 repairs, interior surface preparation and coating of Sulfuric Acid Tank No. 1, repair and coating of ferric sulfate containment, repair and coating of sulfuric acid containment, surface preparation and coating of exteriors of containment areas, replacement of select sulfuric acid containment canopy roof panels, installation of three new eyewash stations, upgrade of 3 existing eyewash stations, installation of two new level sensors, installation of two chemical fill stations, installation of two chemical fill panels, installation of air piping, relocation of an air compressor, and miscellaneous installation and piping. Work also includes general cleanup, start-up and testing.

The CONTRACTOR must conform to the experience and documentation requirements spelled out in the Instructions to Bidders, I-2.02. Additionally, the CONTRACTOR must be able to demonstrate the ability and experience to construct, install, and operate the work specifically described in these Specifications and as shown on the Plans, all as required for a complete functional installation, and as described and directed by the ENGINEER.

SP-2 Permits and Authorizations

The CONTRACTOR shall obtain any required City building permits and shall obtain other permits, licenses and authorizations required for a completed project. The CONTRACTOR is responsible for complying with all licenses, regulations, ordinances, conditions, and permits of the various authorities having jurisdiction over the work.

City building permit fees will be paid by the CITY.

The CONTRACTOR is responsible to schedule and coordinate with the CITY all required inspections and tests for all phases of work to obtain final approval.

The CITY shall be responsible for obtaining any required permits or exemptions from federal, state, regional, and local regulatory agencies.

SP-3 Environmental Protection

The CONTRACTOR will be held liable for the violation of any and all environmental regulations. Violation citations carry civil penalties and in the event of willful violation, criminal penalties. Refer also to Tampa Agreement Article 3.09.

SP-4 Construction Start

Construction shall not begin prior to receipt by the CITY of the required permits. If issuance of the Notice to Proceed is delayed due to permit acquisition, the contract time will be extended to suit, but no extra payment will be made to the CONTRACTOR. Refer also to Tampa Agreement Article 4.01.

SP-5 Coordination and Cooperation

In performing work under this Contract, the CONTRACTOR shall coordinate work with that of any adjacent contractors for the CITY, and others, and cooperate with them in every reasonable way, to the end that there shall be the minimum practicable interference with their operations.

SP-7 Material and Equipment Approval

The CONTRACTOR shall not enter into any subcontracts, or place any order, for the furnishing of any material or equipment until he has received the ENGINEER's written approval of the material and equipment. After the CONTRACTOR has received approval of the ENGINEER, procurement shall commence.

SP-8 Working Hours

Normal working hours for this project will be from 7:30 am to 4:00 pm, Monday through Friday. If certain phases of the project require work outside of the normal hours, a minimum of 7-days notice must be provided to allow scheduling of CITY inspectors.

SP-10 Salvage

All existing pipe, appurtenances and equipment removed by the CONTRACTOR shall become the property of the CONTRACTOR and shall be removed from the site of the work to the CONTRACTOR's own place of disposal.

SP-11 Sequence of Operations

The CONTRACTOR shall be responsible for scheduling his work in an orderly fashion to meet the project goals described herein. The CONTRACTOR shall perform the work in a manner that will not disturb Water Department operations.

A detailed construction sequence and schedule shall be submitted to the ENGINEER for approval.

SP-13 Surface Restoration

Where construction activities are conducted in existing grassed areas, the grassed areas shall be restored as specified or directed by sodding to match existing conditions, including species of grass. Surface restoration in paved areas, where applicable, shall be as shown on the Plans and in accordance with SP-30.

SP-14 Work Adjacent to Utilities

Existing utilities shall be protected as shown on the Plans, specified herein, and in accordance with the requirements of the Agreement. All excavations for pipelines or conduits shall be hand dug with care to avoid damaging underground structures or utilities that may not be shown on the Plans. Refer also to General Provisions Section 1.03.

SP-17 Facility Operations During Construction

CONTRACTOR shall perform all work in recognition of and coordination with on-going Tank Operation activities. The following shall apply:

CONTRACTOR shall perform work in a manner to minimize noise, vibration, dust and debris. CONTRACTOR shall coordinate with the CITY'S Water Production Division in advance of operations producing excessive noise and/or vibration and the use of non-designated areas in order to avoid disruption or interference with operations.

Staging areas shall be as designated, unless adjustments requested by the CONTRACTOR are pre-approved by the CITY.

Deliveries or other use of non-designated areas at the tank property shall be coordinated in advance with the CITY.

Company vehicles will be allowed on the premises provided they are properly marked.

Provide and install barricades, signage, etc. as needed to designate work areas, as well as protection for persons and existing materials to remain in, and adjacent to, work areas. Maintain protections as needed throughout the course of the Work.

Following each and every work session, leave site in clean and orderly fashion with site protections in place.

The CONTRACTOR shall have a supervisor on-site with Contract related personnel at all times. Failure to adhere to approved sequencing/layout plan and/or failure to have supervisory personnel present and/or failure to maintain appropriate site conditions will be cause for work stoppage without additional Contract time.

SP-18 Testing

The cost of all testing required shall be borne by the CONTRACTOR.

SP-19 Monthly Schedules

In addition to the Progress Schedule required in Article 4.02 of the Agreement, the CONTRACTOR shall submit a monthly schedule with each pay estimate. Pay estimates will not be processed unless accompanied by an updated monthly schedule. The schedule shall be broken down into the following components at a minimum:

1. Procurement status
2. Sulfuric Acid Containment Area Repair
3. Sulfuric Acid Containment Area Coating
4. Ferric Sulfate Containment Area Repair
5. Ferric Sulfate Containment Area Coating
6. Install New Eyewash Stations
7. Upgrade Existing Eyewash Stations
8. Ferric Sulfate Tank Repair
9. Sulfuric Acid Chemical Fill Station
10. Ferric Sulfate Chemical Fill Station
11. Sulfuric Acid Piping Installation
12. Ferric Sulfate Piping Installation
13. Air System Improvements
14. Sulfuric Acid Canopy Roof Repair
15. Sulfuric Acid Tank No. 1 Coating
16. Ferric Sulfate Tank No. 2 Coating

17. Electrical & Instrumentation
18. Final Restoration

In addition to the above, CONTRACTOR shall submit 3-Week Look Ahead schedules whenever Progress Meetings are held.

SP-22 Access to Work Area

The CITY's facility is a secure facility. As such, the CONTRACTOR will be obligated to comply with access rules and procedures described herein.

1. Prior to the start of on-site activities, CONTRACTOR must submit a list of employees to the CITY that the CONTRACTOR expects to assign to the project.
2. The above requirement extends to all employees of the Prime CONTRACTOR and all of the CONTRACTOR'S Sub-contractors.
3. The CONTRACTOR shall have a period of five (5) business days following the Notice to Proceed to provide the employee list(s) to the CITY. The list(s) shall include: Employee Name, photo identification, driver license number, race, sex, and date of birth.
4. The CITY reserves the right to reject any employee on the submitted list(s) (Prime and Subs) and may request that the CONTRACTOR submit additional names, if necessary.
5. During the course of the Work, the CITY will require the CONTRACTOR to submit additional names of employees, as needed, who were not on the original list and who are later proposed to work on the project.

SP-24 Temporary Work Stoppages

The CONTRACTOR shall temporarily discontinue all construction activities from, and including, Thanksgiving Day through the following Sunday, and December 24 through January 2.

If applicable, prior to temporary work stoppages, all streets shall be restored to permit access and to allow ingress and egress by CITY vehicles. The CONTRACTOR shall maintain all streets at this condition level for the duration of the shutdown period.

All equipment, except that used for excavation and well pointing, and all materials including, but not limited to, structures, pipe, and stockpiled material shall be removed to either the CONTRACTOR's storage lot or to a location outside the project area as approved by the ENGINEER.

SP-25 Project Photographs and Video

Before the start of construction, the CONTRACTOR will be required to furnish color photographs and video of the Work site and surrounding area. The CONTRACTOR shall not perform any construction work until the pre-construction photographs and video are taken and submitted to the CITY.

The CONTRACTOR shall submit pre-construction photographs in digital form (JPEG) and video in digital form (MP4) to the CITY prior to the start of construction.

SP-26 Record Drawings

During the course of the Work, the CONTRACTOR shall maintain, at the site, a clean undamaged set of Contract Documents. The CONTRACTOR shall mark the Construction Documents on a daily basis showing the location, progress of the Work, and deviations, if any.

Drawings and specifications book shall be on-site at all times and available for review by the CITY. Failure of CONTRACTOR to have the Contract Documents and/or up to date may result in suspension of the Work until the situation is corrected. Extension of the Contract Time will not be granted for such condition.

At the conclusion of the Work, the CONTRACTOR shall provide the CITY with one complete set of Electronic Record Drawings (AutoCAD DWG) incorporating any changes (an un-marked set of construction drawings will be provided to the CONTRACTOR by the CITY for this purpose).

SP-28 Safety

All costs associated with safety measures shall be included in the total lump sum contract price, and no separate payment shall be made therefore. Refer also to the Tampa Agreement Article 3.07.

The CONTRACTOR will be responsible for immediately notifying the CITY if a potential or actual event occurs that may be or is threatening the integrity of the tank and/or affecting its operations, and/or threatening the public in any way.

SP-29 Disposal of Debris

The CONTRACTOR shall be solely responsible for removal and proper disposal of debris to locations off of the project site.

END OF SECTION



Page 1 of 2 –DMI Payment
City of Tampa – DMI Sub-(Contractors/Consultants/Suppliers) Payments
(FORM MBD-30)

[] Partial [] Final

Contract No.: _____ WO#,(if any): _____ Contract Name: _____

Contractor Name: _____ Address: _____

Federal ID: _____ Phone: _____ Fax: _____ Email: _____

GC Pay Period: _____ Payment Request/Invoice Number: _____ City Department: _____

Total Amount Requested for pay period: \$ _____ Total Contract Amount(including change orders):\$ _____

Type of Ownership - (F=Female M=Male), BF BM = African Am., HF HM = Hispanic Am., AF AM = Asian Am., NF NM = Native Am., CF CM = Caucasian S = SLBE

Type	Trade/Work Activity	Total Sub Contract Or PO Amount	Amount Paid To Date	Amount To Be Paid For This Period
[]Sub []Supplier			Amount Pending Previously Reported	Sub Pay Period Ending Date
Federal ID				
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$
			\$	\$

(Modifying This Form or Failure to Complete and Sign May Result in Non-Compliance)

Certification: I hereby certify that the above information is a true and accurate account of payments to sub – contractors/consultants on this contract.

Signed: _____ Name/Title: _____ Date: _____



Page 2 of 2 – DMI Payment

Instructions for completing The DMI Sub-(Contractors/Consultants/ Suppliers) Payment Form (Form MBD-30)

This form must be submitted with all invoicing or payment requests where there has been subcontracting rendered for the pay period. If applicable, after payment has been made to the subcontractor, “Waiver and Release of Lien upon Progress Payment”, “Affidavit of Contractor in Connection with Final Payment”, or an affidavit of payment must be submitted with the amount paid for the pay period. The following will detail what data is required for this form. The instructions that follow correspond to the headings on the form required to be completed. **(Modifying or omitted information from this form my result in non-compliance).**

- **Contract No.** This is the number assigned by the City of Tampa for the bid or proposal.
- **W.O.#** If the report covers a work order number (W.O.#) for the contract, please indicate it in that space.
- **Contract Name.** This is the name of the contract assigned by the City of Tampa for the bid or proposal.
- **Contractor Name.** The name of your business.
- **Address.** The physical address of your business.
- **Federal ID.** A number assigned to a business for tax reporting purposes.
- **Phone.** Telephone number to contact business.
- **Fax.** Fax number for business.
- **Email.** Provide email address for electronic correspondence.
- **Pay Period.** Provide start and finish dates for pay period. (e.g. 05/01/13 – 05/31/13)
- **Payment Request/Invoice Number.** Provide sequence number for payment requests. (ex. Payment one, write 1 in space, payment three, write 3 in space provided.)
- **City Department.** The City of Tampa department to which the contract pertains.
- **Total Amount Requested for pay period.** Provide all dollars you are expecting to receive for the pay period.
- **Total Contract Amount (including change orders).** Provide expected total contract amount. This includes any change orders that may increase or decrease the original contract amount.
- **Signed/Name/Title/Date.** This is your certification that the information provided on the form is accurate.
- **See attached documents.** Check if you have provided any additional documentation relating to the payment data. Located at the bottom middle of the form.
- **Partial Payment.** Check if the payment period is a partial payment, not a final payment. Located at the top right of the form.
- **Final Payment.** Check if this period is the final payment period. Located at the top right of the form.

The following instructions are for information of any and all subcontractors used for the pay period.

- **(Type) of Ownership.** Indicate the Ethnicity and Gender of the owner of the subcontracting business or SLBE.
- **Trade/Work Activity.** Indicate the trade, service, or material provided by the subcontractor.
- **SubContractor/SubConsultant/Supplier.** Please indicate status of firm on this contract.
- **Federal ID.** A number assigned to a business for tax reporting purposes. This information is critical in proper identification of the subcontractor.
- **Company Name, Address, Phone & Fax.** Provide company information for verification of payments.
- **Total Subcontract Amount.** Provide total amount of subcontract for subcontractor including change orders.
- **Amount Paid To Date.** Indicate all dollars paid to date for the subcontractor.
- **Amount Pending, Previously Reported.** Indicate any amount previously reported that payments are pending.
- **Amount To Be Paid for this Period.** Provide dollar amount of dollars requested for the pay period.
- **Sub Pay Period Ending Date.** Provide date for which subcontractor invoiced performed work.

Forms must be signed and dated or will be considered incomplete. The company authorized representative must sign and certify the information is true and accurate. Failure to sign this document or return the document unsigned can be cause for determining a company is in non-compliance of Ordinance 2008-89.

If any additional information is required or you have any questions, you may call the Minority Business Development Office at (813) 274-5522.

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Sign Information

Building a Better Tampa

Downtown Riverwalk

Creates a waterfront pedestrian walkway connecting the south edge of the CapTrust building with MacDill Park.

\$1.5 Million investment
Scheduled for completion in October, 2012

Orion Marine
Construction, Inc.



Jane Castor, Mayor

Project Contact:
Albert Calloway
Contract Administration
City of Tampa
albert.calloway@tampagov.net

For information call:
(813) 635-3400



SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

3"

scale: 3"

Font

Franklin Gothic

Building a Better Tampa

David L. Tippin Water Treatment Facility
Caustic Soda Piping Improvements

Project provides for improvements at the David L. Tippin Water Treatment Facility to improve the reliability and safety of the Sodium Hydroxide System of the water distribution system within the facility.

\$TBD investment
Scheduled for completion in TBD 2014

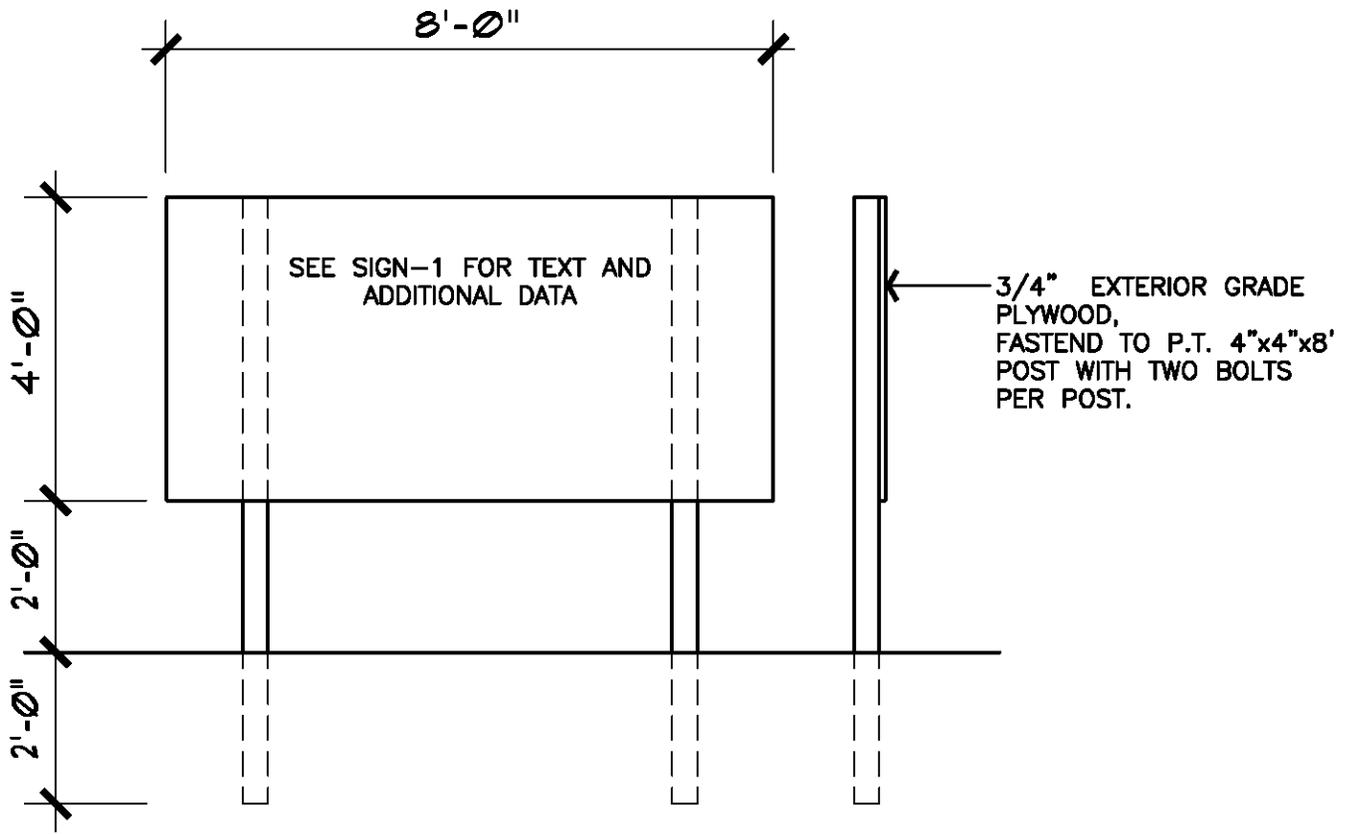
TBD

Colors

Blue: Sherwin Williams Naval SW6244

Green: Sherwin Williams Center Stage SW6920

White: Sherwin Williams Pure White SW7005



SECTION 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Work covered by Contract Documents.
- B. Submittals
- C. Work by others.
- D. Contractor's use of site.
- E. Limits of work area.
- F. Construction permits
- G. Sequence of work.
- H. Connections to existing facilities.
- I. Alteration project procedures.
- J. Cutting and patching.
- K. Facility outages.
- L. Continuity of service plan.
- M. Requests to work outside normal working hours.

1.02. PROJECT – WORK COVERED BY CONTRACT DOCUMENTS

- A. The work shall consist of furnishing all materials, labor, equipment, tools, and all items and services required for the complete construction in conformity with Contract Documents of the David L. Tippin Water Treatment Facility Ferric Sulfate & Sulfuric Acid Tank Rehabilitation project. The project is located at 7125 N 30th Street, for the City of Tampa. All construction work and materials, in addition to complying with requirements of Contract Documents, shall fully comply with all requirements of local building codes, all ordinances and regulations of other Federal, State and public authorities having jurisdiction over this type of work in the given area. Work not specifically identified in the Bid Item Descriptions, but nevertheless required in the Contract Documents, shall be performed as shown and/or specified.

B. Drawing List:

G001	COVER SHEET
G002	LIST OF DRAWINGS, LEGENDS, ABBREVIATIONS & GENERAL NOTES
C001	SITE VICINITY MAP
C002	EXISTING CONDITIONS SITE PLAN
C003	EXISTING CONDITIONS PHOTOS
C004	AIR AND POTABLE WATER PIPING PLAN

S001	STRUCTURAL LEGENDS, ABBREVIATIONS, SYMBOLS & GENERAL NOTES
S002	OVERALL STRUCTURAL SITE PLAN
S003	SULFURIC ACID CONTAINMENT PROPOSED MODIFICATIONS PLAN & SECTIONS
S004	STRUCTURAL DETAILS
M001	SULFURIC ACID FILL STATION PROPOSED MODIFICATIONS PLAN & SECTION
M002	FERRIC SULFATE DEMOLITION PLAN
M003	FERRIC SULFATE PROPOSED MODIFICATIONS PLAN AND SECTIONS
M004	FERRIC SULFATE TANK NO. 1 PROPOSED MODIFICATIONS ELEVATION & ROOF PLAN
M005	FERRIC SULFATE TANK NO. 2 PROPOSED MODIFICATIONS ELEVATION & ROOF PLAN
M006	MECHANICAL DETAILS
E001	ELECTRICAL LEGEND, ABBREVIATIONS, SYMBOLS & GENERAL NOTES
E002	OVERALL ELECTRICAL SITE PLAN & DETAIL
E003	ELECTRICAL DETAILS
E004	CONTROL ONE-LINE DIAGRAMS

- C. Tank inspection reports were prepared for both Ferric Sulfate Tank No.2 and Sulfuric Acid Tank No. 1, these reports are provided as Attachment A for reference.

1.03. CONTRACT

- A. The work hereunder shall be constructed under a unit price contract.

1.04. SUBMITTALS

- A. Prior to the commencement of any work hereunder, the Contractor shall submit the following plans, or proof that such plans are in effect:
1. **Materials Disposal Plan:** The Contractor shall submit a planned course of action to dispose of all waste, spent abrasives, unused coating materials, paint thinner, etc., including hazardous and non-hazardous waste. All disposal shall be in accordance with federal, state, and local government requirements, laws, and ordinances. All waste, including spent abrasives, shall be contained within the work area and disposed of according to the submitted plan.
 2. **Hazardous Communication Plan:** Contractor agrees to communicate to his employees all information regarding chemicals, substances and other hazards to which Contractor's employees foreseeably could be exposed to while performing work on the premises, and to properly inform, educate, and train all employees performing work hereunder as to all applicable Safety and Health laws and regulations including, but not limited to, the Hazard Communication Standard, 29 CFR, Part 1910.1200 issued by Occupational Safety and Health Administration, U.S. Department of Labor.
 3. **Lock-Out/Tag-Out Plan:** Contractor shall provide a plan, locks and tags for locking out and tagging of equipment as may be necessary.
 4. **Health & Safety Policy:** Contractor shall submit a copy of the Health & Safety Policy, and take the necessary steps to ensure that Sub-Contractors, if any, comply with all safety policies, all Federal and State job safety and health regulations including, but not limited to, the Hazard Communication Standard, 29 CFR, Part 1910.1200. **Confined Space Entry:** Contractor shall submit a plan for Confined Space Entry in accordance with 29 CFR 1910.146. Contractor shall also provide confined space entry attendant(s), and LEL/O₂ monitor as required by the Confined Space Entry plan.

5. Hurricane Preparedness Plan:

- a. Within thirty (30) days of the date of Notice to Proceed, the Contractor shall submit to the Engineer/City a hurricane Preparedness Plan. The plan should outline the necessary measures that the Contractor proposes to perform at no additional cost to the City in case of a hurricane warning.
 - b. In the event of inclement weather, or whenever the Engineer/City shall direct, the Contractor will, and will cause the Sub-Contractors to, protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer/City, any portion of work or materials have been damaged or injured by reason of failure on the part of the Contractor or any Sub-Contractors to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.
6. Prior to mobilizing to the site, the Contractor shall submit a plan to the Engineer/City for satisfying damage claims on surrounding property such as buildings, automobiles, landscaping, sidewalks, etc., as a result of paint spatter, abrasive blast materials, mechanical damage, etc.
7. Reference each section of these specifications for additional submittal requirements

B. Post-Job Submittals

1. 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 observation. Provide submittals to the Engineer that are required by governing or other authorities. The Contractor shall submit all documentation to the Engineer necessary for proper completion of the Project. This documentation shall include but not be limited to all manifests, abrasive testing results, other testing results, etc. Submit Application for Final Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.05. QUALIFICATION OF BIDDERS

- A. The bidder shall submit, among other things, specifically the name of the proposed superintendent and detailed information identifying the above mentioned and all personnel to be utilized on this project and written evidence with respect to the following:
 1. General Requirements:
 - a. That the Bidder has a trained and competent organization, which has completed work of similar character and value;
 - b. That the Bidder will have available to do the work at the proper time or times, adequate equipment and facilities, listing such equipment and facilities in such detail that they can be quickly and accurately checked;
 - c. That the Bidder has sufficient repair parts and supplies to maintain all equipment and facilities properly and with a minimum of delay; The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the City.
 - d. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

- e. City may elect to stop the project at any time. If so, Contractor will not be awarded any additional payment except for the work performed up to that time and demobilization and cleanup. The City will not pay for stored materials if the project is stopped.
- f. Contractor shall, except as otherwise specifically stated in applicable parts of these Contract Documents, provide and pay for labor, materials, equipment, tools, construction equipment, facilities, and services necessary for proper execution, testing, and completion of the work.

2. Personnel Requirements

- a. All employees shall be First Aid and CPR certified.

1.06. WORK BY OTHERS

- A. Where two or more contracts are being performed at one time on the same site or adjacent land in such a manner that work under one contract may interfere with work under another, the City will determine the sequence and order of the Work in either or both contracts. When the site of one contract is the necessary or convenient means of access for performance of work under another, the City may grant privilege of access or other reasonable privilege to the Contractor so desiring, to the extent, amount, and in manner, and at time, that the City may determine. No City determination of method, time, sequence, order of the work, or access privilege shall be the basis for a claim for delay or damage, except under provisions of the General Conditions for temporary suspensions of the work. The Contractor shall conduct its operations so as to cause a minimum of interference with the work of such other Contractors, and shall cooperate fully with such Contractors to allow continued safe access to their respective portions of the site, as required to perform work under their respective contracts.
- B. Interference with Work On Utilities: The Contractor shall cooperate fully with all utility forces of the City or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging any facilities which interfere with the progress of the Work, and shall schedule the Work so as to minimize interference with said relocation, altering, or other rearranging of facilities
- C. Contractor shall cooperate and coordinate with City and all others performing other work at the site

1.07. CONTRACTOR USE OF SITE

- A. Onsite storage of materials, onsite fabrication facilities, and field offices. The Contractor's use of site is limited as indicated
 - 1. City occupancy and utilization as necessary to maintain facility operations. Work by others.

1.08. LIMITS OF WORK AREA

- A. Confine construction operations within the Limits shown on the Drawings
- B. Storage of equipment and materials, or erection and use of sheds outside of the Contract Limits, if such areas are the property of City, shall be used only with City's approval. Such storage or temporary structures, shall be confined to City's property and shall not be placed on properties designated as easements or rights-of-way.
- C. Where storage of equipment, materials, job trailers, etc. are proposed outside the approved limits of disturbance, obtain permits including erosion and sedimentation control plan approval for those areas at no additional cost to City.

1.09. PERMITS

- A. Contractor shall obtain and pay for necessary construction permits from those authorities or agencies having jurisdiction over land areas, utilities, or structures which are located within the Contract Limits and which will be occupied, encountered, used, or temporarily interrupted by Contractor's operations
- B. When construction permits are accompanied by regulations or requirements issued by a particular authority or agency, it shall be Contractor's responsibility to familiarize himself and comply with such regulations or requirements as they apply to Contractor's operations on this Project. All costs associated with additional field supervision or inspection by authorities or agencies having jurisdiction over land areas, utilities, or structures shall be Contractor's responsibility.
- C. Keep an approved set of permitted construction plans on site at all times.

1.10. CITY OCCUPANCY

- A. The City will occupy the site during the entire period of construction in order to conduct normal operations.
- B. Cooperate with City to minimize conflict, and to facilitate City's operations.
- C. Schedule the work to accommodate City occupancy.

1.11. SEQUENCE OF WORK

- A. General
 - 1. The sequence of operations will be generally as outlined in PART 3 -- EXECUTION contained at the end of this section. Contractor shall provide an intended sequence of construction in accordance with Section 01 32 16, Construction Progress Schedule.
 - 2. Contractor shall be solely responsible for the means, manpower, methods, techniques, sequences and procedures of construction unless specifically identified in the Contract Documents.
 - 3. Contractor shall be responsible for sequencing and coordinating the work in accordance with the Contract Documents.
 - 4. Contractor shall provide temporary facilities to maintain continuous operation of all existing facilities and utilities unless scheduled facility shutdowns are identified in the Contract Documents
 - 5. Work shall be performed in a manner that minimizes impact to normal operation of existing facilities and utilities.
 - 6. Contractor's operations shall not cause City to violate operating permit requirements.
 - 7. If Contractor's operations cause City to receive a notice of violation for a leachate spill or erosion and sedimentation practices, all costs including fines, legal notices, mailings, administrative tasks, and engineering associated with resolving the notice shall be borne by City.

1.12. OPERATION OF EXISTING FACILITIES

- A. Normal operations of the existing facilities will be performed by City. Only City's staff is allowed to operate existing facilities including equipment, valves, gates, motor controls, etc.
 - 1. Provide City and Engineer a minimum of 5 working days written notice of necessary

operation of existing valves, pumps, or equipment to facilitate construction activities.

2. Contractor's activities shall not disrupt City's access to operate and maintain existing equipment and facilities. Contractor shall furnish any temporary access required, including ladders, platforms, grating, walkways, and awais, which shall comply with OSHA laws and regulations, for necessary plant operations.
- B. Contractor's operations shall not disrupt truck access for the delivery or hauling of materials and suppliers to and from the site.

1.13. CONNECTIONS TO EXISTING FACILITIES

- A. Contractor shall provide all cutting and patching required for connection to existing facilities.
- B. Temporary connections to existing facilities are covered in Section 01 50 00, Temporary Facilities and Controls.
- C. General Contractor shall provide all openings, chases, etc., to fit its own Work and that of other Contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by approved Shop Drawings, or shown on manufacturer's erection drawings, shall be provided by General Contractor.
- D. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as an integral part of an opening, the sleeves opening forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be installed by General Contractor. Where hanger inserts, anchor bolts and similar items are to be installed as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the same, but shall be installed by General Contractor.
- E. When requested by General Contractor, the installer of the pipes, conduit or equipment, including those Contractors who require openings or chases in slabs and walls for passage of ducts, mounting of equipment, etc., shall furnish all necessary information, instructions and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the Contractor for whom the items are installed shall ascertain the proper number, locations and settings thereof, and General Contractor shall schedule its operations so as to provide a reasonable opportunity and time interval for such inspection.
- F. After installation of the pipe, conduit or duct is completed, the installer shall be responsible for sealing the annular space around the installed pipe, conduit or duct in accordance Laws and Regulations.
- G. Cost resulting from correction of defective, ill-timed or incorrectly located work, or for subsequent work, which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc, shall be borne by the Contractor responsible therefore. To this end, no Contractor shall arbitrarily cut, drill, alter, damage or otherwise endanger the work of another Contractor. The nature and extent of any corrective or additional work shall be subject to the approval of the Engineer following consultation with the Contractors involved.
- H. General Contractor shall be responsible for all equipment and housekeeping pads and shall coordinate locations, sizes, and orientation with the installer. Coordination shall include verification of actual required size. Contractor shall not rely solely on the sizes shown on the Drawings.
- I. Temporary connections to existing facilities are covered in Section 01 50 00, Temporary Facilities and Controls

1.14. ALTERATION PROJECT PROCEDURES

- A. Materials - As specified in individual specification sections; match existing products and work

- for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
 - C. Remove, cut, and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.
 - D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
 - E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
 - F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Engineer.
 - G. Where a change of plane of 1/4-inch or more occurs, submit recommendation for providing a smooth transition for Engineer review.
 - H. Patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections.
 - I. Finish surfaces as specified in individual specification sections

1.15. CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of City or separate Contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete work, and to:
 - 1. Fit the several parts together, to integrate with other work.
 - 2. Uncover work to install or correct ill-timed work.
 - 3. Remove and replace defective and non-conforming work.
 - 4. Remove samples of installed work for testing.
 - 5. Provide openings in elements of work for penetrations of mechanical and electrical work.
- D. Execute work by methods, which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore work with new products in accordance with requirements of Contract Documents.

- G. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Identify any hazardous substance or condition exposed during the Work to Engineer in writing for decision or remedy

1.16. FACILITY OUTAGES

A. General:

1. Provide a minimum of 30 working days written notice to City and Engineer prior to actual date of scheduled outage.
2. Unless the Contract Documents indicate otherwise, the Contractor shall not remove from service, de-energize, or modify settings for any existing operating tank pipeline, valve, channel, equipment, structure, road, or any other facility without written permission from the City.
3. Where the Work requires modifications to existing facilities or construction of new facilities and/or connection of new facilities to existing facilities, the Contractor shall submit a detailed outage plan and schedule for the City's and Engineer's approval a minimum of two (2) weeks in advance of the time that such outage is required.
4. The Engineer shall be notified in writing at least one week in advance of the required outage if the schedule for performing the work has changed or if revisions to the outage plan are required.
5. All associated work that can be completed on a system without taking a unit or process out of service shall be completed prior to the outage to minimize downtime.
6. Have all required materials, labor, tools, and equipment on site at the required locations and available for use prior to beginning an outage.
7. Provide all temporary facilities required for outages, including bypassing pumping, in accordance with Section 01 50 00 Temporary Facilities and Controls
8. Outages cannot be scheduled to begin on a Friday or day before a scheduled holiday.
9. When temporary shutdowns are planned utilizing tankage with finite storage volumes and/or for limited timeframes, backup bypass pumping systems shall be on site and immediately available for use during shutdowns in case facilities cannot be brought back on-line within the required time limits.
10. Begin work on temporarily isolated facilities immediately after isolation and expedite.
11. During scheduled outages, complete all associated work within time frames and constraints identified in Contract Documents and the approved Continuity of Service Plan, including testing and startup.
12. The Contractor shall be responsible for taking existing facilities off-line, draining and cleaning existing tanks, and removing liquid and solids from existing tanks, wetwells, and other water holding structures as required for new work. County will designate locations on Site for liquid and solids removed from the existing facilities to be pumped and/or hauled by Contractor.
13. Contractor is responsible for final washdown and cleaning of existing facilities to the

degree required to perform associated work.

B. Scheduled Outages

1. Contractor will be allowed to schedule facility with written approval of County.

1.17. CONTINUITY OF SERVICE PLAN

- A. Submit in accordance with the procedures described in Section 01 33 00, Submittal Procedures.
- B. Submit plans for the continuity of utility service and plant operations no later than 30 days prior to each planned interruption.
- C. Plans shall include:
 1. Approximate dates and times of scheduled interruption of service
 2. Estimated period of outage
 3. List of existing equipment and facilities that will be affected by the outage
 4. Proposed sequence of equipment and facility shutdown and startup
 5. Contractor personnel responsible for overseeing operations
- D. Plans must be approved by City and Engineer prior to proceeding with outage. Revisions to Continuity of Service Plans after initial approval shall be resubmitted to City and Engineer at least 14 days prior to scheduled outage and must be approved by City and Engineer prior to proceeding with outage.

1.18. REQUESTS TO WORK OUTSIDE OF NORMAL WORKING HOURS

- A. Submit requests to work outside normal working hours at least one week in advance. Requests to work outside normal working hours must be approved in advance by City and Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Administrative and procedural requirements governing allowances.

1.02. SELECTION AND PURCHASE

- A. Submittals
 - 1. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
 - 2. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.03. CONTINGENCY ALLOWANCES

- A. Use the Contingency Allowance only as directed by the Owner.
- B. The Contractor's related costs for services, products and equipment ordered by the Owner under the Contingency Allowance include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Work Directive Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to the Owner by Change Order.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

3.01. EXAMINATION

- A. Examine products covered by an allowance promptly upon delivery for damage or defects.

3.02. PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.03. SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: include a contingency allowance of \$70,000 for use according to Owner's instructions.

THE ALLOWANCE SHALL BE INCLUDED IN THE BID

END OF SECTION

SECTION 01 31 13

PROJECT COORDINATION

PART 1 GENERAL

1.01. SECTION INCLUDES

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:

1. Pre-Bid site Access
2. Coordination.
3. Administrative and supervisory personnel.
4. General installation provisions.
5. Cleaning and protection.

1.02. PRE-BID SITE ACCESS REQUIREMENTS

A. Prior to the Pre-Bid meeting, Bidders shall contact the Plant's Security Supervisor (Israel Vigier, 231-5242). Contractors shall fax a copy of photo I.D. of everyone from their company that will be attending the Pre-Bid meeting. Badges will be available at the Plant's security gate on the day of the Pre-Bid meeting.

1.03. COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Includesuch items as required notices, reports, and attendance at meetings.
5. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required

1.04. ADMINISTRATIVE PROCEDURES

A. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.

3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project Close-out activities.
- B. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
- C. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.05. SUBMITTALS

A. Coordination Drawings

1. Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
 - a. Show the interrelationship of components shown on separate Shop Drawings.
 - b. Indicate required installation sequences.

B. Staff Names

1. At the Preconstruction Conference, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
 - a. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone, or as directed by the City.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

3.01. GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- B. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
- C. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- D. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.

- E. Recheck measurements and dimensions, before starting each installation.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.02. CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading. Excessive internal or external pressures. Excessively high or low temperatures. Thermal shock.
 - 2. Excessively high or low humidity.
 - 3. Air contamination or pollution.
 - 4. Water or ice.
 - 5. Solvents.
 - 6. Chemicals.
 - 7. Light.
 - 8. Radiation.
 - 9. Puncture.
 - 10. Abrasion.
 - 11. Heavy traffic.
 - 12. Soiling, staining and corrosion. Bacteria.
 - 13. Rodent and insect infestation. Combustion.
 - 14. Electrical current.
 - 15. High speed operation,
 - 16. Improper lubrication,
 - 17. Unusual wear or other misuse. Contact between incompatible materials. Destructive

testing.

18. Misalignment.
19. Excessive weathering.
20. Unprotected storage.
21. Improper shipping or handling.
22. Theft.
23. Vandalism.

3.03. FACILITY OPERATIONS DURING CONSTRUCTION

- A. Contractor shall perform all work in recognition of, and coordination with, ongoing building activities. Adhere to approved sequence/layout plan and project schedule. Work hours are 7:30 a.m. to 4:00 p.m. daily. Please note the following:
 1. After the Contract is awarded plant staff will conduct a safety training session with the Contractor's designated supervisor(s). The supervisor(s) will then be responsible for informing their employees of plant safety procedures.
 2. Company vehicles will be allowed on the premises provided that they are properly marked.
 3. Individual workers will be required to park their personal cars outside the plant's security fencing and walk to the Security Guard House. For their first entry, they will be required to present a photo I.D. They will then be issued a badge. At the end of the work day the workers will turn in their badge at the Guard House; the guard at the security gate will re-issue the badge when they come to work the next day. The procedure will be followed every day.
 4. Contractor shall not be allowed to use the plant's break room or any other areas not a part of the limited construction area. Contractor shall coordinate with alarm monitoring company as required to isolate work zones during dust generating activities that might activate fire alarm system.
 5. Provide and install barricades, signage, etc. as needed to designate work areas, as well as protection for persons and existing materials to remain, in and adjacent to work areas. Maintain protections as needed throughout the course of the work.
 6. Contractor shall perform work in a manner to minimize noise, vibration, dust and debris. Radios or similar devices shall not be played during regular work hours (7:30 a.m. - 4:00 p.m., Monday through Friday).
 7. Contractor shall coordinate with the facility in advance of operations producing excessive noise and/or vibration and the use of non-designated areas to avoid disruption or interference with facility operations.
 8. Deliveries or other use of non-designated areas around the perimeter of the facility shall be coordinated in advance with the facility.
 9. Use of the facility dumpster shall not be allowed. Trash and debris shall be removed from the site by the Contractor on a regular basis.
 10. Following each and every work session, leave site in clean and orderly fashion with site protections in place.

11. Failure to adhere to approved sequencing/layout plan and/or failure to have supervisory personnel present and/or failure to maintain appropriate site conditions will be cause for work stoppage without additional Contract time.
12. Staging areas shall be as designated, unless adjustments requested by the Contractor are pre-approved by the City. The Contractor shall provide temporary fencing to secure areas accessible to the public. City of Tampa inspector shall be issued a key to these areas for emergency purposes.
13. The Contractor shall have a supervisor on-site with Contract related personnel at all times.

END OF SECTION

SECTION 01 78 36

WARRANTIES AND OPERATIONS MANUAL

PART 1 GENERAL

1.01. GURANTEE

- A. All work covered under these specifications shall be guaranteed for a period of two (2) years after Final Completion and acceptance of the work. A Second Anniversary inspection will be scheduled by the Contractor, during the 23rd month following acceptance of the work. A report shall be furnished to the City describing the condition of the coating and liner system and other work covered under this Contract. Tank draining shall be coordinated with the City representative. Any latent defects found during this inspection shall be promptly repaired by the Contractor. Any location where coats of paint have peeled off, bubbled or cracked coatings or lining, and any location where rusting is evident, shall be considered a failure of the coating or lining system. The Contractor shall make repairs at all points where failures are observed as per these Technical Specifications. The Contractor shall submit a schedule and plan outlining the repair procedures. Pre-Bid site Access
- B. Failure on the part of the Contractor to schedule this warranty inspection will not relieve him of warranty responsibility. Any defects found by the City, after the normal warranty period, will be assumed to have occurred during the time the warranty was in effect. Administrative and supervisory personnel.

1.02. COATING AND LINING

- A. The Contractor shall comply with the above section and also shall provide Manufacturer's standard warranty for all materials and labor for a period of two(2) years after the date of final acceptance by the City.

1.03. DOCUMENT REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: six (6) each. (includes required General Provision amount)
- C. Table of Contents. Neatly typed in orderly sequence.
- D. Provide complete information for each item:
 - a. Product or work item.
 - b. Firm, with name of principal, address and telephone number.
 - c. Scope.
 - d. Date of beginning of warranty, bond, or service and maintenance contract.
- E. Duration or warranty, bond, or service and maintenance contract. Provide the following information for City personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.

- c. Contractor, name of responsible principal, address and telephone number.

1.04. FORM OF REQUIREMENTS

- A. Prepared in duplicate packets.
- B. Format:
 - a. Size 8-1/2-inches x 11-inches, punch sheets for standard 3-post binder.
 - b. Fold larger sheets to fit into binders.
- C. Cover: Identify each packet with typed or printed title "Operations Manual" List:
 - a. Title of Project
 - b. Name of Contractor
 - c. Tank Name
 - d. Tank Address
- D. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2-inches. If more than one volume, identify volume number on spine and cover.

1.05. WARRANTY SUBMITTAL REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the Contractor's for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the CITY. Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
- B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment which has a 1 HP motor or which lists for more than \$1,000. The Engineer reserves the right to request warranties for equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.
 - a. Show the interrelationship of components shown on separate Shop Drawings.
 - b. Indicate required installation sequences.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

3.01. SECOND ANNIVERSARY INSPECTION

- A. The Contractor shall perform the following duties at the Second Anniversary Inspection:
 - a. The Contractor shall perform the inspection, and shall furnish an experienced foreman, laborer, and rigging person for the inspection.
 - b. The City shall wash out the interior of both tanks for the evaluation the day

prior to the evaluation.

- c. The Contractor shall be prepared to perform minor touch-up and/or repairs.
- d. Spot repairs shall be made by the Contractor before returning the tank to service. Repairs requiring extensive Work and rigging may be delayed until a time mutually agreeable to the City and Contractor.
- e. All costs associated with the Second Anniversary Inspection, including the rigging, lighting, and other costs, shall be included in the Base Bid price. The performance of this inspection and/or any remedial Work shall not relieve the Contractor of any responsibility for defects in materials or workmanship that may or may not be evident during the Second Anniversary Inspection.

END OF SECTION

SECTION 03 00 00

CONCRETE

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Cast-in-place fill station.
- B. Sloped Concrete Topping in Sulfuric Acid containment areas.
- C. Formwork.
- D. Reinforcing steel bars and accessories.
- E. Concrete mixes.
- F. Concrete testing.
- G. Concrete finishes.
- H. Concrete curing and protection.
- I. Repair to new, defective concrete.
- J. Chemical adhesive system to install dowels and anchor bolts.
- K. Waterstops.
- L. Joint filler and sealant.
- M. Bonding agent.

1.02. REFERENCES

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

- A. American Concrete Institute (ACI)

ACI 201.1	Guide for Conducting a Visual Inspection of Concrete in Service
ACI 211.1	Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 301	Specifications for Structural Concrete
ACI 302.1	Guide for Concrete Floor and Slab Construction
ACI 304	Measuring, Mixing, Transporting and Placing Concrete
ACI 305	Hot Weather Concreting
ACI 308	Guide to Curing Concrete
ACI 309	Guide for Consolidation of Concrete
ACI 315	Details and Detailing of Concrete Reinforcement
ACI 315R	Manual of Engineering and Placing Drawings for Reinforced Concrete Structures
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Recommended Practice for Concrete Formwork
ACI 350	Code Requirements for Environmental Engineering Concrete Structures

B. American Society for Testing and Materials (ASTM)

ASTM A185	Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM A497	Steel Welded Wire Reinforcement, Deformed, for Concrete
ASTM A615	Deformed and Plain Billet Steel Bars for Concrete Reinforcement
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C88	Soundness of Aggregates
ASTM C94	Ready-Mixed Concrete
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Portland Cement
ASTM C172	Sampling Freshly Mixed concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C309	Liquid Membrane Forming Compounds for Curing Concrete
ASTM C494	Chemical Admixtures for Concrete
ASTM C595	Specification for Blended Hydraulic Cements
ASTM C618	Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989	Ground Granulated Blast-Furnace Slag for Use in Concrete

1.03. SUBMITTALS

- A. Submit Concrete Mix Designs - Concrete mixes used on this project shall be either established mixes verified by "Field Test Data" or new custom laboratory designed "Trial Mixtures." Requirements for either option are as follows.

All data shall be dated within the last 12 months. Partial submittal will not be reviewed.

- List amount and sources of mix ingredients:

- Cement
- Pozzolans (fly ash and slag)
- Fine aggregate
- Coarse aggregate
- Water
- Admixtures (including fibers)

- Strength Test Reports - The average strengths shall be higher than the required average compressive strengths (f'_{cr}) as per ACI 301, paragraph 4.2.3.3.

Typed letter signed by an official from concrete supplier stating that all ingredients for proposed mix(es) are identical and from the same source as ingredients used for concrete in provided strength test reports.

- Certified tests of fine and coarse aggregates meeting requirements in Part 2 of this specification.
- Certified statement from source of fine and coarse aggregates pertaining to history of alkali-aggregate reactivity (ASR) or State DOT confirmation that ASR issues are not

evident at the aggregate source.

5. Certified mill test of cement and fly ash or slag.
 6. Certified test for amount of water-soluble chloride ion (CL⁻) in concrete.
 7. One-page admixture catalog cuts.
- B. Submit one-page catalog cut for retarding admixture.
- C. Submit one-page catalog cut for surface-applied hot weather evaporation reducer.
- D. Submit a written statement regarding Contractor's anticipated curing procedures.
- E. Reinforcing Steel - Submit shop drawings in accordance with ACI 301, ACI 315 and ACI 315R, as modified below.
1. Drawings shall be clearly drawn and show enough details to locate every bar without the need to refer to the Contract Drawings. All construction and control joints must be shown. Photocopies of Contract Drawings, in whole or in part, will not be acceptable.
 2. No fabrication shall commence until shop drawings are approved. All bars shall be shop fabricated.
- F. Submit catalog cut for threaded rebar splicing system.
- G. Submit catalog cuts for chemical adhesive system used to install dowels and threaded anchor bolts into hardened concrete.
- H. Submit catalog cuts for joint filler and sealant.
- I. Submit catalog cut for bonding agent.
- J. Submit catalog cuts for waterstops and waterstop accessories, clearly indicating which item(s) are to be used.
- K. Submit catalog cut for curing compound with fugitive dye specifically indicated.
- 1.04. COORDINATION
- A. Coordinate all concrete placements with work indicated in all specifications and on all Contract Drawings.
 - B. Coordinate the installation of all cast-in (embedded) items prior to start of concrete placement. Post-installation of cast-in (embedded) items will not be allowed.
 - C. Contractor shall receive approval on anticipated curing and protection procedures prior to placement of all concrete.
 - D. Coordinate all concrete placements with testing and inspection requirements specified herein.
- 1.05. QUALITY ASSURANCE
- A. The concrete batch plant providing concrete to this project shall be certified by the Florida DOT.
 - B. Bar Identification and Mill Test Reports - All reinforcing bars shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade.
 - C. Concrete testing shall be performed prior to and during placement.

PART 2 PRODUCTS

2.01. FORMWORK

- A. Form materials shall be new wood, new plywood, or steel. Worn, used forms will not be allowed on exposed work.
- B. Chamfer forming strips for exposed edges of concrete.
 - 1. Exposed edges and outside corners of concrete shall be formed with 3/4-inch by 3/4-inch chamfer forming strips.
 - 2. Provide chamfer to other areas as indicated on the Drawings.
- C. Forms shall be coated with a release agent which will not stain concrete or absorb moisture.
- D. Form Ties
 - 1. Form ties shall leave no metal closer than 1-inch to the surface of the finished concrete. The ends of the form ties shall create cone-shaped tie holes for sealing with plug mortar.
 - 2. Snap ties without cone-shaped ends that leave metal exposed at surface can only be used at unexposed areas of frost walls and retaining walls.
 - 3. Ties used for watertight and below-grade structures shall contain an integral waterstop.

2.02. REINFORCING STEEL

- A. Deformed Reinforcing Bars - ASTM A615, Grade 60.
- B. Bar Supports and Bolsters
 - 1. Bar supports and bolsters shall be a non-bleeding and non-staining material where concrete surfaces remain exposed. Plastic, plastic tipped, or stainless steel bar supports shall be used for this purpose.
 - 2. Bar supports bearing on grade, insulation, or fill material shall be continuous runner type supplied with continuous welded-on plates, or minimum 4000 psi precast concrete blocks specifically cast for this intended use to assure proper support of reinforcement. Individual high chair supports will not be considered adequate.

The use of pavers, brick, or concrete masonry units (CMU) to support reinforcement shall not be permitted.

2.03. CONCRETE

- A. Concrete Classes and Their Use
 - Mix A - All cast-in-place concrete on this project.
 - Mix C-F – Concrete topping with fibers.

Mix	28-Day Compressive Strength (psi)	Coarse Aggregate Size per ASTM C33	Minimum Total Cementitious Content (lbs/CY)	Maximum Water/Cement Ratio (w/c) ⁽¹⁾	Air Content % ⁽²⁾	Maximum Water-Soluble Chloride Ion (CL ⁻)
A	4,000	#57	550	0.44	6.0	0.30
C-F	4,000	#7	550	0.44	6.0	0.30

- (1) The maximum water/cement ratio shall be considered for selection of supplier's mix design. The water/cement ratio specified in the approved mix design shall be the maximum used in production.
- 2) Tolerance for air content is $\pm 1-1/2$ percent.

- B. All concrete shall be air-entrained as specified in the above chart.
- C. Without plasticizers, concrete slump for flatwork shall not exceed 3 inches. Wall concrete shall be placed with a maximum slump of 4 inches. If necessary, superplasticizers may be added to wall placement, and corresponding maximum slump shall be 6 inches.
- D. Mix C-F shall contain short fiber reinforcement at a rate of 2 lbs/CY. Polypropylene Micro-fibers – Synthetic fibers for use in fiber-reinforced concrete topping shall be 100 percent virgin polypropylene self-fibrillating micro-fibers conforming to Type III per ASTM C1116 Section 4.1.3; use Euclid "Fiberstrand F" fibers or Propex Concrete Systems "Fibermesh 300" fibers.

2.04. MATERIALS

- A. Cement shall be Portland cement Type I or Type II and shall conform to ASTM C150.
- B. Pozzolans
 1. Fly ash shall meet the requirements of ASTM C618 Class F, except as modified below:
 - a. Loss of Ignition, Maximum - 5.0 percent.
 - b. Maximum Retained on #325 Sieve - 30 percent.

A blend of Portland cement and fly ash shall be between 15 to 25 percent of total cementitious content.
 2. Blastfurnace slag shall meet the requirements of ASTM C989 and be specifically manufactured to produce higher concrete strengths and provide greater resistance to chloride penetration and sulfate attack.

A blend of Portland cement and ground iron blastfurnace slag shall contain no more than 50 percent slag. The resulting blend of cementitious material shall meet the requirements of ASTM C595.
- C. Aggregates
 1. Fine Aggregate (Sand)
 - a. Natural or manufactured siliceous sand.
 - b. Quantity of deleterious substances as approved by State DOT or as limited by Table 1 of ASTM C33.
 - c. Graded within the limits of ASTM C33.

2. Coarse Aggregate
 - a. Crushed stone or crushed gravel.
 - b. Quantity of deleterious substances as approved by State DOT or as limited by Table 3 of ASTM C33 for Class [3S] [4S] aggregates.
 - c. Graded within the limits of ASTM C33.
3. Five cycle soundness tests for fine and coarse aggregates shall meet the requirements of ASTM C33.

PERCENT LOSS

	MAGNESIUM SULFATE	SODIUM SULFATE
Fine aggregate ⁽¹⁾	15	10
Coarse aggregate ⁽²⁾	18	12

- (1) If provided results of soundness tests exceed these limits, it would be acceptable to provide a certified letter attesting to the favorable performance of the fine aggregates as outlined in ASTM C33, Article 8.
- (2) Soundness tests for coarse aggregates do not need to be provided if they are approved by State DOT for use with concrete. Submit verification of such.

4. Source of fine and coarse aggregates shall not have a history pertaining to alkali-aggregate reactivity. In the event that aggregate source with potential alkali-aggregate reactivity is unavoidable, at least two of the following measures shall be taken to minimize this reaction:
 - a. Provide low alkali cement (<0.60 percent alkalis).
 - b. Use lithium-based additives.
 - c. Test aggregates to show non-reactive.

D. Use fly ash (minimum 20 percent content) or slag. Mixing Water - Clear and potable.

2.05. ADMIXTURES

- A. General - Admixtures other than those specified may only be used after written approval by the Engineer.
- B. Admixtures shall be as manufactured by BASF Chemical Company; Sika Corporation; The Euclid Chemical Company; W.R. Grace, Inc.; or equal.
- C. Air Entrainment Admixture - All concrete [requiring air entrainment] shall contain an air entrainment admixture meeting the requirements of ASTM C260.
- D. Water Reducing Admixture - All concrete shall contain a water reducing admixture that meets the requirements of ASTM C494 Type A (water reducing) or Type F (superplasticizer). This admixture shall not contain chlorides.
- E. Retarding Admixture - If air temperatures are expected to exceed 85 degrees F during the placement and/or finishing of any flatwork, a retarding admixture shall be used that meets the requirements of ASTM C494 Type D.
- F. Evaporation Reducer - For all concrete flatwork during hot and/or windy weather conditions, apply to freshly placed concrete prior to finishing. Use BASF Chemical Company "Confilm," L&M Construction Chemicals "E-Con," Conspec (by Dayton Superior) "Aquafilm," or equal.

2.06. OTHER PRODUCTS

- A. Bonding Agent – When placing freshly-mixed concrete against existing hardened concrete, use a corrosion inhibiting, non-vapor barrier, extended open time bonding compound.

Use Sika Corporation “Armatec 110 EpoCem,” The Euclid Chemical Company “Duralprep A.C.,” Larsen Products Corporation “Weld-Crete,” or equal.

- B. Liquid curing compound shall only be used during cold weather conditions and curing of foundation wall strip footings. When allowed, use a dissipating, VOC-compliant, water-based membrane forming with fugitive dye, conforming to ASTM C309, Type 1-D. Curing compound shall be applied at twice the manufacturer’s recommended application rate.

Use Euclid Chemical Company “Tammsecure WB 30D,” SYMONS Corporation “Resi-Chem Clear Cure 1D,” W.R. Meadows, Inc. “1100-Clear” (with optional fugitive dye), or equal.

- C. Waterstop material shall be PVC 6-inch x 3/8-inch ribbed center bulb waterstop No. CR-6380 by Wirestop of Paul Murphy Plastics Company; No. RB6-38 by Vinylex; No. 705 by Greenstreak; or equal.

- D. Where shown on the Drawings and where new concrete is cast against hardened concrete:

- E. Provide a premolded 1-inch by 3/4-inch bentonite self-adhering waterstop strip which expands on contact with water, applied with primer adhesive. The bentonite waterstop material shall meet the requirements of ASTM D217. Waterstop and adhesive shall be “Waterstop-RX” and “CetSeal” by CETCO Building Materials Group; “Swellstop” and “Swellstop Primer” by Greenstreak; or equal. Isolation joint filler shall be preformed, closed cell, high grade polyethylene or non-extruding PVC, such as “Expansion Joint Filler” by BASF Chemical Company; “Plastic Expansion Board” by Westec Barrier Technologies; “Deck-O-Foam” by W.R. Meadows, Inc.; or equal.

1. Joint fillers shall be held back for sealants.
2. The joint filler shall be compatible as a back-up material, with regard to the sealant not bonding to or being stained by the backup.

- F. Sealant for joints in concrete structures shall be a two-component polyurethane material. Use Sika Corporation “Sikaflex-2c,” The Euclid Chemical Company “Eucolastic II,” or equal.

- G. Chemical adhesive anchor system to install threaded anchor bolts and dowels into concrete or masonry shall be a high-strength, premeasured, two-part, self-mixing, cartridge-type epoxy adhesive, such as “HIT RE 500” by Hilti; “Epcon G5” by ITW Red Head; “ET Epoxy-Tie” by Simpson Strong-Tie Company, Inc.; or equal.

1. All framing connections for steel or aluminum members into concrete shall be a minimum of two bolts. Bolts into concrete and masonry shall not be closer than 6 inches on center, unless indicated otherwise.

- H. After materialsources have been established and approved, these sources shall not be changed for the duration of the project.

PART 3 EXECUTION

3.01. FORMS

- A. Earth cut forms shall not be used; all footings, base slabs, etc., shall be formed.
- B. Contractor is responsible for design and bracing of all forms for strength, integrity, and to produce the desired tolerances and finishes.

3.02. TOLERANCES FOR FORMED SURFACES

- A. Tolerances apply to concrete dimensions only, not to positioning of reinforcing steel or cast-in/embedded items.

1. Variation from plumb:	
a. In the lines and surfaces of columns, piers, walls, and other vertical members:	1/4 inch
b. For exposed corners of walls and columns, construction/ control joint grooves, and other conspicuous vertical lines:	1/4 inch
2. Variation from level or from grades specified:	
a. In slab soffits, ceilings and beam soffits, measured before removal of supporting shores:	1/4 inch
b. In exposed lintels, sills, parapets, grooves, tops of walls, slab edges, and other conspicuous horizontal lines:	1/4 inch
3. Variation of the linear [building lines] [lines of structures] from position in plan and related position of columns, walls, and partitions:	1/2 inch
4. Variation in the sizes and location of sleeves, floor openings, and wall openings:	+1/4 inch
5. Variation in [cross-sectional dimensions of columns and beams and in the] thickness of slabs and walls:	-1/4 inch +1/2 inch
6. Footings and thickened edges of slabs:	
a. Variations in dimensions in plan:	-1/2 inch +2 inches
b. Misplacement or eccentricity:	
• 2 percent of the footing width in the direction of misplacement but not more than 2 inches	
c. Thickness:	
• Decrease in specified thickness	5 percent
• Increase in specified thickness. No limit but increased thickness must be maintained for minimum 5 feet 0 inch length	

3.03. CONCRETE COVER

- A. Clear concrete cover not indicated on Drawings shall conform to ACI 318 and ACI 350, as applicable. However, in no case shall the clear cover be less than 1-1/2 inches.
- B. Contrary to the practice permitted by CRSI, the use of brick or CMU block supports for reinforcement shall not be permitted. Only special made wire bar supports or special cast, precast concrete blocks shall be allowed.
- C. All metal and plastic bar supports bearing on grade shall have continuous runners to prevent settlement during construction activities.
- D. Metal ties used for tying rebar shall be bent parallel to the rebar mat after tying. Do not allow tie ends to extend into the concrete cover zone.

3.04. CLEANING

- A. Prior to concrete deposition, reinforcing steel shall be free from mortar, mud, loose mill and rust scale, grease, oil or any other coatings, including ice, that would destroy or reduce bond with the concrete.

3.05. PREPARATION, MIXING, AND HANDLING OF CONCRETE

- A. Batch Plant Requirements - Measurement of materials at the batch plant shall be in accordance with ASTM C94.
- B. Mixing Methods - All concrete shall be ready mixed to meet the requirements of ASTM C94.

A written delivery slip or ticket, prepared and signed by the plant operator shall be made out at the proportioning plant for each truck load batch. Each slip shall show the following information:

- Truck number
- Date and time truck is batched
- Ticket number
- Mix designation of concrete (per paragraph 2.03.A)
- Cubic yards of concrete
- Cement brand, type and weight in pounds
- Weight in pounds of each size and type of aggregate
- Admixtures, brand and weight in pounds and ounces
- Moisture content of fine and coarse aggregates
- Water added to the batch at the plant
- Water added to the batch during transport
- Water added to the batch at the job site

The driver shall record the number of gallons of water added during transport and at the job site. In no case shall the w/c ratio be exceeded.

Any truck delivering concrete to the job site without a delivery slip will be rejected and shall immediately depart from the job site.

- C. Heating and Cooling of Materials - The batch plant shall be equipped to heat aggregates and water, or cool water with ice, and cool aggregates by shading and/or spraying with cool water to obtain acceptable concrete delivery temperatures in the range of 55 to 85 degrees F. Aggregates shall not contain ice or have frozen lumps nor shall they be heated to a temperature over 120 degrees F.
- D. Surface Preparation for Concrete Topping in Sulfuric Acid containment areas -SSPC-SP13 / NACE No.6 Surface Preparation of Concrete: The Contractor shall remove loose and deteriorated concrete and all existing coatings and contaminants by Abrasive Blast Cleaning, Ultra High Pressure Jetting, and/or Mechanical Cleaning in accordance with SSPC-SP13 / NACE No.6 the Surface Preparation of Concrete.

3.06. CONCRETE PLACEMENT

- A. The Contractor shall notify the Engineer (and Special Inspector when required) a minimum of 48 hours in advance of placement to allow sufficient time for inspection and for any corrective measures which are subsequently required.
- B. Concrete shall be placed in accordance with ACI 304 and ACI 318.
- C. Concrete shall be placed and vibrated in lifts not exceeding 30 inches.
- D. Curing and protection of the concrete shall begin immediately after completion of the finishing operation.
- E. Adjacent concrete placements (sections) shall not be placed anysooner than three days following placement of newly cast sections.

3.07. FORM REMOVAL

- A. The Contractor shall assume full responsibility for the strength of all components from which forms are removed.
- B. Forms and supports shall remain undisturbed until the concrete has attained sufficient strength to support its own weight in addition to any anticipated loads (temporary or permanent) that may be placed upon it during subsequent work. In no event shall forms be loosened or removed prior to 24 hours' wet cure time. Re-shore at midspan where necessary.
- C. Vertical forms such as beam side forms, column forms, and wall forms may be removed at any time after 24 hours, provided that stripping does not damage surfaces and such action does not endanger any part of the structure. Coordinate timing of form removal with rub finish requirements.

- D. No structural forms supporting suspended slabs or beams shall be removed prior to concrete attaining at least 80 percent of the required design strength and less than 14 days.
- E. Residue of the form release agent shall be completely cleaned off the concrete surface.

3.08. FINISHING

- A. The finish of all walls and slabs (vertical and horizontal surfaces, respectively) shall be as described below and in accordance with the schedules at the end of this Article.

B. As-Cast Wall Finishes

- 1. Type I - Rough Form Finish - Tie holes and defects shall be filled with patching mortar. Fins exceeding 1/4-inch in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imprinted by the forms.
- 2. Type II - Smooth Form Finish - The form facing material shall produce a smooth, hard, uniform texture on the concrete.

Tie holes and defects (including bugholes) shall be patched with a grout rubbing mixture as defined below. All fins shall be completely removed.

- C. Rubbed Wall Finishes - The following finishes shall be produced on concrete with a Type II smooth form finish. Where a rubbed finish is to be applied, the forms shall have been removed and necessary patching completed.

- 1. Type III - New Concrete, Smooth Rubbed Finish - New concrete is defined here as concrete less than seven days old.
 - a. The finishing shall be applied no later than the day following form removal (green concrete maximum seven days old). Surfaces shall be wetted and rubbed with a carborundum brick until uniform color and texture are produced.
 - b. No cement grout shall be used other than the cement paste drawn from the concrete itself by the rubbing process. Delayed application of Type III finish will not be accepted. A Type IV finish will be required.
- 2. Type IV - Old Concrete, Grout-Cleaned Rubbed Finish - Old concrete is defined here as concrete over seven days old that cannot be "green rubbed."
 - a. The walls shall have previously received a Type II finish. This finish will not hide projections caused by form slippage and alignment problems.
 - b. Large areas more than 12 feet high or 24 feet long shall be marked off with chalk lines to produce a uniform overall pattern.
 - c. A grout rubbing mixture shall be 1 part Portland cement and 1-1/2 parts fine sand mixed to a stiff masonry mortar consistency.

The sand and the Portland cement shall be obtained from the concrete plant where the concrete was purchased and shall be the same as used in the concrete.

- d. The surface shall be soaked with water. The surface being worked on shall not be in direct sunlight while finishing. Curing in direct sunlight is acceptable. Immediately after soaking, apply the grout rubbing mixture with a rubber or cork float. The material is spread to form a paste over the area being worked on.

The applicator shall always work to a wet edge.

If the area starts to visually lighten up or dry, water can be added by shaking a wetted brush onto the surface.

The coated area shall be permitted to set similar to waiting for a concrete floor to set.

- e. The applicator shall use a carborundum brick to vigorously work the material in a circular motion to a smooth rubbed finish. It is not intended to leave a thin grout coating or a “swirl” or “fan” pattern in the surface.
- f. Should the mixture start to dry out or get too stiff to work, the applicator may re-wet the wall with either a pump or brush.
- g. When the area is complete, it will be smooth and dark-to-medium grey in color. The smooth surface will be equal to a medium grade of sand paper with no evidence of patterns or individual rubbing strokes. No globs of excess material shall remain.
- h. Spray surface with liquid curing compound.
- i. When viewed from a distance about 10 to 20 feet, the concrete will appear to be a uniform grey, creamy smooth surface.

D. Slab Finishes - The finish of all slabs and top of walls shall be described below:

- 1. Type A - Floated Finish - After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Preferably a magnesium float will be used.

Floating shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10-foot straightedge.

If water has been brought to the surface by the rough floating operation, additional floating shall not proceed until this water has evaporated.

The slab is further floated, with all high spots cut down and all low spots filled during this procedure. The slab shall be finish floated to a uniform sandy texture.

- 2. Type B - Troweled Finish - The surface shall first receive a Type A floated finish. It shall then be power troweled and finally hand troweled for thorough consolidation. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall produce a ringing sound as the trowel is moved over the surface.

The finished surface shall be essentially free of trowel marks, uniform in texture and appearance. Finish Schedules

TABLE 030000-1 - WALL (VERTICAL) FINISHES

Type I	-
Type II	Smooth Form Finish – Interior wall surface of fill station.
Type III ⁽¹⁾	Smooth-Rubbed Finish – Exterior surface of fill station.

(1) Unacceptable Type III finish areas shall be refinished with a Type IV grout-cleaned rubbed finish.

TABLE 030000-2 – SLAB (HORIZONTAL) FINISHES

Type A	-
Type B	Troweled Finish – Ferric Sulfate containment area topping.
Type C	-

3.09. CURING AND PROTECTION

- A. All freshly placed concrete shall be protected from adverse weather elements, and from defacement. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provision shall be made for providing sufficient water for hydration and preventing loss of moisture from the concrete for at least a seven-day period.
- B. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on the newly cast concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the curing period.
- C. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.
- D. Walls and Columns (and Pilaster)
1. Immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moisture for at least the first 24 hours. The forms shall be intermittently re-moistened and the concrete shall remain tightly formed and covered thereafter for a total curing period of at least seven days.
 2. If forms are left in place for the entire seven-day cure, the forms can be loosened only after 24 hours to allow water to soak the sides of the concrete. If forms are loosened, continuous moisture shall be provided for the entire seven-day curing period. If forms are removed in less than seven days, the walls and columns shall be sprayed with water and tightly sealed with polyethylene or burlap combined with continuous water spray for the remainder of the seven-day period.
 3. If patching and finishing is done after the seven-day wall curing is completed, the walls shall be further cured by immediately spraying the entire wall surface with a heavy coating of liquid curing compound.
- E. Slabs and Other Flatwork
1. After finishing and immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, spray the surface with water to provide continuous moist curing for at least the first 24 hours.
 2. After the initial 24-hour period, soak with water and cover for an additional six days with waterproof paper or white polyethylene blankets. Wet burlap coverings may be used if the burlap is kept wet by continuous sprinkling with water. Lap the cover material at least 12 inches, covering the top and sides of the concrete.
 3. If cover material is not used, the concrete surfaces shall be kept continuously wet by spraying or other approved methods.

- F. In hot weather conditions (defined in ACI 305), provide curing procedures as outlined above along with additional provisions required by ACI 305.
- G. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on newly cast concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the curing period.

3.10. TESTING FOR QUALITY ASSURANCE

- A. The City shall hire and pay for the services of an independent testing laboratory to perform the testing for quality assurance. Any additional testing required due to deficient construction shall be paid for by the Contractor.
- B. This testing shall consist of calculation of w/c ratio; measuring slump; air content; and tests for the compressive strength. Four 6-inch diameter cylinders shall be made with 1 cylinder to be tested at 7 days, 2 cylinders to be tested at 28 days, and 1 cylinder to be tested at 56 days if the 28-day strengths are inadequate. These test results will be used by the Contractor to assist his control of quality.
- C. The Contractor shall schedule and provide 48 hours' notice to the independent testing laboratory. The Contractor shall provide free access to work and cooperate with the testing laboratory.
- D. In general, testing shall be required for each placement in excess of 5 cubic yards.
- E. Copies of all test reports shall be mailed directly to the Owner and Engineer by the testing laboratory as soon as they become available.

- 3.11. The Contractor shall accept all test results reported by the testing laboratory. Any disputed results shall be validated by an independent testing laboratory hired by the Contractor at their expense.

3.12. REPAIR OF NEWLY CAST CONCRETE

- A. Areas of concrete in which cracking, spalling, or other signs of deterioration develop during initial curing or thereafter until the end of the guarantee period shall be removed and replaced, or repaired in accordance with this Article.

The Contractor may propose to use a specific method most suitable to the situation and have the method approved by the Engineer prior to repair. The Contractor shall submit manufacturer's product data sheets and recommended application procedures to the Engineer for approval prior to performing repairs.

- B. Structural Cracks (as determined by Engineer) - Random shrinkage or structural cracks shall be repaired utilizing a low viscosity, 100 percent solids, two-component epoxy resin system.

Crack or void must be dry at time of application. Remove all dust, debris or disintegrated material from crack or void by use of oil-free compressed air or vacuuming or by other approved methods as may be required by manufacturer. After successful crack repair, remove temporary seal and excess adhesive. Clean surfaces adjacent to repair and blend finish.

Surface preparation, mixing, and application shall be in conformance with manufacturer's recommendations.

Prior to repair, Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.

- C. Leaking and/or Active Cracks (that are not structural cracks) – Leaking and active cracks shall be repaired utilizing a low viscosity, hydrophobic, closed cell polyurethane foam injection system.

Inject water into the crack to thoroughly flush out the crack and remove dirt, dust, and contaminants. Follow flush water by injecting urethane foam with accelerating catalyst as required. After successful crack repair, continue wall preparation by removing injection ports and grind to remove excess injection material and surface seal. Patch port holes and blend wall finish with surrounding area.

Surface preparation, mixing, and application shall be in conformance with manufacturer's recommendations.

Prior to repair, Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.

- D. Excessive surface cracking in concrete slabs as defined herein shall receive a penetrating epoxy resin sealer to seal the cracks.

Excessive cracking shall be defined as areas containing "craze cracking" or "map cracking" as defined by ACI 201.1. In the event that excessive cracking occurs in isolated areas of a given concrete slab, sealer could only be required in the area of the cracks bounded by construction or control joints pending Engineer approval.

Surface preparations, priming, mixing, application and finishing shall be in accordance with the manufacturer's recommendations. Epoxy resin penetrating sealer shall be "Sikadur 55 SLV" by Sika Corporation, or equal. Contractor shall submit a suitable remedial product and installation procedures to the Engineer for approval.]

- E. All spalled, weakened, damaged or disintegrated concrete and areas of honeycombing shall be removed to sound concrete.

For spalled or honeycombing areas involving depths generally less than 3 inches, utilize a polymer-modified cementitious repair mortar, such as Sika Corporation "Sikatop 122 or 123," Euclid Chemical Company "Verticoat," BASF Construction Chemicals "HB2 Repair Mortar," or equal.

Surface preparation, mixing, priming and application shall be in conformance with manufacturer's recommendations.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install metal fabrications including shop-fabricated metal items, ledge and shelf angles, structural supports for miscellaneous attachments, anchor bolts and all other required accessories in accordance with the Contract Documents.

1.02. RELATED SECTIONS

- A. Section 03 00 00 – Concrete
- B. Section 09 96 00 – High Performance Coatings

1.03. REFERENCES

AA DAF-45	Designation System for Aluminum Finishes
AAMA 611	Voluntary Specification for Anodized Architectural Aluminum
AAMA 2603	Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
AAMA 2604	Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels
AAMA 2605	Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels
ANSI A14.3	American National Standard (ASC) for Ladders - Fixed - Safety Requirements
AWS A2.4	Standard Symbols for Welding, Brazing, and Nondestructive Examination
AWS D1.1/D1.1M	Structural Welding Code - Steel
AWS D1.6/D1.6M	Structural Welding Code - Stainless Steel
ASTM A36/A36M	Standard Specification for Carbon Structural Steel
ASTM A53/A53M	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123/A123M	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A193/A193M	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications
ASTM A240/A240M	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASTM A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
ASTM A276	Standard Specification for Stainless Steel Bars and Shapes
ASTM A307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

STM A312/A312M	Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
ASTM A325	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A354	Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
ASTM A500/A500M	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A554	Standard Specification for Welded Stainless Steel Mechanical Tubing
ASTM A563	Standard Specification for Carbon and Alloy Steel Nuts.
ASTM A572/A572M	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A653/A653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A666	Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A992/A992M	Standard Specification for Structural Steel Shapes
ASTM B26/B26M	Standard Specification for Aluminum-Alloy Sand Castings
ASTM B85	Standard Specification for Aluminum-Alloy Die Castings
ASTM B177	Standard Guide for Engineering Chromium Electroplating
ASTM B209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B210	Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes
ASTM B211	Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire
ASTM B221	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B695	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM F436	Standard Specification for Hardened Steel Washers
ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ANSI/BHMA A156.20	American National Standard for Strap and Tee Hinges and Hasps
GC-03	Green Seal Environmental Criteria for Anti-Corrosive Paints
NOMMA Guideline 1	Joint Finishes
SSPC	Steel Structures Painting Manual
SSPC Paint 15	Steel Joist Shop Primer/Metal Building Primer
SSPC Paint 20	Zinc-Rich Coating (Type I - Inorganic and Type II - Organic)
SSPC SP 1	Solvent Cleaning
SSPC SP 10	Near-White Blast Cleaning

1.04. SUBMITTALS

- A. Provide in accordance with Section 01 33 00, Submittal Procedures and as supplemented herein. Submittals shall include, but not be limited to, the following:
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

- C. Samples: Submit two, 2 inch by 2 inch size sets of samples, illustrating available factory finishes.
- D. Welders Certificates: Certify welders employed on the Works, verifying AWS D1.1 qualification within previous 12 months.
- E. Field Quality Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statement: Submit qualifications for licensed professional.

1.05. QUALITY ASSURANCE

- A. Finish joints according to NOMMA Guideline 1 finish #3 or better.
- B. Certifications: Provide certificate of compliance from manufacturer(s), certifying that all materials furnished comply with the contract documents.

1.06. DELIVERY, STORAGE AND HANDLING

- A. Deliver products in original packaging, labeled with product identification, manufacturer and batch number.
- B. Inspection: Accept metal fabrications on Site in labeled shipments. Inspect for damage.
- C. Protect metal fabrications from damage by exposure to weather or by ground contact.

1.07. EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on the Shop Drawings.

PART 2 PRODUCTS

2.01. LEDGE AND SHELF ANGLES

- A. Ledge and Shelf Angles not attached to Structural Framing:
 - 1. For support of metal grating
- B. Finish: to match supported object.

2.02. STRUCTURAL SUPPORTS

- A. Description: Steel sections, shape and size as shown on the Drawings.
- B. Finish: galvanized, primed, and painted.

2.03. ANCHORS

- 1. Description: ASTM F1554; Grade 55, unless noted otherwise.
- 2. Shape: as shown on plans.
- 3. Furnish with nut and washer.
- 4. Finish: galvanized unless noted otherwise.

B. Epoxy Adhesive Anchors:

1. Manufacturers:
 - a. Hilti, Inc.
 - b. Simpson Strong-Tie Co., Inc.
 - c. Substitutions: According to Section 01 60 00.
2. Adhesive: as shown on plans

C. Threaded Rod: as shown on plans

D. Steel:

1. Structural W Shapes: ASTM A992.
2. Structural Shapes: ASTM A36
3. Channels and Angles: ASTM A36.
4. Steel Plate: ASTM A572 Grade 50.
5. Hollow Structural Sections: ASTM A500, Grade B.
6. Steel Pipe: ASTM A53, Grade B, Schedule 40 unless noted otherwise.
7. Sheet Steel: ASTM A653, Grade 33 Structural Quality.
8. Bolts: ASTM A325 Type 1.
9. Nuts: ASTM A563 heavy-hex type.
10. Washers: ASTM F436 Type 1.
11. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

E. Stainless Steel:

1. Bars and Shapes: ASTM A276 Type 316.
2. Tubing: ASTM A269 Type 316.
3. Pipe: ASTM A312, welded; Type 316.
4. Plate, Sheet, and Strip: ASTM A240 Type 316. Bolts, Nuts, and Washers: ASTM A354.
5. Welding Materials: AWS D1.6/D1.6M; type required for materials being welded.

F. Aluminum:

1. Extruded Aluminum: ASTM B221/B221M Alloy 6063, Temper T6.
2. Sheet Aluminum: ASTM B209 Alloy 6061, temper T6.
3. Aluminum-Alloy-Drawn Seamless Tubes: ASTM B210 Alloy 6063, Temper T6.

4. Aluminum-Alloy Bars: ASTM B211 Alloy 6063, Temper T6.
5. Aluminum-Alloy Sand Castings: ASTM B26, Alloy
6. Bolts, Nuts, and Washers: Stainless steel.
7. Welding Materials: AWS D1.2; type required for materials being welded.

2.04. FABRICATION

- A. Fit and shop-assemble items in largest practical sections for delivery to the Site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small, uniform radius.
- E. Fabrication Tolerances:
 1. Squareness: 1/8 -inch maximum difference in diagonal measurements.
 2. Maximum Offset Between Faces: 1/16 inch.
 3. Maximum Misalignment of Adjacent Members: 1/16 inch.
 4. Maximum Bow: 1/8 inch in 48 inches.
- F. Maximum Deviation from Plane: 1/16 inch in 48 inches.

2.05. FINISHES

- A. Steel:
 1. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
 2. Do not prime surfaces in direct contact with concrete or where field welding is required.
 3. Prime-paint items with two coats except where galvanizing is specified.
 4. Galvanizing: ASTM A123; hot-dip galvanize after fabrication.
 5. Galvanizing for Fasteners, Connectors, and Anchors:
 - a. Hot-dip Galvanizing: ASTM A153.
 6. Bolts: Hot-dip galvanized.
 7. Nuts: Hot-dip galvanized.
 8. Washers: Hot-dip galvanized.
 9. Shop Primer: SSPC Paint 15, Type 1, red oxide.

10. Touchup Primer: Match shop primer.
11. Touchup Primer for Galvanized Surfaces:
 - a. SSPC Paint 20, Type I – Inorganic.
 - b. ASTM A780.
- B. Stainless Steel:
 1. Satin-polished Finish: Number 4, satin directional polish parallel with long dimension of finished face.
 2. Mirror-polished Finish: Number 8, mirror polish with preliminary directional polish lines removed.
- C. Aluminum:
 1. Exterior Aluminum Surfaces:
 - a. Two-step anodized to clear color, to 7 mil thickness.
- D. Apply two coats of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02. PREPERATION

- A. Clean and strip primed steel items to bare metal and aluminum where Site welding is required.
- B. Supply steel items required to be cast into concrete with setting templates to appropriate sections.

3.03. INSTALLATION

- A. Install items plumb and level, accurately fitted, and free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment until permanent bracing and attachments are installed.
- C. Field-weld components shown on the Drawings.
- D. Perform field welding according to AWS D1.1/D1.1M.
- E. Obtain approval of ENGINEER prior to Site cutting or making adjustments not scheduled.

3.04. TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story or for every 12 feet in height, whichever is greater, non-cumulative?

- B. Maximum Variation from Level: 1/16 inch in 3 feet and 1/4 inch in 10 feet.
- C. Maximum Offset from Alignment: 1/4 inch.
- D. Maximum Out-of-Position: 1/4 inch.

3.05. FIELD QUALITY CONTROL

- A. Welding: Inspect welds according to AWS D1.1/D1.1M.
- B. Replace damaged or improperly functioning hardware.
- C. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.
- D. Touch up factory-applied finishes according to manufacturer-recommended procedures.

3.06. ADJUSTING

- A. Adjust operating hardware and lubricate as necessary for smooth operation.

END OF SECTION

SECTION 05 52 00

HANDRAILS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Aluminum pipe guardrails and handrails (both referred to as railing).
- B. Railing to be assembled using non-welded components with internal splice insert system that produces a consistent outside diameter of fittings and railing.

1.02. RELATED SECTIONS

- A. Section 03 00 00 – CONCRETE
- B. Section 05 50 00 – METAL FABRICATIONS
- C. Section 09 96 00 – HIGH PERFORMANCE COATINGS

1.03. REFERENCES

ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes
ASTM B221	Aluminum-Alloy 6063 Extruded Bars, Rods, Wire, Shapes, and Tubes
ASTM B241	Aluminum-Alloy 6063 Seamless Pipe and Extruded Tube

1.04. DESIGN REQUIREMENTS

- A. Railing assembly, wall rails, and attachments to resist the maximum force from a concentrated lateral load of 200 lbs. or a uniform load of 50 lbs. per linear foot at any point or direction without damage or permanent set. Vertical posts must withstand concentrated load applied at the top of 200 lbs. with a 4 foot 0 inch maximum post spacing.

1.05. DELIVERY, STORAGE AND HANDLING

- A. Protect from corrosion, deformation and other types of damage. Store items in an enclosed area free from contact with soil and weather. Replace damaged items with new materials.

1.06. SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, accessories, materials, and finishes.
- B. Provide detailed shop fabrication and erection drawings to include connections, fittings, complete bill of materials, finishes, etc.
- C. Product Data: Provide single-page catalog cut sheets on all manufactured items.
- D. Samples: Submit one each for aluminum and fiberglass 12-inch long assembled sample of railing. Sample to include one elbow, tee, wall bracket, toeboard, escutcheon, end stop, and base detail showing orientation to run of railing. Sample shall represent quality of workmanship and welding as applicable.

1.07. FIELD MEASUREMENTS

- A. Field verify all dimensions before fabrication.

1.08. COORDINATION

- A. Where work of this section is required to tie into the work of other sections, the Prime Contractor shall coordinate such tie-in.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Julius Blum and Company: Connectorail system with #7571 floor flange or #757/758 fascia flange (aluminum).
- B. Moultrie Mfg. Company: Wesrail II system with #W32612 base or #WIISMBEXT side-mount bracket (aluminum).
- C. Tubular Specialties Mfr., Inc.: Adaptarail system with #662 floor flange (aluminum).
- D. Strongwell: Product: SAFRAIL handrail system (fiberglass).
- E. Fibergrate Composite Structures: Product: Dynarail handrail system (fiberglass).
- F. IKG Borden: Product: CorGrip modular handrail system (fiberglass).
- G. Or equal. Substitutions are allowed provided that the submitted manufacturer can demonstrate satisfaction of load requirements as stated above.

2.02. ALUMINUM RAILING SYSTEM

- A. Rails: 1-1/2-inch diameter, extruded aluminum Schedule 40 pipe per ASTM B241. Roll rails to match radius of structure.
- B. Posts: 1-1/2-inch diameter, extruded aluminum per ASTM B241.
 - 1. Use Schedule 40 pipe at top-mounted systems.
 - 2. Use Schedule 80 pipe at side-mounted systems.
- C. Fittings: Elbows, T-shapes, wall brackets, escutcheons; machined aluminum.
- D. Welded components require aluminum filler alloy 5356 to improve color match after anodizing treatment.
- E. Mounting: Pre-manufactured, heavy duty, four-bolt floor flange with internal reinforcement post or side-mount fixture.
- F. Splice Connectors: Concealed spigot machined aluminum.
- G. Exposed Fasteners: Flush countersunk stainless steel screws or bolts; consistent with design of railing.
- H. Vertical posts to be spaced at 4 feet 0 inches o.c. maximum.
- I. Toeboards shall be manufacturer's standard, OSHA compliant, rolled to match curved handrail.

2.03. FABRICATION

- A. Fabricate aluminum railing with compatible connectors, fittings and fasteners. Joints to be mechanical without welding. Provide floor and wall brackets, terminals, flanges and caps, etc., as indicated and required for complete installation. Railing details to be as indicated.

- B. Fit and shop assemble components in largest practical sizes, for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Supply components required for anchorage of fabrications. Fabricate related components of same material and finish as fabrication.
- E. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- F. Accurately form components to suit stairs, landings, and building structure. Terminate stair handrails as indicated.
- G. All railings shall be protected from entrapped water and from temperature-induced stresses. The railing manufacturer shall provide weep holes and expansion joints.
- H. Toeboards shall be provided at all railings whether shown or not. Toeboards shall be fastened at each post. Provide expansion joints at 20 feet 0 inches maximum intervals with 1/4-inch opening rolled to match curved handrail.
- I. Install toeboards up to and in front of all sluice gates and slide gate guides.

2.04. FINISHES

- A. Aluminum railing systems shall receive an Architectural Class I clear anodized finish.
- B. Aluminum toeboards shall be mill finish.
- C. Fiberglass railing to be factory color throughout.
- D. Backpaint aluminum surfaces in contact with concrete or masonry with bituminous paint.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.

3.02. PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete and embedded in masonry.

3.03. DISSIMILAR MATERIALS

- A. Make connections using stainless steel fasteners.
- B. Aluminum in contact with concrete or masonry to be backpainted.

3.04. INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.

- C. Provide and install anchors, plates or angles required for connecting railings to structure.
- D. Field weld as required on shop drawings. Grind welds smooth.
- E. Conceal bolts and screws whenever possible.

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb: 1/4-inch.
- B. Maximum Offset From True Alignment: 1/4-inch.

END OF SECTION

SECTION 06 61 00

FRP PULTRUDED PEDESTRIAN GRATING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, fabricate (where necessary), and install all fiberglass reinforced plastic (FRP) items, with all appurtenances, accessories and incidentals necessary to produce a complete, operable and serviceable installation as shown on the Contract Drawings and as specified herein, and in accordance with the requirements of the Contract Documents.

1.02. RELATED SECTIONS

- A. 01 33 00 Submittal Procedures

1.03. REFERENCES

- A. ASTM D635 - Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
- B. ASTM D 732 - Shear Strength of Plastics by Punch Tool
- C. ASTM E 84 - Surface Burning Characteristics of Building Materials

1.04. SUBMITTALS

- A. Provide in accordance with Section 01 33 00, Submittal Procedures and as supplemented herein. Submittals shall include, but not be limited to, the following:
- B. Shop Drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
- C. Furnish manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
- D. Submit the manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.
- E. Sample pieces of each item specified herein for acceptance by the Engineer as to quality and color. Sample pieces shall be manufactured by the method to be used in the Work

1.05. QUALITY ASSURANCE

- A. All items to be provided under this Section shall be furnished only by manufacturers having a minimum of ten (10) years experience in the design and manufacture of similar products and systems. Additionally, if requested, a record of at least five (5) previous, separate, similar successful installations in the last five (5) years shall be provided. Manufacturer shall offer a 3 year limited warranty on all FRP products against defects in materials and workmanship.
- B. Manufacturer shall be certified to the ISO 9001 standard.
- C. Manufacturer shall provide proof of certification from at least two other quality assurance

programs for its facilities or products (DNV, ABS, USCG, AARR).

1.06. DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
- B. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.existing conditions.

1.07. EXISTING CONDITIONS

- A. Verify field measurements prior to fabrication. Indicate field measurements on the Shop Drawings.

PART 2 PRODUCTS

2.01. MANUFACTURER

- A. Fibergrate Composite Structures - Products: Fiberglass square mesh, molded, non-slip platform grating. Fibertred rectangular mesh stair treads. Fibergrate EZ angle frame. Use Fibergrate "Vi-Corr" resin system.
- B. Or equal.

2.02. GENERAL

- A. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
- B. Fiberglass reinforcement shall be a combination of continuous roving, continuous strandmat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.
- C. Resins shall be vinyl ester with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.
- D. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
- E. All pultruded structural shapes shall be further protected from ultraviolet (UV) light with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to help produce a resin rich surface.
- F. All FRP products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test. Gratings shall not burn past the 25 mm reference mark and will be classified HB per ASTM D635.
- G. All grating clips shall be manufactured of Type 316SS (stainless steel).

2.03. FIBERGLASS GRATING

- A. Shall be made with a compression molded process using an extra corrosion-resistant vinyl ester resin system; manufacturer's standard color impregnated throughout material.
- B. Fiberglass grating and treads shall have an integral non-slip surfacemolded onto the wear surface.

2.04. FIBERGLASS FRAMES

- A. Fiberglass frames cast into concrete shall be made with a pultrusion process using an extra corrosion-resistant vinyl ester resin system.

PART 3 EXECUTION

3.01. INSPECTION

- A. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits.

3.02. INSTALLATION

- A. Contractor shall install gratings and frames in accordance with manufacturer's assembly drawings. Lock grating panels securely in place with hold-down fasteners as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

END OF SECTION

SECTION 09 96 00

HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Contractor shall provide protective coatings and special preparation of surfaces, complete and in place, in accordance with the City standards and Contract Documents.
- B. The Contractor shall field prime and finish coat all bare ferrous metal surfaces of new structures, equipment, and appurtenances scheduled to receive the Work. Surfaces that are not scheduled to receive coating system included:
 - 1. Galvanized steel.
 - 2. Stainless steel Work.
- C. The Contractor shall finish coat all shop-primed ferrous metal surfaces of new structures, equipment, piping, and appurtenances.
- D. The Contractor shall touch up paint all shop-finished metal surfaces.

1.02. RELATED SECTIONS

- A. Section 01 10 00 – Supplementary Summary of Work Provisions.
- B. Section 43 21 43 – Sump Liquid Pumps.

1.03. REFERENCES

ANSI/AWWA C104	Cement-Mortar Lining for Ductile Iron Pipe and Fittings
ANSI/AWWA C550	Protective Coatings For Valves
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D522	Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings (Method A, Conical Mandrel)
ASTM D870	Standard Practice for Testing Water Resistance of Coatings Using Water Immersion
ASTM D1014	Standard Practice for Conducting Exterior Exposure Tests of Paints and Coatings on Metal Substrates
ASTM D1653	Moisture Vapor Transmission
ASTM D2794	Impact
ASTM D3363	Hardness
ASTM D4541	Adhesion (Type II Fixed Alignment Adhesion Tester)
ASTM D4541	Adhesion (Type V Self-Aligning Adhesion Tester)
ASTM D4585	Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation
ASTM D16	Standard Terminology for Paint-Related Coatings, Materials, and Applications
ASTM D4060	Abrasion Resistance (CS-17 Wheel, 1000 Grams Load)
ASTM D3359	Adhesion by Tape Test
ASTM G53	QUV Exposure (UVA-340 Bulbs, 4 Hours Light, 4 Hours Dark)
ASTM G85	Prohesion
ACE	NACE International (formerly "National Association of Corrosion Engineers") – Certification Program
NSF International	ANSI/NSF Standard 61

SSPC-Volumes I and II	Steel Structures Painting Council - Steel Structures Painting Manual
SSPC-SP1	Solvent Cleaning
SSPC-SP2	Hand Tool Cleaning
SSPC-SP3	Power Tool Cleaning
SSPC-SP5	White Metal Blast Cleaning
SSPC-SP6	Commercial Blast Cleaning
SSPC-SP7	Brush-Off Blast Cleaning
SSPC-SP10	Near-White Metal Blast Cleaning
SSPC-SP11	Power Tool Cleaning to Bare Metal
SSPC-SP16	Brush-Off Blast Cleaning of Coated and Uncoated galvanized Steel, Stainless Steels, and Non-Ferrous Metals
N.S.F. (National Sanitation Foundation)	

1.04. DEFINITIONS

- A. The term “coatings”, “finishes”, or “paint” as used herein, shall include surface treatments, emulsions, enamels, paints, epoxyresins, and other protective coatings, whether used as a pretreatment, primer, intermediate coat, or finish coat.
- B. The term “DFT” means minimum dry film thickness, without any negative tolerance.

1.05. REGULATORY REQUIREMENTS

- A. The Contractor shall comply with all City standards for painting and protective coatings.

1.06. SUBMITTALS

- A. Submittals shall include a complete schedule of coating systems and surface preparations proposed.
 1. List all interior and exterior surfaces and all major equipment to be coated.
 2. The schedule is to reflect the approved manufacturer’s recommendations, and include certification that a qualified manufacturer’s representative has reviewed and approved the schedule. The qualified manufacturer’s representative shall hold current NACE certification as a Coating Inspector, Protective Coatings Specialist, or Materials Selection/Design Specialist.
 3. As a minimum, schedule shall itemize each coated item or surface and shall contain the following information in tabular format:
 - a. Type of surface preparation (note whether shop or field preparation).
 - b. Coating System (generic name).
 - c. Prime Coat (product, number of coats, DFT per coat, square feet coverage per gallon).
 - d. Intermediate coat, if required (product, number of coats, DFT percoat, square feet coverage per gallon).
 - e. Finish coat (product, number of coats, color, DFT per coat, square feet coverage per gallon).
 - f. Painting status at time of installation.
 - g. Remarks (any special treatment or application requirements, etc.)

B. Manufacturer Information:

1. Provide manufacturer Data Sheet for each product proposed, including statements on the suitability of the material for the intended use.
2. Provide technical and performance information that demonstrates compliance with system performance and material requirements.
3. Provide manufacturer's instructions and recommendations on surface preparation and application.
4. Provide Material Safety Data Sheet for each product proposed.
5. Provide Manufacturer's certification of coating system and approval of installation.

C. Experience Requirements:

1. Field Applicator Experience Requirements:

- a. Unless the Contractor has a successful experience record on projects of similar size and nature, all field painting shall be by an approved coating Subcontractor.
- b. Submit coating experience records of proposed Contractor or Subcontractor for approval. Include size (area of coating), time of completion, name, the City's address, and telephone number for each experience record.
- c. Provide SSPC QP 1 Certification or the manufacturer's certification of the applicator for the specified coating system.
- d. Provide a written statement from the Contractor or subcontractor stating that they are qualified and experienced in the application of the specified coating systems. The letter shall state the manufacturer and model number of any mixing, heating, and pumping equipment to be used to apply the specified coating systems.

2. Shop Applicator Experience Requirements:

- a. NACE Coating Inspector Program certification documents for Quality Assurance/Quality Control representative at manufacturer facility. This representative will be responsible for submitting inspection reports to the City.
- b. A copy of typical Quality Assurance/Quality Control inspection report containing coating schedule items.
- c. Submit coating experience records that verify that shop painting has demonstrated successful application of specified coatings on projects of similar size and nature. Include size (area of coating), time of completion, name, the City's address, and telephone number for each experience record.
- d. The Shop Coating Applicator shall provide SSPC QP 3 certification or the coating manufacturer's certification of the applicator for the selected coating system.

1.07. SAMPLES

- A. Two sets of color samples from the manufacturer's standard color sheets to match City standards. If custom mixed colors are indicated, the color samples shall be made using color

formulations prepared to match the color samples approved by City standards. The color formula shall be shown on the back of each color sample.

1.08. EQUIPMENT WARRANTIES AND SPECIAL GUARANTEES

- A. All coating systems shall be provided with a three (3) year warranty.
- B. An inspection may be conducted during the eleventh month following completion of coating work. The Contractor and a representative of the coating material manufacturer shall attend this inspection.
- C. Defective work shall be repaired in accordance with these specifications and to the satisfaction of the City. The City may, by written notice to the Contractor, reschedule the inspection to another date within the one year correction period or may cancel the inspection altogether.
- D. The Contractor is not relieved of its responsibilities to correct defects, whether or not the inspection is conducted.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Materials shall be as manufactured by Tnemec Company, Inc., Sherwin-Williams; or equal
- B. Where thinning is necessary, only the products of the particular manufacturer furnishing the paint shall be used and all such thinning shall be done in strict accordance with the manufacturer's instructions.
- C. Pipe and conduit labels as manufactured by Seton Nameplate Corporation or EMED Company, Inc.

2.02. MATERIALS

A. Exterior Chemical Storage Tanks

CHEMICAL	TNEMEC	SHERWIN-WILLIAMS
Ferric Sulfate	<ul style="list-style-type: none"> • Abrasive Blast • Series 94-H2O Primer (3.5 mils) • Series 215 Pit Filler 	<ul style="list-style-type: none"> •
CHEMICAL	TNEMEC	SHERWIN-WILLIAMS
	<ul style="list-style-type: none"> • Series 27WB Stripe Coat (8.0 mils) • Series 27WB Intermediate Coat (8.0 mils) • Series 1095 finish Coat (5.0 mils) 	

Sulfuric Acid	<ul style="list-style-type: none"> • Abrasive Blast • Series 94-H2O Primer (3.5 mils) • Series 215 Pit Filler • Series 27WB Stripe Coat (8.0 mils) • Series 27WB Intermediate Coat (8.0 mils) • Series 1095 finish Coat (5.0 mils) 	•
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B. Interior Chemical Storage Tanks

CHEMICAL	TNEMEC	SHERWIN-WILLIAMS
Sulfuric Acid	<ul style="list-style-type: none"> • Abrasive Blast • Series 94-H2O Primer (3.5 mils) • Series 215 Pit Filler • Series 27WB Stripe Coat (8.0 mils) • Series 27WB Intermediate Coat (8.0 mils) • Series 1095 finish Coat (5.0 mils) 	•

C. All materials which will be in contact with potable water shall be approved by the National Sanitation Foundation and appropriate state and local health departments. Contractor shall submit evidence of approval for all applicable materials.

D. All materials which will be in contact with chemicals shall be compatible with said chemical per manufacturer's experience and recommendations.

E. All materials used on this project, whether shop applied by equipment manufacturer or field applied by Contractor or approved subcontractor, shall comply with all current federal, state and local Clean Air Act-related regulations. It shall be the responsibility of equipment manufacturers to comply with laws in effect at their painting facilities. Where laws or regulations prohibit field applications of any scheduled paint product, Contractor shall submit for Engineer's approval, an alternate product of similar performance characteristics which complies with those laws. If approved, those products shall be provided at no additional cost to the Owner.

F. Pipe and Conduit Labels

1. Shall be removable semi-rigid plastic (not pressure-sensitive) identification markers meeting all applicable ANSI and OSHA standards.
2. Contractor is advised that, due to nature of this project, labels may require custom fabrication.

PART 3 EXECUTION

3.01. EXAMINATION

A. Ensure that substrate conditions are ready to receive work in accordance with the Contract Documents and the product manufacturer's written instructions.

- B. Examine surfaces scheduled to be finished prior to the commencement of work. Correct any condition that may potentially affect proper application.

3.02. ENVIRONMENTAL REQUIREMENTS

- A. No coating work shall be performed under the following conditions:
 - 1. Surface or ambient temperatures exceed the manufacturer's recommended maximum or minimum allowable.
 - 2. Dust or smoke laden atmosphere.
 - 3. Damp or humid conditions, where relative humidity is above manufacturer's maximum allowable.
 - 4. Substrate and ambient temperatures are less than 5 degrees F above the dewpoint and are decreasing
 - a. Dew point shall be measured by use of an instrument such as a Sling Psychrometer in conjunction with U.S. Department of Commerce, Weather Bureau psychrometric tables. Elcometer 319 Dew Point Meter or equal may be used.
 - 5. Ambient temperature that is expected to drop below 50 degrees F or less than 5 degrees F above the dew point within 8 hours after application of coating.

3.03. SURFACE PREPARATION

- A. All surfaces to be painted and coated shall be prepared with the objective of obtaining a clean and dry surface free from dust, rust, scale, and all foreign matter. No painting or coating shall be done before surfaces meet requirements of manufacturer.
- B. Hardware accessories, machined surfaces, plates, and similar items in place prior to cleaning and coating, and not intended to be coated, shall be protected or removed during painting and coating operations and repositioned upon completion of the painting and coating operations. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces.
- C. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.
- D. Care shall be exercised not to damage adjacent works during blasting operations. Spraying shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair all damages to adjacent works or adjoining property occurring from blasting or coating operations.
- E. Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly coated surfaces.
- F. The Contractor shall comply with the applicable federal, state, and local air-pollution control regulations for blast cleaning.
- G. If the required abrasive blast cleaning will damage adjacent works, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, than SSPC-SP2 or SSPC-SP3 may be used.
- H. Ferrous Metals:

1. All ferrous metals to be primed shall have all rust, dust, and scale removed by abrasive blast cleaning in accordance with SSPC (Steel Structures Painting Council) procedures designated in the Specifications or Contract Drawings. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent rusting. If rusting beyond ASTM Rust Grade 8 occurs in the field, rusted portions of shop-primed ferrous metals shall be field-cleaned in accordance with SSPC blast cleaning specification appropriate for service and immediately field primed.
 2. All ferrous metals not primed in shop shall be abrasive blast cleaned to SSPC-SP10 Near White Blast or an SSPC-SP6 Commercial Blast, depending on exposure, prior to application of any primer, pretreatment, or paint.
 3. Grease, oil, and welding fluxes shall be removed per SSPC SP1.
 4. All sharp edges shall be rounded or chamfered and all burrs, rust, scale, welding lag, and spatter shall be removed and the surface prepared by SSPC SP2 Hand Tool Cleaning, and SSPC SP3 Power Tool Cleaning.
- I. Nonferrous Metals
1. All nonferrous metals, whether shop or field primed, shall be solvent cleaned (SSPC-SP1) prior to application of primer.
- J. Concrete:
1. All concrete surfaces shall be cleaned of all dust, oil, curing compounds, and other foreign matter before paints or coating are applied. Poured concrete and submerged surfaces to be painted shall be prepared using the following method:
 - a. Blasting:
 - 1) Brush-off abrasive blast cleaning of concrete shall be described as lightly abrading the surface without entirely removing surface or exposing underlying aggregate. Brush-off abrasive blasting shall open up subsurface holes and voids, etch the surface sufficiently for coatings to bond, and adhere at a satisfactory level. Care shall be taken during blasting that concrete is not excessively eroded.
 - a) Dry abrasive blasting equipment with a compressed air nozzle shall be used for blasting concrete. After blast cleaning is complete, abrasive dust and loose particles shall be removed from surface by vacuuming and blowing off with high pressure air. Voids and cracks that will cause discontinuities in coatings or unsightly appearances shall be patched.
 - b) All floor and tank drains subject to abrasive spray shall be plugged prior to blasting. After blasting is completed, all abrasives shall be removed from area prior to opening drains. Under no circumstances shall abrasives be allowed to enter tank or floor drains.
- K. Prior to Coating:
1. Old paint surfaces on concrete and ferrous metal shall be prepared by abrasive blast cleaning in accordance with appropriate SSPC method for the service, as applicable.
- L. Touchup:

1. Any abraded areas of field or shop applied coatings shall be touched up with the same type of field or shop applied coating, even to the extent of applying an entire coating, if necessary. Touchup coatings and surface preparations shall be in addition to and not considered at the first field coat.

M. Shop primed equipment shall be solvent-cleaned in the field before finish coats are applied.

3.04. APPLICATION

- A. The application of protective coatings to steel substrates shall be in accordance with SSPC PA1 – Paint Application Specification No. 1.
- B. The Contractor shall be responsible for cleanliness of all painting operations and use covers and masking tape to protect Work. Contractor shall protect not only his own Work, but also all adjacent Work and materials by adequate covering with drop cloths.
- C. The Contractor shall maintain a daily epoxy coatings induction record log showing each epoxy paint-mixing event. A signed copy of this log shall be turned over to the Engineer's field representative before the end of each working day during which epoxy coatings are mixed or applied.
- D. Any unwanted paint or coating material shall be carefully removed without damage to finished paint or surface. If damage does occur, the entire surface adjacent to and including damaged area shall be repainted without visible lap marks.
- E. Do not use plumbing fixture or waste piping for mixing of paint or disposal of any refuse material. All waste shall be disposed of properly into a suitable receptacle located outside of building.
- F. All coating and painting shall be applied without runs, sags, thin spots, or unacceptable marks. Coating and paint shall be applied at the rate specified to achieve minimum DFT required. Additional coats shall be applied, if necessary, to obtain DFT specified.
- G. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. The Contractor shall use an independent stripe coat per SSPC PA Guide 11 for these areas. Particular care shall be used to ensure that the specified coverage is secured on the edges and corners of all surfaces.
- H. Special attention shall be given to materials that will be joined so closely together that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.
- I. No painting whatsoever shall be accomplished in rainy or excessively damp weather when the relative humidity exceeds 85 percent, or when the general air temperature cannot be maintained at 50 degrees F (10 degrees C) or above throughout entire drying period.
- J. Application shall be by spraying where recommended by manufacturer. If material has thickened or must be diluted for application by spray gun, each coat shall be built up to the same film thickness achieved with undiluted brushed-on material. Where thinning is necessary, such thinning shall be done in strict accordance with manufacturer's instructions.
- K. A minimum of 24 hours drying time shall elapse between applications of any two coats of paint on a particular surface, unless otherwise recommended by coating manufacturer. Longer drying times may be required for abnormal conditions in concert with manufacturer's recommendations.
- L. Unburied steel piping shall be abrasive blast cleaned and primed prior to installation.
- M. Finish coats shall be applied after concrete and equipment installation is complete, and working areas are clean and dust free.

3.05. CURING OF COATINGS

- A. The Contractor shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer prior to placing the completed coating system into service.
- B. In the case of enclosed areas or forced air ventilation, using heated air, if necessary, may be required until the coatings have fully cured.

3.06. IDENTIFICATION OF PIPING

- A. Piping labels shall be located as follows:
 - 1. Adjacent to each valve and fitting (except at pump suction and discharge connections where labels are required on headers only).
 - 2. At each branch and riser take-off.
 - 3. At each pipe passage through wall, floor or ceiling.
 - 4. Maximum distance between labels shall be 10 feet on all non-potable water, chemical piping, and on all chlorine solution lines with a minimum of two labels in each room, gallery, or tunnel. Maximum distance between labels on all other piping runs shall be 20 feet.
- B. Identification lettering shall be located midway between color coding bands where possible and shall be properly inclined to pipe axis to facilitate easy reading. In the event lettering and arrow identifications are required for piping less than 3/4-inch in diameter, the Contractor shall furnish and attach approved color coded tags where instructed.
- C. Apply piping labels in accordance with Section 40 05 13.19, Stainless Steel Process Piping, and F.A.C. 62-610.469(7) (f). All lettering shall have an overall height in inches, in accordance with the following table:

Diameter of Pipe or Pipe Covering	Height of Lettering
3/4 to 1-3/8 inches	1/2 inch
1-1/2 to 2-3/8 inches	3/4 inch
2-1/2 to 7-7/8 inches	1-1/2 inches
8 to 10 inches	2-1/2 inches
Over 10 inches	3 inches

3.07. FIELD QUALITY CONTROL

- A. Prior to receiving a Certificate of Substantial Completion, Contractor shall arrange for manufacturer to inspect the application of his product and shall submit his report to Engineer identifying products used and verifying that said products were properly applied and that paint systems were proper for the exposure and service. The manufacturer's representative shall also certify that all coats in each system are compatible with one another.
- B. The Engineer, or his authorized representative, shall inspect each field coat of priming and finishing paint before the succeeding coat is applied. The Contractor shall follow a system of tinting successive paint coats so that no two coats for a given surface are exactly the same color. Areas to receive black protective coatings shall be tick-marked with white or actually gaged as to thickness when finished.

3.08. SHOP PAINTING

- A. Unless otherwise indicated, items of equipment or parts or equipment which are not

- submerged in service shall be shop-primed and finish-coated with the indicated color. The methods, materials, application equipment, and other details of shop painting shall comply with this Section. If the shop primer requires top coating within a specific period of time, the equipment shall be finish-coated in the shop and touched up after installation, as applicable.
- B. Shop primed surfaces which are to be incorporated in the Work shall be prepared in the field by cleaning all surfaces as necessary in accordance with SSPC SP1 and SSPC SP2. Damaged shop coating shall be cleaned in accordance with SSPC SP3 – Power Tool Cleaning, and recoated in the field with the primer as specified.
 - C. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the indicated quality in the field. Such equipment shall be primed and finish-coated in the shop and touched up in the field with the identical material after installation. The Contractor shall require the manufacturer of each such piece of equipment to certify as part of its Shop Drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the Shop Drawings for the equipment.
 - D. All shop-painted items shall be properly packaged and stored until they are incorporated in Work. Any painted surfaces that are damaged during handling, transportation, storage, or installation shall be cleaned, scraped, and patched before field painting begins so that work shall be equal to original painting at shop. Equipment or steel work that is to be assembled on the site shall likewise receive a minimum of one shop coat of paint at factory. Paint and surface preparation used for shop coating shall be identified on equipment shop drawings submitted to Engineer.
 - E. The Contractor shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this Section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment Shop Drawings.
 - F. Where exact identity of shop primer cannot be determined, or where primer differs from that specified, Contractor shall perform blast cleaning appropriate for service, followed by specified paint system. In lieu of above, Contractor has the option of shipping bare metal to job site and performing appropriate blast cleaning, followed by field prime coat of specified material immediately thereafter.

END OF SECTION

TABLE A-1

COATING SYSTEM SCHEDULE

Non-Submerged Concrete Walls and Ceilings - Interior (paint only when scheduled in Table A-2 or in the architectural drawings)

SYSTEM C-1	TNEMEC	REMARKS
Surface preparation	Clean and dry	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	Series N69 Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT - 8.0 mils minimum

Concrete - Exterior (paint only when scheduled in Table A-2 or in the architectural drawings)

SYSTEM C-5	TNEMEC	REMARKS
Surface preparation	Clean and dry	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series 157-Color Enviro-Crete 111-148 sq.ft. per gal.	--
Intermediate coat	--	--
Finish coat	Series 157-Color Enviro-Crete 111-148 sq.ft. per gal.	Total DFT - 12.0 mils minimum

Concrete in Contact With Raw or Potable Water (paint only when scheduled in Table A-2 or in the architectural drawings)

SYSTEM C-6	TNEMEC	REMARKS
Surface preparation	Brush blast	Allow concrete to cure 28 days prior to beginning coating operations
Prime coat	Series N140-158L Pota-Pox Plus 214-357 sq.ft. per gal.	--
Intermediate coat	Series N140-1255 Pota-Pox Plus 178-268 sq.ft. per gal.	--
Finish coat	Series N140-158L Pota-Pox Plus 178-268 sq.ft. per gal.	Total DFT = 14.0 mils minimum

Non-Submerged Ferrous Metal

SYSTEM M-1	TNEMEC	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	Shop
Prime coat	Series 4-56 Versare Primer 2.0-3.0 mils	Shop
Intermediate coat	Series 23-Color Enduratone 2.0-3.0 mils	--
Finish coat	Series 23-Color Enduratone 2.0-3.0 mils	Total DFT = 7.5 mils minimum

General Ferrous Metal - Interior

SYSTEM M-2	TNEMEC	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	Shop
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT - 12.0 mils minimum

Submerged Ferrous Metal

SYSTEM M-3	TNEMEC	REMARKS
Surface preparation	SSPC-SP10 Near White blast	--
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT = 12.0 mils minimum

TABLE A-1 (continued)

General Ferrous Metal - Exterior

SYSTEM M-4	TNEMEC	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	Shop
Prime coat	Series N69-1211 Hi-Build Epoxoline II 3.0-5.0 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--

Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT = 10.5 mils minimum
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Ferrous Metal Below Grade

SYSTEM M-5	TNEMEC	REMARKS
Surface preparation	SSPC-SP6 Commercial blast	--
Prime coat	--	--
Intermediate coat	--	--
Finish coat	46H-413 Hi-Build Tneme-Tar 16.0-20.0 mils	Total DFT - 16.0 mils minimum

Uncertain Base Coat

SYSTEM M-8	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning and SSPC-SP2 Hand tool cleaning	Remove grease and oil. Scuff sand to dull gloss
Prime coat	Series 1 Purple-Prime 2.5-3.5 mils	Follow with appropriate system for exposure.
Intermediate coat	--	Delete normal specified primer
Finish coat	--	--

Aluminum Surfaces in Contact with Concrete

SYSTEM M-9	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	--	Total DFT - 4.0 mils minimum

Interior Insulated Piping

SYSTEM M-10	TNEMEC	REMARKS
Surface preparation	Clean and dry	--
Prime coat	Series 6-Color Tneme-Cryl 2.0-3.0 mils	--
Intermediate coat	--	--
Finish coat	Series 6-Color Tneme-Cryl 2.0-3.0 mils	Total DFT = 5.0 mils minimum

Non-Submerged Ferrous Metal - Extra Corrosion Protection - Exterior

SYSTEM M-11	TNEMEC	REMARKS
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Surface preparation	SSPC-SP6 Commercial blast	Shop
Prime coat	90-97 Tneme-Zinc 2.5-3.5 mils	Shop
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT - 9.5 mils minimum

Nonferrous Metal - Interior

SYSTEM M-12	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent Cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT = 8.0 mils minimum

Nonferrous Metal - Exterior

SYSTEM M-13	TNEMEC	REMARKS
Surface preparation	SSPC-SP1 Solvent Cleaning	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT - 6.5 mils minimum

Galvanized Steel - Exterior

SYSTEM M-14	TNEMEC	REMARKS
Surface preparation	SSPC-SP7 Brush-off blast	--
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	Series 1075-Color Endura-Shield II 2.0-3.0 mils	Total DFT = 6.5 mils minimum

Galvanized Steel - Interior

SYSTEM M-15	TNEMEC	REMARKS
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Surface preparation	SSPC-SP1 Solvent cleaning to remove soluble contaminants. SSPC-SP3 Power tool cleaning to remove insoluble contaminants	SSPC-SP1 preferred method is steam cleaning or power wash with degreaser/fresh water rinse
Prime coat	Series N69-Color Hi-Build Epoxoline II 3.0-5.0 mils	--
Intermediate coat	--	--
Finish coat	Series N69-color Hi-Build Epoxoline II 3.0-5.0 mils	Total DFT - 8.0 mils minimum

TABLE A-1 (continued)

Gypsum Board or Plaster Walls, Ceiling and Soffits - Interior/ Exterior

SYSTEM G-1	TNEMEC	REMARKS
Surface preparation	Clean and dry	--
Prime coat	Series 6-Color Theme-Cry 12.0-3.0 mils	--
Intermediate coat	--	--
Finish coat	Series 6-Color Theme-Cry 12.0-3.0 mils	Total DFT = 5.0 mils minimum

Gypsum Board, Walls, Ceilings, and Soffits, High Performance - Interior

SYSTEM G-2	TNEMEC	REMARKS
Surface preparation	Clean and dry	--
Prime coat	51-792 PVA Sealer 1.0-2.0 mils	--
Intermediate coat	Series N69-Color Hi-Build Epoxoline II 2.0-3.0 mils	--
Finish coat	Series N69-Color Hi-Build Epoxoline II 2.0-3.0 mils	Total DFT - 6.5 mils minimum

NOTE: Table A-1 and the Equipment Finish Schedule (Table A-2) are not intended to list every structure or equipment item to be painted. All new and existing structures, equipment, and appurtenances including all items furnished under the contract shall be painted by the Contractor, in accordance with the most applicable category from Table A-1. New and existing concrete tanks are not to be painted unless specifically identified in the following tables or on the architectural drawings.

TABLE A-2

EQUIPMENT FINISH SCHEDULE

BUILDING NAME/PROCESS	ITEM NAME	COLOR
General equipment	Aluminum in contact with concrete	Black
	Wall sleeves (interior portion only)	Black
	Gate operators	Grey
	Strainers, backflow preventers, water meters	Match pipe color
	Hydrants – fire	Safety Yellow
	Submerged ductile iron and steel pipe, supports, valves	Black
	Non-submerged interior ductile iron and steel pipe, supports, valves	Per pipe schedule
	PVC pipe accessories	Per pipe schedule
	Miscellaneous interior non-submerged ferrous metal	*
	Flow elements	Light Brown
	Floor drains	Black
	Lintels	*
	Chemical feed system, feed pumps and supports (unless otherwise listed)	Per pipe schedule
	Sump pumps	Manufacturer's standard
	Interior motors, drives, pump operators – non-submerged	Light Gray
	Interior ferrous metal – non-submerged	*
	Existing and new monorails, cranes, and support systems**	Safety Yellow
	Existing and new trolleys, hoists and portable lifting devices**	Safety Yellow
Bollards	Safety Yellow	

*To be selected by Owner during shop drawing review.

**Except components that are finished with a hot dip galvanized coating or are either all stainless steel and/or aluminum materials; are not painted.

Note: All other equipment shall be manufacturer's standard unless otherwise indicated in the equipment specification.

TABLE A-3

PIPING COLOR AND LABEL SCHEDULE

LEGEND	LABEL COLOR	PIPE COLOR
	GR	Grey
	GR	Grey
	BR	Brown
	BR	Brown
	BK	Blue
	BK	Purple
	BK	Purple
	G	Light Blue
	GR	Grey
	GR	Grey
	GR	Grey
	OR	Orange
	OR	Orange
Process Air	G	Green
	BR	Brown
Other	(1)	(1)

1) To be selected by Owner during shop drawing review.

Color Code:

- GR - Gray with black letters
- B - Blue with white lettering
- LB - Light blue with white lettering
- DB - Dark blue with white lettering
- G - Green with black letters
- Y - Yellow with black letters
- BR - Brown with white letters
- LBR - Light brown with white letters
- DBR - Dark brown with white letters
- BK - Black with white letters
- R - Red with white letters
- OR - Orange with white lettering

Notes:

- a) In addition to this color chart, label and paint (or band) all piping shown on H&V, mechanical, and plumbing drawings.
- b) Multi-use pipes shall receive labels designating only their primary use.
- c) Paint all metal electrical conduit to match background. Do not paint PVC or PVC-coated conduit.
- d) Do not paint stainless steel, copper, FRP or PVC pipe. Provide pipe labels only.
- e) This table may not list every pipe to be painted or labeled. All piping and conduit shall be painted.
- f) All new and existing pipe shall be painted unless buried or of a material for which painting is not required per these notes.
- g) Some pipe types listed include several different materials and only exposed piping of relevant materials shall be painted.
- h) Some pipe types listed include buried and exposed piping. Only piping that is not buried shall be painted.

PAINT SCHEDULE

Reviewed by Paint Mfg. Rep. _____

Interior or Exterior Surfaces to Be Painted and Major Equipment	Surface Preparation		Paint System	Prime Coat Product, No. of Coats, Dry Film Thickness, and Coverage		Intermediate Coat		Finish Coat		Painting Status	Remarks (Any Special Treatment or Application Requirements)
	Shop	Field		Color	Color	Color	Color				

DAILY EPOXY COATINGS INDUCTION RECORD

Date	Product	Location	Ambient Temperature (°F)	Mix Start Time	Induction End Time	Total Induction Time Before Use

END OF SECTION

SECTION 09 96 35

CHEMICAL RESISTANT COATINGS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Contractor shall provide chemical resistant coatings and special preparation of surfaces, complete and in place, in accordance with the City standards and Contract Documents.
- B. Coated surfaces shall withstand continuous immersion in chemicals listed at the end of this Specification.

1.02. RELATED SECTIONS

- A. Section 01 10 00 – Supplementary Summary of Work Provisions.
- B. Section 03 30 00 – Cast-In-Place Concrete

1.03. REFERENCES

ASTM C722	Chemical-Resistant Resin Monolithic Surfacing
ASTM C811	Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacing
ASTM C1583	Tensile Strength of Concrete Surface
ASTM D570	Water Absorption of Plastics
ASTM D4263	Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM 4541	Pull-Off Strength of Coatings on Metal Surfaces
ASTM D7234	Pull-Off Strength of Coatings on Concrete Surfaces

1.04. DEFINITIONS

- A. The term “coatings”, “finishes”, or “paint” as used herein, shall include surface treatments, emulsions, enamels, paints, epoxyresins, and other protective coatings, whether used as a pretreatment, primer, intermediate coat, or finish coat.
- B. The term “DFT” means minimum dry film thickness, without any negative tolerance.

1.05. REGULATORY REQUIREMENTS

- A. The Contractor shall comply with all City standards for chemical resistant coatings coatings.

1.06. SUBMITTALS

- A. Prior to submittal, provide specification to product manufacturer to review project chemicals and to make project-specific product recommendations.
- B. Product Data - Provide manufacturer’s data on specified products, describing physical and performance characteristics.
- C. Samples - Submit two samples, minimum 3-inch x 3-inch in size illustrating color and pattern -- one sample for standard finish and the second to show non-slip characteristics for each coating system provided on the project.
- D. Manufacturer’s Installation Instructions - Indicate required pre-application testing, surface

- preparation, primer, perimeter and joint conditions requiring special attention, non-slip treatment, top coat, and total material thicknesses.
- E. Submit qualifications statement (letter) from manufacturer stating Contractor's training, qualifications, and approved status to install products.
 - F. Submit name and qualifications of manufacturer's representative(s) who will provide site inspections and oversee testing and installation of coatings.
 - G. Submit brief report of slab moisture content and strength, approved by product manufacturer.
 - H. Submit maintenance information.
 - I. Submit manufacturer's inspection reports for surface preparation.

1.07. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this Section with minimum five years' documented experience.
- B. Applicator - Company specializing in performing the work of this Section with minimum five years' documented experience demonstrating five successful projects and a letter of approval by manufacturer.
- C. Supervisor - Trained by product manufacturer.

1.08. MANUFACTURER'S REPRESENTATIVE

- A. Manufacturer shall provide on-site representative to review all installation procedures and to inspect surface preparation.

1.09. DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original, factory-sealed containers or packages labeled with identification of contents, manufacturer's name, address, trademark, date of manufacture, specification number, batch number, color, instructions for use, and recommendations for protective measures against toxicity.
- B. Materials shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage shall be maintained between 50 degrees F and 75 degrees F.
- C. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.10. ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature required by manufacturer three days prior to, during, and minimum 24 hours after installation of materials or as required for proper curing as specified by manufacturer, whichever is longest.

1.11. WARRANTY

1.12. Warranty- Include coverage against C.R.F. delamination from substrate, degradation of surface finish, and spalling. MAINTENANCE DATA

- A. Provide maintenance procedures, recommended maintenance materials, and procedures for repairing surface.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Chemical Containment Areas
 - 1. Tnemec Company, Inc.
 - 2. Sauereisen, Inc.
 - 3. Or equal.

2.02. LINING SYSTEM

A. Interior Concrete Chemical Containment Areas

CHEMICAL	TNEMEC	SAUEREISEN, INC.
Ferric Sulfate	<ul style="list-style-type: none"> • Abrasive Blast • Series 217 Filler • Series 201 Primer (8.0 mils) • Series 239SC-MCK Base Coat (80.0 mils) • Series 239SC Saturant Coat (12.0 mils) • Series 120-5001 Top Coat (12.0 mils) 	<ul style="list-style-type: none"> • Abrasive Blast • 209HB Epoxy Filler • 501 Conoweld Primer • 202SL Self Leveling Epoxy • Two (2) – 20 mil coats minimum
Sulfuric Acid	<ul style="list-style-type: none"> • Abrasive Blast • Series 217 Filler • Series 201 Primer (8.0 mils) • Series 239SC-MCK Base Coat (80.0 mils) • Series 239SC Saturant Coat (12.0 mils) • Series 120-5001 Top Coat (12.0 mils) 	<ul style="list-style-type: none"> • Abrasive Blast • 209HB Epoxy Filler • 501 Conoweld Primer • 202SL Self Leveling Epoxy • Two (2) – 20 mil coats minimum

B. Exterior Concrete Chemical Containment Areas

TNEMEC	SAUEREISEN, INC.
<ul style="list-style-type: none"> • Abrasive Blast • Spall Repairs • Series 218 Surfacer/Filler • Series 156 Prime Coat (8.0 mils) 	<ul style="list-style-type: none"> •
TNEMEC	SAUEREISEN, INC.
<ul style="list-style-type: none"> • Series 156 Finish Coat (8.0 mils) 	

- C. All gutters, sumps, and base of walls, including around base of concrete pads, shall be reinforced with 1.5 oz. chopped strand fiberglass mat.

- D. For traffic area of chemical containment areas, floor space, and around pump pads, apply a broadcast 20/40 mesh silica aggregate, garnet, or a slip resistant additive as recommended by the manufacturer, to achieve a non-slip finish.
- E. Apply multicoats - minimum final system DFT shall be as follows:
 - 1. Chemical Containment Areas – 30 mils wet on vertical surface, 40 mils wet on horizontal (60 mils including non-slip treatment, where applicable).

PART 3 EXECUTION

3.01. TESTING

- A. Complete the following tests prior to application of coatings. Test results shall be reviewed by the material manufacturer's representative and approved in writing.
 - 1. Concrete Surface strength, ASTM C1583
 - 2. Moisture Content, ASTM D4263
 - 3. Surface temperature, surface dial thermometer.

3.02. SURFACE PREPARATION

- A. New concrete shall have a light hand trowel finish; do not machine finish or burn in.
- B. New concrete shall obtain a minimum age of 28 days prior to testing, surface preparation, and application of primer.
- C. Remove substrate ridges, fins, and other irregularities by grinding.
- D. All concrete surfaces to be coated shall be cleaned using solvents, detergents, or other suitable methods to remove grease, oils, dirt, or other foreign matter. Follow with abrasive blasting to remove weak concrete and surface laitance and to provide a "tooth" for bonding. Finished surface shall have a texture of course grit (No. 80) sandpaper.
- E. At masonry and concrete surfaces, after surface prep and application of primer, fill bug holes and surface imperfections with a scratch coat epoxy or vinyl ester mortar.

3.03. INSPECTION REPORTS

- A. Prior to application of primer and again after application of scratch coat mortar, the product manufacturer's representative shall inspect surfaces and submit a brief report with required corrections and/or approval.

3.04. INSTALLATION

- A. Follow manufacturer's instructions for surface preparation, application of coatings, curing, and non-slip aggregates.
- B. Unless otherwise stated by the product manufacturer, surfaces shall be dry prior to application of primer or coatings.
- C. Mix and spray apply each coat of resinous lining system in compliance with manufacturer's directions to produce a uniform, monolithic surface of specified thickness.
- D. At base of all walls, inside sumps, and at gutters, install fiberglass reinforcement. Press

material into a wet resin base. After fiberglass is smoothed and fully embedded, saturate with additional resin.

- E. Provide 1-inch radius at all horizontal to vertical transitions.
- F. Apply multi-coats as required to achieve a minimum final thickness.
- G. Finish to smooth or non-slip level surface without open areas, cracks or voids.
- H. Coating to extend over floor, pump pads, tank pad, and on vertical surface of containment wall.

3.05. PROTECTION OF FINISHED WORK

- A. Barricade area to protect coating until cured.

3.06. CHEMICALS

- A. The following is a list of chemicals that may spill and subject the CRF to continuous immersion for an indefinite time period:

STRUCTURE	CHEMICAL	% OF CONCENTRATION
Ferric Sulfate Tank #2 Containment Area, Ferric Sulfate tank #1 and #3 Containment Area	Ferric Sulfate	N/A
Sulfuric Acid Containment Area	Sulfuric Acid	93

3.07. APPLICATION SCHEDULE

- A. Chemical Containment Areas
 - 1. Ferric Sulfate
 - a. Ferric Sulfate Tank #2 Containment Area: floor, equipment pads, and inside face of walls to the top of the containment wall.
 - 2. Ferric Sulfate Tank #1 and #3 Containment Area: floor, equipment pads, and inside face of walls to the top of the containment wall.
- Sulfuric Acid
 - a. Sulfuric Acid Containment Area: floor, equipment pads, and inside face of walls to the top of the containment wall.

END OF SECTION

SECTION 09 96 36

RUBBER LINING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Contractor shall provide rubber lining and special preparation of surfaces, complete and in place, in accordance with the City standards and Contract Documents.
- B. Coated surfaces shall withstand continuous immersion in chemicals listed at the end of this Specification.

1.02. MATERIAL AND WORKMANSHIP

- A. The protective lining selected is to provide the maximum chemical and mechanical resistance for the service indicated. The adhesives used shall be compatible to the lining stock, as recommended by the rubber stock manufacturer, and shall meet the service and physical conditions indicated. See Section 6 for the "Service Conditions Information Required" Form.
- B. Workmanship shall be high quality in all respects and the finished appearance shall conform to the highest standards.
- C. Failure by the contractor to comply with these specifications in any manner shall constitute sufficient cause for rejection of lining by the manufacturer's representative.

1.03. REGULATORY REQUIREMENTS

- A. The Contractor shall comply with all City standards for rubber linings.

1.04. SUBMITTALS

- A. Prior to submittal, provide specification to product manufacturer to review project chemicals and to make project-specific product recommendations.
- B. Product Data - Provide manufacturer's data on specified products, describing physical and performance characteristics.
- C. Samples - Submit two samples, minimum 3-inch x 3-inch in size illustrating color and pattern -- one sample for standard finish and the second to show non-slip characteristics for each rubber lining system provided on the project.
- D. Manufacturer's Installation Instructions - Indicate required pre-application testing, surface preparation, lining, conditions requiring special attention, and total material thicknesses.
- E. Submit qualifications statement (letter) from manufacturer stating Contractor or Sub-Contractor's training, qualifications, and approved status to install products.
- F. Submit name and qualifications of manufacturer's representative(s) who will provide site inspections and oversee testing and installation of coatings.
- G. Submit brief report of slab moisture content and strength, approved by product manufacturer.
- H. Submit maintenance information.
- I. Submit manufacturer's inspection reports for surface preparation.

1.05. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing the products specified in this Section with minimum five years' documented experience.
- B. Applicator - Company specializing in performing the work of this Section with minimum five years' documented experience demonstrating five successful projects and a letter of approval by manufacturer.
- C. Supervisor - Trained by product manufacturer.

1.06. MANUFACTURER'S REPRESENTATIVE

- A. Manufacturer shall provide on-site representative to review all installation procedures and to inspect surface preparation.

1.07. DELIVERY, STORAGE, AND HANDLING

- A. Rubber linings shall be stored in areas where they are not exposed to direct sunlight and, ideally, where the temperature does not exceed 50°F(10°C). As shown on each data sheet, for a specific lining, storage life decreases appreciably with increasing temperature.
- B. The materials shall be stored and handled in a manner such that at no time is there any possibility of the material being exposed to freezing conditions, heat, flame, or spark which could damage or ignite the material.
- C. Materials issued from storage shall be limited to the quantity required for the use of each shift with sufficient lead time to allow it to reach ambient temperature.
- D. Materials once removed from cold storage shall be stored in a shady area, or protected from direct sunlight.
- E. The Contractor shall monitor container labeling, condition and shelf life expiration prior to use of materials.
- F. The oldest materials in storage shall be issued for use first (up to the limit of shelf life).
- G. Materials shall be transported to and stored at the work area in a manner to prevent their damage, contamination or access by unauthorized personnel.

1.08. RECEIVING

- A. The Contractor is responsible for receiving and inspecting all materials delivered to the job site.
- B. Abrasive Blast Media Receipt Method
 - 1. Abrasive blast media shall be surveyed for evidence of shipping damage, excessive leakage or loss of materials or evidence of contamination by water or other substances. Contaminated abrasive blast media shall be rejected.
 - 2. Abrasive blast media shall be promptly stored in a dry and protected area, in a manner which precludes damage to packaging and allows for reasonable access. Minimally, abrasive media shall be raised off the ground and securely covered with reinforced polyethylene.
- C. Adhesives & Lining Receipt Method
 - 1. Each container shall be examined to verify the presence of a proper label identifying component type and size, batch or lot number, and date of delivery (or shelf life expiration date). Rubber lining material must be stored in accordance with shelf life conditions in the specification.

2. Boxes containing torn, broken or punctured lining material shall be marked and segregated for use as patch or seam material, if contents are damaged but still usable.
3. Adhesive material containers which are punctured, leaking or otherwise exposed shall be marked and removed to the approved material disposal area.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. Rubber Lining
 1. Blair Rubber Company
 2. Or equal.

2.02. LINING SYSTEM

A. Chemical Containment Areas

CHEMICAL	BLAIR RUBBER COMPANY
Ferric Sulfate	<ul style="list-style-type: none"> • Abrasive Blast • Series LS582 – Plioweld

- B. All gutters, sumps, and base of walls, including around base of concrete pads, shall be reinforced with 1.5 oz. chopped strand fiberglass mat.
- C. For traffic area of chemical containment areas, floor space, and around pump pads, apply a broadcast 20/40 mesh silica aggregate, garnet, or a slip resistant additive as recommended by the manufacturer, to achieve a non-slip finish.
- D. Apply multicoats - minimum final system DFT shall be as follows:
 1. Chemical Containment Areas – 30 mils wet on vertical surface, 40 mils wet on horizontal (60 mils including non-slip treatment, where applicable).

PART 3 EXECUTION

LINING REPAIR

- A. Rubber lined equipment shall be repaired with the same type of lining as used for the original installation.
- B. Repair procedures shall be performed in accordance with manufacturer's recommendations.

3.02. SURFACE PREPARATION

- A. Rubber shall be mechanically stripped in accordance with contractor's standard practice.
- B. Take special care around any weld seams and welded joints to prevent metal damage.
- C. All rubber not removed in the initial stripping operation must be removed by buffing. No rubber shall remain after completion of this operation.
- D. All metal damage incurred by air hammers from the stripping operation will be ground to a suitable finish for relining at the completion of this operation.
- E. All buffing dust and debris shall be removed from the vessel and disposed of by the Contractor.

- F. The manufacturer’s representative will inspect the equipment after elastomer removal.

3.03. SOLVENT CLEANING

- A. Solvent clean per SSPC-SP1-63, as required to remove detrimental oil, grease, or dirt on the surfaces to be blasted.
- B. Manufacturer’s representative will inspect the equipment after solvent cleaning.

3.04. ABRASIVE BLAST CLEANING

- A. All carbon steel surfaces shall be dry abrasive blasted in accordance with NACE 1/SSPC-SP5-63 “White Metal Blast Cleaning”.
 - 1. Abrasive media shall be 20/30 Mesh, or Company approved blast material.
 - 2. Surface profile shall be 2.0 mils to 3.0 mils.
 - 3. Blasting material shall be thoroughly dry and air shall be free of moisture and contaminants.
 - 4. The steel surface temperature must be a minimum of 5°F(15°C) above the dew point.
- B. Blow down, brush and/or vacuum to remove all visible abrasive and dust from the surfaces to be primed.
- C. The manufacturer’s representative will inspect the equipment after abrasive blast cleaning.

3.05. ADHESIVES, MIXING AND APPLICATION

- A. Mixing and application to be in accordance with the “manufacturers recommended procedures” and the supplementary requirements of this Section.
- B. All areas that are prepared and satisfactory shall have the cement system applied:
 - 1. Using only undamaged containers mix and thoroughly agitate with a power driven mixer for 5 minutes.
 - 2. Apply each coat by brush or roller to all areas, frequently hand stirring the container to maintain contents in suspension.
 - 3. All adhesives shall be kept out of direct sunlight at all times before and after application.
 - 4. Tightly re-seal all containers when not in use.
 - 5. The primer shall be applied to the sandblast surface in accordance with the following schedule. The time span between surface preparation and adhesive application is dependent on the relative humidity.

RELATIVE HUMIDITY	MAXIMUM TIME SPAN
Over 90%	No application
86-90%	1 hour
80-85%	4 hours
50-79%	8 hours

50 or below	24 hours
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In any of the above cases, there shall be no visible rust bloom on the prepared surface when the adhesive is applied.

6. The steel substrate temperature during the adhesive application shall be maintained between 60°F(16°C) and 90°F(32°C). The temperature of the substrate shall be maintained at least 5°F(15°C) above the dew point.
 7. Separate containers and application tools shall be used for each type of cement.
 8. During periods of high humidity, condensation of moisture can appear on the surface to be lined. If this happens, adhesive application shall stop until the condition is eliminated. All necessary precautions must be taken during adhesive application to prevent condensation of moisture inside the tank.
- C. The manufacturer's representative will inspect the vessel after all adhesives have been applied.

3.06. INSTALLATION OF LINING

- A. Lining thickness shall be shown on drawings or as called for in the purchase order and bid package.
- B. Allow sheet stock to come to the temperature of the minimum substrate allowable temperature.
- C. Install sheet and completely roll out making sure not to entrap air. If strings are used for venting, ends will be trimmed so as not to extend onto flange faces.
- D. Panel lay-up must be staggered so that no area of the lining has more than two layers of sheet stock. Where three sheet corners must come together, the overlay shall be cut down before application of the third sheet. Every effort shall be made to avoid four layer overlaps including staggering alternate panels.
- E. All edges and seams shall be laid straight, and all lapped seams shall be made by overlapping adjacent sheets by not less than two (2) inches. Overlapping edges shall be skived and turned down so as to give a smooth, neat appearance with no exposed tie gum. The number of seams shall be kept to a minimum, consistent with good workmanship. The bond between adjacent sheets of overlap shall be such that separation cannot occur.
- F. Butt seams may be used only where lapped seams are impractical. Butt seams shall be covered with a minimum cap strip of 4 inches wide.
- G. The rubber lining shall extend out on all flanges, manholes, and nozzles. Circumferential joints in nozzles shall be located so as not to restrict the opening.
- H. The ambient temperature during lining application shall be maintained between 50°F(10°C) and 100°F(38°C) and the relative humidity shall not exceed 90%. The temperature of the surface being cemented shall be at least 5°F(15°C) above the dew point.
- I. Equipment requiring double linings shall be lined such that item 10.6 (above) is accomplished for the outer lining only. Seams of the underlying lining shall be butt joints and shall not be within six (6) inches of the lapped seams of the overlay lining unless approved by the manufacturer's representative.
- J. Internal flanges shall be completely lined, including the bolt holes.
- K. After cure, all flange faces shall be ground smooth and even.

- L. Lining shall be spark tested.
- M. Lining shall be checked for blisters, physical damage, looseness of splices, etc. Defective areas shall be repaired and the lining shall be retested and inspected after cure.
- N. All air blisters shall be removed from between the lining and the metal surface. Any air not removed by rolling shall be removed with a hypodermic needle. Each needle puncture is to be capped with a patch. All patches must have 45 degree beveled edges and be a minimum of 2 square inches. Every effort shall be made to prevent an entrapment when stitching the lining in place.
- O. A test panel will be prepared, lined and cured concurrently with the equipment. Sample panel design to be supplied by the manufacturer's representative.
- P. The manufacturer's representative will inspect the equipment after application of all elastomeric sheet lining.

3.07. CURE OF LINING

- A. Vulcanizing or curing methods, including temperature, time required, etc., shall comply with the stock manufacturer's written procedures for the rubber stock to be used.
- B. Uniform temperatures shall be maintained during the curing process, and the lining or covering shall be protected against excessive heat losses to insure uniform vulcanizing conditions. Vessels should be tarped or otherwise insulated from the detrimental effects of inclement weather and temperatures below 60°F(16°C).
- C. The following instrumentation shall be installed to monitor temperatures:
 - 1. Internal temperature and pressure measuring devices
 - 2. Internal temperature recorder
 - 3. Outside steel temperature measuring devices
- D. Contractor may use a multi point recorder to measure temperatures required on the "Record Temperature During Cure" log sheet. These readings are to be recorded hourly, every shift during temperature warm-up and throughout the entire cure cycle.
- E. Cure times may have to be adjusted in accordance with data or curves on outside metal surface temperature vs. time provided by the lining manufacturer.
- F. The cure times shall be in accordance with the manufacturer's recommendation.
- G. Temperature and pressure shall be monitored throughout the entire cure cycle.
- H. Cured linings shall attain hardness values recommended by the manufacturer.

3.08. INSPECTION AND REPAIRS AFTER CURE

- A. A durometer (Shore "A") hardness survey shall be made of the cured lining. A sufficient number of readings shall be taken at all elevations to assure all areas of the lining are properly cured.
- B. Spark testing shall be conducted over the entire surface lining with a high potential spark tester adjusted.
- C. All joint and seam areas shall be visually inspected.
- D. Defective areas shall be repaired and the lining shall be retested and inspected after curing.

The repair materials, application methods and curing procedures shall be based upon the type, size and frequency of the defects.

- E. The adhesion test sample that the contractor has previously lined and cured shall be tested in accordance with ASTM D-429. The rubber shall be adhered to the steel so that tests will show a strength of adhesion that is specified for each lining.
- F. All lining material containing bubbles and blisters shall be removed to an area of good adhesion. Bevel edges of remaining rubber to approximately 30° angle to the metal and buff existing rubber back at least 4" from the edge of area to be repaired.
- G. All exposed steel surfaces shall be prepared by grinding to a clean bright metal finish. Upon completion of surface preparation, adhesives shall be prepared and applied in accordance with the procedures for Adhesives, Mixing and Application; prime coat only on the steel and the remaining adhesive system on the entire patch area.
- H. Upon completion of adhesives system application, rubber shall be applied as follows:
 - 1. To repair cracks and small areas, fill in the area flush with existing lining using full thickness original lining stock. Cover this with larger patch extending out 4" over the existing lining.
 - 2. For larger areas (above 12" diameter or equivalent) it will be satisfactory to use a single layer of the full thickness original lining stock over the metal area bringing stock up over the bevel and back 4" over the existing lining.
- I. Area of repair shall then be re-cured in accordance with the System Steam Curing Procedure.
- J. Areas will be re-checked in accordance with spark test procedures and hardness.

3.09. INSPECTION AND DOCUMENTATION

- A. This Section outlines all inspections and documentation required by the Contractor for the satisfaction of the contract. It shall be the Contractors' responsibility to maintain all documentation and turn over a complete package to the manufacturer's representative at the completion of the contract. Routine type "log" entries such as temperature, pressure, relative humidity, time, date, etc. will be entered by the Contractor. Other entries for documentation concerning the quality of work such as surface profile, seams, overlaps, spark testing, etc. will be made by the Contractor after proper testing and inspection by the manufacturer's representative. The manufacturer's representative will review all entries on a daily basis.
- B. The following inspections are required for surface preparation:
 - 1. Inspection after elastomer removal and buffing to assure no metal damage has taken place.
 - 2. Inspection after solvent cleaning for SSPC-SP1.
 - 3. Inspection after abrasive blast cleaning per SSPC-SP5 to assure a minimum surface profile of 2.0-3.0 or equal mils. Use a KTA-Tator Comparator or something similar for this inspection and document. At least one check for each 90° increment should be made for each staging level.
 - 4. Inspection after blow down, brush and/or vacuum cleaning prior to application of primers and adhesives.
- C. Documentation: All inspections listed above shall be documented on the inspection sheets for this contract.
- D. The following inspections of rubber lining application are required:

1. Visual inspection of surfaces to receive adhesive to assure there are no visible rust blooms on the surface.
 2. Visual inspection of mixing and adhesives to assure compliance with manufacturers recommendations, proper adhesive number and proper sequence of application.
 3. Visual inspection of adhesive application for complete coverage, film thickness and drying time. Use a Positector or equal for measuring dry film thickness.
 4. Visual inspection of the lining raw sheet stock, temperature of the sheet stock, rolling of the sheet and stitching of seams, seam width and overlap and lining of internal and external flanges, nozzles and openings.
 5. Visual inspection of all steam cure equipment such as pressure gauges, condensate removal system, pressure vacuum relief system, internal & external temperature measuring devices and closure of all openings to assure steam cure is in strict compliance with manufacturers recommendations.
 6. After repairs, visual inspection and re-spark test.
 7. Visual inspection at job completion.
- E. Documentation: All inspection entries for rubber lining application shall be documented on the inspection sheets for this contract.

3.10. INSPECTION DOCUMENTS

- A. Responsibility
1. The Contractor shall be responsible for proper documentation of all inspection sheets covered by this specification. This will become a permanent record for each project/contract.
- B. Inspection sheets (attached)
1. Record of Atmospheric Conditions
 - a. This sheet will be used to record atmospheric conditions during surface preparation including sandblasting, application of primers and adhesives and installation of rubber. Readings to be recorded every hour of every shift.
 2. Inspection Log: Surface Preparation, Primary and Spark Test. This inspection log will be used for the four inspection activities listed during these inspections. The "Comments" column will be used to describe the area being tested such as "Pipe Spool Mark No.," "N-E Floor Quadrant," etc. and to list inspection deficiencies or failures.
 3. Record of Temperature During Cure. During the steam cure, this record or log will be maintained. Entries will be made every hour of every shift during warm-up and steam cure.

END OF SECTION

SECTION 22 11 13

WATER DISTRIBUTION PIPING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test water distribution piping and all other required accessories in accordance with the Contract Documents.

1.02. REFERENCES

- A. ANSI Z 358.1 – American National Standard for Emergency Eyewash And Shower Equipment

1.03. SUBMITTALS

- A. Provide in accordance with Section 01 33 00 Submittal Procedures and as supplemented herein. Submittals shall include, but not be limited to, the following:

- 1. Product Data, for each product:
 - a. Manufacturer's data sheets indicating operating characteristics, materials and finishes.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

- 1. Protect plastic piping from direct sunlight.
 - a. Support to prevent sagging and bending.
- 2. Protect internal parts, valve ends, and specialties against corrosion, dirt, and damage.
- 3. Store valves set in open position.
- 4. Storage:
 - a. Indoors: Higher than ambient dew point temperature.
 - b. Outdoors: Well ventilated, light colored watertight enclosures off ground.

- B. Handling: Comply with manufacturer's recommendations. Avoid damaging components.

- 1. Large Valves: Operating handles or stems are not rigging points for slings.

PART 2 PRODUCTS

2.01. PVC PIPE AND FITTINGS

- 1. Standards:

- a. ASTM D 1784.
 - b. ASTM D 1785.
 - c. ASTM D 2464.
 - d. ASTM D 2466.
 - e. ASTM D 2467.
 - f. ASTM D2672.
 - g. ASTM F480.
 - h. CSA B137.0.
 - i. CSA B137.3
 - j. NSF 14.
 - k. NSF 61.
2. Material Requirements: ASTM D1784.
- a. Cell classification 12454.
 - b. Physical Dimensions: Comply with ASTM D1785.
 - 1) Certified to: CSA B137.3.
 - 2) Belled end pipe:
 - a) ASTM D 2672.
 - b) ASTM F 480.
3. Pipe Marking to comply with the following:
- a. ASTM D 1785.
 - b. NSF 14.
 - c. CSA B 137.0/137.3.
4. Potable Water Service: NSF 61.
5. Pipe Threading: Use Schedule 80 pipe only. PVC threaded joints have a maximum pressure rating of 50 percent when compared to the same size solvent welded joints operating at the same temperature.
6. Fittings: Third party certified to NSF 14.
- a. Schedule 40:
 - 1) Per standard ASTM D 2466.
 - b. Schedule 80:
 - 1) Socket: ASTM D 2467.

- 2) Threaded: ASTM D 2464.
- 3) Taper pipe thread: ASME B1.20.1.
- c. Hydrostatic Design Basis (HDB): 3150 psi at 73 degrees F (21,718 kPa at 23 degrees C).

2.02. PVC VALVES

- A. All valves are to be made of the same material as the attached piping
- B. Ball Valves:
 1. Body Material: PVC, cell class 12454 per ASTM D1784.
 2. Pressure Rating (psi / kPa): 232 psi at 73 degrees F (1600 kPa at 23 degrees C).
 3. Design: Union type.
 4. Ends: Detachable, socket or threaded.
 5. Ball and Stem:
 - a. Material: PVC.
 - b. Machined smooth.
 - c. Stem Design: Double-O-ring seal, safety shear point.
 - d. Port: Full.
 - e. Seats: PTFE with in-line micro adjustment.
 - f. Stem Seals: EPDM
 - g. Unions: Double-blocking. DUAL BLOCK system, locks union nuts to prevent backing-off due to vibration of thermal cycling.
 - h. Handle: Tee shaped, built-in tool for adjustment of seat carrier.
 - i. Mounting features for actuation.
 - j. NSF 61, potable.

PART 3 EXECUTION

3.01. PIPING APPLICATIONS

- A. Underground water-service piping:
 1. PVC, schedule 80 pipe: NPS 3/4 to NPS 8 (DN 20 to DN 200).
 - a. Socket fittings.
- B. Aboveground and enclosed water-service piping:
 1. PVC, Schedule 80 pipe: NPS 3/4 to NPS 8 (DN 20 to DN 200).
 - a. Socket fittings.

3.02. INSTALLATION

- A. Install PVC pipe according to ASTM F 645
- B. Pipe joints: Per manufacturer's written instructions.
- C. Join dissimilar pipe materials with adapters compatible with pipe materials being joined.

END OF SECTION

SECTION 22 45 00

EMERGENCY PLUMBING FIXTURES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish, install, and test emergency plumbing fixtures and all other required accessories in accordance with the Contract Documents.

1.02. RELATED SECTIONS

- A. 22 11 13 Water Distribution Piping

1.03. REFERENCES

- A. ANSI Z 358.1 – American National Standard for Emergency Eyewash And Shower Equipment

1.04. SUBMITTALS

- A. Provide in accordance with Section 01 33 00 Submittal Procedures and as supplemented herein. Submittals shall include, but not be limited to, the following:

1. Product Data, for each product:
 - a. Manufacturer's data sheets indicating operating characteristics, materials and finishes.
 - b. Include details of electrical and mechanical operating parts.
 - c. Provide mounting requirements and rough-in dimensions.
 - d. Mark each sheet with product drawing designation.
2. Shop Drawings

1.05. QUALITY ASSURANCE

- A. Obtain emergency plumbing fixtures and accessories from a single manufacturer.

PART 2 PRODUCTS

2.01. COMBINATION EYEWASH/DRENCH SHOWER STATIONS

- A. General
 1. Eyewash and Eye/Facewash Units: Integral flow control at 5.1 gpm (19.1L/m) with steady water flow under varying water supply conditions from 30 to 90 psi; self-draining bowl with integral strainer.
 - a. Push paddle and foot pedal activated
 - b. Supply piping 1/2-inch NPT with stay-open ball valve.
 - c. Drain piping 1-1/4-inch NPT.

2. Showerhead: 22 gpm (1.38 L/s) flow rate, 3.1-inch (78.1 mm) diameter ABS plastic.
 - a. Pull rod activated
 - b. Supply piping 1-1/4-inch NPT with stay-open ball valve.
 - c. Drain piping 1-1/4-inch NPT.

B. Materials

1. Eyewash Sprayhead: ABS plastic with dust covers
2. Eyewash Bowl: Stainless Steel, ASTM A 666 Type 316.
3. Shower Shroud: Stainless Steel, ASTM A 666 Type 316.
4. Ball Valve: Stainless Steel, ASTM A 666 Type 316.

C. Accessories

1. All combination eyewash/drench shower stations shall be provided with the following:
 - a. Class 1, Division 1 flow switch and junction box designed to meet NEMA 4X. Flow switch shall be stainless steel double pole, double throw for remote monitoring.

D. Manufacturers

1. Bradley Corporation,
2. Guardian,
3. Or equal.

2.02. OR EQUAL AND SUBSTITUTION QUALIFICATIONS

- A. In the case of an “or-equal” or a substitution, demonstrate in writing, to the satisfaction of Engineer that the manufacturer has produced the specified type and size of equipment that has been in successful operation for a minimum period of five years prior to the Bid date.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Assemble fixtures and associated fittings and trim in accordance with manufacturer's instructions.
- B. Install fixture supports attached to building structure for fixtures requiring supports.
- C. Install fixtures onto waste-fitting seals or flanges and attach to supports or building structure.
- D. Install fixtures level, plumb, and firmly in place in accordance with manufacturer's rough-in drawings.
- E. Install water supply piping to each fixture requiring water supply connection. Provide stop on each supply in readily-serviced location. Fasten supply piping to supports or substrate.
- F. Install trap and waste piping to each fixture requiring sanitary system connection.

3.02. TESTING AND STARTUP

- A. Testing and startup shall be performed in accordance with Section 01660 (Testing and Startup) and as specified herein unless otherwise noted.

END OF SECTION

SECTION 26 05 00

ELECTRICAL-GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Electrical-General is specifically applicable to Division 16 Sections, in addition to Division 1 - General Requirements, but is also applicable to other Divisions where electrical work may be specified or required.
 - 1. This Section includes the general work description and requirements for electrical work required by this Contract.

1.02. SCOPE OF WORK

- A. Furnish all materials and equipment and provide all labor for the following:
 - 1. Electric power service and distribution.
 - 2. Communication systems.
 - 3. Control, signal and instrumentation systems.
 - 4. Conduit and wiring.
 - 5. Grounding systems.
 - 6. Electrical labeling, signs and nameplates.
 - 7. Controls required for, but not integral with, piping or process control systems; i.e., valve limit switches.
 - 8. Contract closeout information to include record drawings, operation and maintenance manuals, final testing, inspection certificates, guarantees, and warranties as per Division 1.
 - 9. All Division 26 and 40 specifications.
- B. Demolition - See Contract Drawings.

1.03. WORK COVERED UNDER OTHER DIVISIONS

- A. The following electrical-related work is specified in Specification Sections of other Divisions of the Contract Documents:
 - 1. Furnishing and installation of electrical equipment and miscellaneous controls specifically included under other Sections.
 - 2. Interior and exterior concrete equipment bases and pads, except for coordination.
 - 3. Instrumentation, power, and control cables furnished under other Sections or by equipment manufacturers.
 - 4. Furnishing and installing motor starting equipment and/or control panels specifically included under other sections.
 - 5. Finish caulking (caulking up to 1/2-inch below wall or floor surface is provided under the electrical work).

1.04. RELATED SECTIONS

- A. Division 01 specifications.
- B. Section 02 41 00 – STRUCTURE DEMOLITION.
- C. All Division 26 specifications.
- D. All Division 40 Specifications.

1.05. GENERAL REQUIREMENTS

- A. Contractor shall obtain all drawings and information required to properly install, connect, adjust, and electrically operate equipment.
- B. Where any device or part of equipment is referred to in these Specifications in the singular number (such as “the switch”), such reference shall apply to as many such devices as are required to complete the installation.

1.06. EXAMINATION OF PREMISES

- A. The Contractor shall examine the existing conditions per the Contract Documents affecting compliance with the plans and specifications before visiting site and/or buildings.
- B. During the site visit the Contractor shall verify all existing conditions so as to enable the completion of this project. Any variations shall be brought to the attention of the Engineer prior to bidding.
- C. The Contractor shall ascertain access to site, available storage and delivery facilities.
- D. Before commencing work, the Contractor shall verify all governing dimensions at site and/or buildings, and observe existing areas and work limits adjacent to where the work is to be performed.

1.07. WORK PERFORMANCE

- A. Schedule, coordinate and perform work to assure electrical service for each building at all times per Division 1.
- B. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged areas, equipment and materials shall be replaced or repaired to its prior conditions.
- C. All work shall be installed in a neat, workmanlike and professional manner. All enclosures shall be installed level and plumb. All exposed raceway shall be level, plumb, and run parallel or at 90 degrees to all structural work.
- D. Coordinate location of equipment and conduit with other trades to minimize interferences.
- E. Perform field touch-up work and touch-up painting of electrical material and equipment.
- F. Repair or restore new and existing building components damaged or left open or bare as a result of the electrical work.
- G. It is the intent of the Contract Documents that only new, unused, current production equipment and supplies be used.

1.08. REFERENCES

- A. The following references comprise standards and codes applicable to this Contract.

ANSI/NFPA 70	National Electrical Code
ANSI	American National Standards Institute 1430 Broadway, New York, NY 10018
ASTM	American Society for Testing and Materials 1916 Race Street, Philadelphia, PA 19103
CSA	Canadian Standards Association 178 Rexdale Boulevard, Rexdale (Toronto) Ontario, Canada M9W 1R3
ETL	ETL Testing Laboratory, Inc. Industrial Park, Cortland, NY 13045
FM	Factory Mutual System 1151 Boston-Providence Turnpike, P.O. Box 688, Norwood, MA 02062
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street, New York, NY 10017
NEMA	National Electrical Manufacturers Association 2101 "L" Street, N.W., Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park, Quincy, MA 02269
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60062
IPCEA	Insulated Power Cable Engineers Association

- B. Contractor shall conform with all applicable codes and requirements as a minimum standard of performance.
- C. In the case of a discrepancy between the requirements of the Contract Documents and other regulating groups or agencies, the stricter requirements shall apply.
- D. U.L. Listed Equipment
1. All material and equipment of a type listed by Underwriters' Laboratories shall be so labeled (unless exempted in writing by the Engineer). All equipment labeling shall indicate the intended application of the equipment.
 2. Equipment and material not covered by UL Standards will be accepted provided equipment and material are listed, labeled, certified or otherwise determined to meet safety requirements by a nationally recognized third-party testing laboratory such as ETL, FM, or CSA. Equipment of a class not listed, labeled, certified or approved by any acceptable reviewing body will be considered only if inspected or tested in accordance with national industrial standards, such as NEMA or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.
 3. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above.
 4. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the bid price. Ignorance of any rule, requirement or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Owner or Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

1.09. REGULATORY REQUIREMENTS

- A. Conform to applicable Building Codes for the State of Pennsylvania.
- B. Conform to NFPA 70 – 2017 National Electric Code.
- C. Conform to ANSI C2 - National Electrical Safety Code.

- D. Obtain permits, and request inspections as required from local authority having jurisdiction. Contractor shall provide a final inspection certificate to the Owner from the inspecting agency.

1.10. DEFINITIONS

- A. Listed - Equipment is "listed" if of a kind mentioned in a list which:
 - 1. is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment; and
 - 2. states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
- B. Labeled - Equipment is "labeled" if:
 - 1. it carries a valid label, symbol, or other identifying mark of an organization acceptable to the authority having jurisdiction and concerned with product evaluation that makes periodic inspections of the production of labeled equipment or materials; and
 - 2. whose labeling indicates compliance with appropriate standards or performance in a specified manner.
- C. Certified - Equipment is "certified" if:
 - 1. equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner; or
 - 2. production is periodically inspected by a nationally recognized testing laboratory; and
 - 3. it bears a label, tag, or other records of certification.
- D. Nationally recognized testing laboratory - A testing laboratory which is approved in accordance with OSHA regulations by the Secretary of Labor.

1.11. MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be current products of manufacturers regularly engaged in the manufacture of such items and for which replacement parts are available.
- B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components.
 - 1. All components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. All factory wiring shall be labeled and identified on or within the equipment being furnished and on all elementary, schematic and wiring diagrams, in accordance with these specifications
- E. When Factory Testing is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The Contractor shall

notify the Engineer a minimum of 15 working days prior to the manufacturer's making the factory tests.

2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
3. When equipment fails to meet factory test and reinspection is required, the Contractor shall be liable for all related additional expenses, including expenses of the Engineer.

1.12. REQUEST FOR APPROVAL OF "EQUAL" EQUIPMENT

- A. Requests for approval of "equal" equipment shall conform to guidelines set forth in Standard General Conditions.

1.13. EQUIPMENT PROTECTION

- A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. Contractor shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.
- B. All programmable logic controllers, variable frequency drives, and instrumentation to be transported under this contract shall be shipped to and from the site in enclosed, weather tight, sealed containers in a manner designed to protect the units against damaging stress caused by sudden acceleration or deceleration. An indicating meter such as "Drop-N-Tell," designed to indicate any sudden impacts that exceed the unit's rating shall be shipped with and fixed to each assembly or its packing crate. Upon arrival of each shipment at the project site, the meter shall be examined in the presence of representatives of the Engineer, the Contractor, and the equipment manufacturer. If the meter indicates the package exceeded the limits of the meter, the assembly or subassembly shall be dismantled and completely inspected. All damage shall be corrected before the equipment is incorporated into the work. The Contractor shall bear all cost arising out of dismantling, inspection, repair, and reassembly, including engineering costs.
- C. During installation equipment, controls, controllers, circuit protective devices, etc., shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.
- D. Damaged equipment, as determined by the Owner and/or the Engineer, shall either be repaired to new condition or replaced with new equipment as directed by the Engineer.
- E. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.14. EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.
 1. Equipment shall be installed as close as practical to locations shown on the Drawings. Where Contractor supplied equipment sizes differ from that anticipated on the Drawings, the Contractor shall prepare and submit to the Engineer new "to-scale" layouts showing new equipment locations for approval.
- B. Equipment Provided Under Other Divisions:
 1. Reasonable effort has been made to show the actual locations of the equipment to be provided under other Sections of the Specifications. These locations shall be considered approximate, but suitable for preparation of the Contractor's bid. These locations are not necessarily final locations. Contractor shall verify equipment size and location before rough in and obtain the applicable shop drawing information to enable

the electrical and control services to be provided to the equipment.

2. The Contractor shall coordinate the exact locations of all equipment, receptacles, box-outs, sleeves and similar items required for the completion of electrical work with the structural, architectural, mechanical or other work.
 3. The wiring configuration of equipment provided by other divisions will vary, depending on the manufacturer used. Specific wire connections to equipment provided by other divisions are not shown in these documents. The Contractor shall coordinate the wire connections with the division supplying the equipment.
 4. No additional compensation will be made for relocations, reconnections or additional work required as a result of the failure of the Contractor to fully coordinate the work of this project.
- C. Inaccessible Equipment:
1. Where the Engineer determines that the Contractor has installed equipment that is not conveniently accessible for operation and maintenance, said equipment shall be removed and reinstalled as directed by the Engineer at the Contractor's expense.
 2. "Conveniently accessible" is defined as reachable without the use of ladders, without climbing over or crawling under obstacles such as equipment, structures, piping and ductwork. Equipment shall be installed at the heights as specified in other Sections of these Specifications, except any readout devices shall be installed so that the centerline of the readout is 5 feet 0 inches above finish floor.
- D. Equipment and Material - Equipment and material shall be designed to assure satisfactory operation and operating life for the environmental conditions where being installed. These specifications, the NEC and other code requirements shall apply to the installation in areas requiring special protection; i.e., hazardous, wet or corrosive area/location, and weatherproof construction.
- E. Classified Areas:
1. General - Enclosures for classified areas shall be as specified in Section 16161, Control Panels and Enclosures.
 2. Hazardous Areas:
 - a. In the areas designated as Hazardous and where explosion proof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.
 - b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed for Class I, Division 1, Group D, and Class I, Division 2, Group D atmospheres.
 3. Wet Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these Specifications and of the NEC for wet locations.
 4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise. All work shall meet the requirements of these specifications.
- F. Rigging and Moving Equipment - Contractor and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be employed to move any equipment over 300 pounds or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving

or placing equipment.

G. Diagrammatic Drawings:

1. Circuit diagrams shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The Contractor shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always scheduled.
3. The number of conductors shown is not necessarily the correct number required. Contractor shall install as many conductors as are required for the complete and satisfactory operation of all systems.

1.15. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300, Submittals.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.
- D. The shop drawing submittals shall include the following:
 1. Information that confirms compliance with contract requirements; i.e., the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current source and price of each part.
- E. After shop drawing approval and prior to installation, furnish the Engineer with one sample of each of the following:
 1. An 18-inch length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken. Length of sample to include one complete wire or cable marking by manufacturer.
 2. Each type of conduit, coupling, bushing and termination fitting.
 3. Conduit hangers, clamps and supports.
 4. Duct sealing compound.
 5. Each type of receptacle, toggle switch, outlet box, manual motor starter*, device plate, engraved nameplate, wire and cable splicing and terminating material and single pole molded case circuit breaker*.

*These will be returned to Contractor.

1.16. OPERATIONS AND MAINTENANCE MANUALS AND INSTRUCTIONS

- A. Manuals, both hard copy and electronic, shall be submitted in accordance with Section 01640, Equipment-General, and as specified in this section.

- B. Information shall be sufficient to enable a qualified technician to perform normal first line maintenance and repair.
- C. Operation manuals shall describe, in detail, the information required to operate the equipment provided.

1.17. RECORD DRAWINGS

- A. Record drawings shall be provided in accordance with Section 01700, Record Documents. In addition, the Contractor shall prepare and submit to the Owner:
 - 1. One Mylar reproducible (24-inch by 36-inch) of each of the marked-up field record drawings.
 - 2. One Mylar reproducible (24-inch by 36-inch) showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, and pullboxes shall have at least two ties.
 - 3. Revised control schematics. Revised elementary wiring diagrams. Provide block diagrams for all equipment items. All schematics and diagrams shall be prepared on 24-inch x 36-inch size Mylar drafting medium. Drawings shall:
 - a. Be fully labeled; show all point-to-point connections; indicate conduit size and wire size, quantity and color; show junction boxes, pullboxes, panels, etc.
 - b. Indicate termination numbers at respective locations.
 - c. Contractor shall submit preliminary 8-1/2 x 11 sheets of these diagrams before final drafting.
 - 4. Sample block and interconnecting drawings are included at the end of this Section.
 - 5. Record drawings shall include all changes to the original documents, including addenda issued during bidding and change orders and other field changes issued during construction. Also, any alternates chosen shall be shown. Each drawing shall have the following information:

Prepared By: (name of Contractor)

Date Issued: _____
 - 6. All work, including notes, shall be revised to reflect actual construction.
 - 7. All drafting shall be professionally done following accepted drafting standards.
 - 8. See other 260000 and 400000 sections for additional record drawing requirements
 - 9. Contractor shall submit all materials on compact discs (CDs). All drafting shall be AutoCAD 2012 as a minimum. The CD shall include a complete table of contents where the viewer can simply click on a title to go to that item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 05 13

CONDUCTORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Building wire and cable.
- B. Underground feeder and branch circuit cable.
- C. Wiring connectors and connections.
- D. Special wire and cable.

1.02. RELATED SECTIONS

- A. Section 26 05 00 – ELECTRICAL-GENERAL
- B. Section 26 05 33 - RACEWAYS
- C. Section 26 05 34 – BOXES
- D. Division 40

1.03. REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ASTM - American Society of Testing and Materials.
- C. U.L. - Underwriters Laboratories.
- D. Material construction of copper conductors strands shall be coated or uncoated soft drawn or annealed copper as specified in Part 2 and meet or exceed the following:
 - 1. ASTM B-3 for uncoated strands.
 - 2. ASTM B-33 for tin coated strands.
- E. Copper conductor strands shall be combined to form conductors according to the following:
 - 1. ASTM B-8 for concentric-lay-stranded copper conductors.
 - 2. ASTM B-173 for rope-lay-stranded copper conductors.
 - 3. ASTM B-174 for bunch-stranded copper conductors.
- F. Insulation:
 - 1. General.
 - a. All insulation thicknesses shall be in accordance with Section 310 of the National Electric Code.

- b. Maximum operating temperature as noted in Article 3.05.
 - c. Insulation for specific use shall be as specified herein.
2. Construction - Material construction of insulation shall meet or exceed the following:
- a. Ethylene Propylene (EP) - IPECCA S-68-516/NEMA WC 8 and UL 44 standards.
 - b. Ethylene Propylene Diene (EPD) - IPECA S-68-516/NEMA SC-8 and UL 44 Standards.
 - c. Cross Linked Polyethylene (XLP) - IPECA S-66-524/NEMA WC-7 and UL 44 Standards.
 - d. Polyvinyl Chloride (PVC) - UL 83 Standard.
 - e. High Molecular Weight Polyethylene (HMW-PE) - IPECA S-61-402/NEMA WC-5 and UL 83 Standards.
- G. Jacketing and Covering - Material construction of jacketing shall meet or exceed the following:
- 1. Chlorosulfonated Polyethylene (CP) - (Hypalon) - IPECA S-19-81/NEMA WC-3 and UL 44 Standards.
 - 2. PVC - IPECA S-19-81/NEMA WC-3, IPECA S-61-402/NEMA WC-5 and UL 83 Standards.
 - 3. Nylon - UL Standard 62 and 758.

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 26 05 00 – Electrical-General.
- B. Product Data - Provide for each cable assembly type.
- C. Test Reports - Indicate procedures and values obtained.
- D. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.06.
- E. Submittals shall contain a material list with manufacturer data describing the material and showing its compliance with specification, associated standards and test requirements.

1.05. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing products specified in this section with minimum three years' documented experience.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.07. PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing, if shown on Drawings, is approximate unless dimensioned. Route wire and cable as required to meet project conditions.
- C. Where wire and cable routing is not shown, and destination only is indicated, Contractor shall determine exact routing and lengths required.

1.08. COORDINATION

- A. Coordinate work under provisions of Section 01039, Coordination.
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.01. MAJOR POWER DISTRIBUTION

- A. Major power distribution is that shown on one-line drawing.
- B. Description - ANSI/NFPA 70, Type XHHW.
- C. Conductor - Copper.
- D. Insulation Voltage Reading - 600 volts.
- E. Insulation - Type XLP (cross-linked polyethylene) or EP.
- F. Manufacturers:
 - 1. Anixter - Model 3B.
 - 2. Manhattan - Model M8628.
 - 3. Okonite Company - Model 112-32-3.
 - 4. Or equal.

2.02. BUILDING WIRE AND CABLE

- A. Description - Single conductor insulated wire.
- B. Conductor - Stranded or solid copper as specified in Part 3 of this section.
- C. Insulation Voltage Rating - 600 volts.
- D. Insulation - ANSI/NFPA 70; Type XHHW insulation for feeders and branch circuits larger than 4 AWG; Type THHN/THWN insulation for feeders and branch circuits 6 AWG and smaller.
- E. Manufacturers:

1. Southwire – THHN or XHHW.
2. Anixter - Model 6G.
3. Okonite - Model 116-67.
4. Or equal.

2.03. TWISTED INSTRUMENTATION CABLE (INTERIOR)

- A. Description - Single and multi-pair cable with overall shield.
- B. Conductor - Stranded copper, size 16 AWG (18 AWG 300V in panels).
- C. Insulation Voltage Rating - 600 volts.
- D. Insulation - PVC/nylon.
- E. Shielding – 100 percent overall aluminum or aluminum/polyester foil.
- F. Manufacturers:
 1. Alpha - Model 2471 (2421).
 2. Belden – Model 8719 (8760).
 3. Clifford – Multi-pairs.
 4. Or equal.

2.04. TELECOMMUNICATION CABLE FOR INSIDE USE (ETHERNET)

- A. Description - Multi-conductor cable, Insulated conductor are twisted into pairs.
- B. Conductor - Minimum size No. 24 solid copper.
- C. Insulation - Color-coded, PVC.
- D. Rip Cord - If available.
- E. Outer Jacket - PVC. COLOR - BLUE
- F. Manufacturers:
 1. Anixter - Inside Wiring Cable, Model EX-CM-00224BAG.
 2. Triangle PWC, Inc. - Type 123BM; Model TP-610TC.
 3. Brand-REX - Model BMD.
 4. Or equal.

2.05. BONDING CONDUCTORS

- A. Description - Bare copper wire.
- B. Conductor - Solid ASTM B-1 for sizes No. 8 and smaller; stranded ASTM B-8 for sizes No. 6

and larger.

C. Manufacturers:

1. Anixter - Model 1A or 1B.
2. Cablec - Model "Bare and coated copper conductors" listed under Section 7 "Special Purpose Cables."
3. Southwire – Bare copper ground.
4. Or equal.

2.06. CONTROL PANEL WIRE

- A. Description - 90 degrees C Machine Tool Wire (MTW).
- B. Conductor - Minimum Size AWG #16, 19 strand.
- C. Insulation - PVC, 2/64-inch for 600 V service.
- D. Manufacturers:

1. Carol - Catalog Series 7600.
2. Anixter - Catalog Series 6W.
3. Manhattan – Series MTW.
4. Or equal.

2.07. WIRING CONNECTORS

A. Terminal Block Manufacturer:

1. Control Wiring:
 - a. Buchanan - Model 0241.
 - b. Connection - Model NSS3.
 - c. Ideal.
 - d. Or equal.
2. Equipment Power Wiring:
 - a. Buchanan - Model 416.
 - b. Connection - Model NC3.
 - c. Ideal.
 - d. Or equal.

B. Wire Nuts:

1. For Unclassified Areas - Hexagonal shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).
 - a. Ideal - Models 341 and 342.
 - b. 3M - Models 212, 312, and 512.
 - c. Buchanan - Models B-1, B-2, and B-4.
 - d. Or equal.
 2. For Wet and Corrosive Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).
 - a. Ideal - Model DB Plus.
 - b. Buchanan - Models BTS2 and BTS4.
 - c. 3M.
- C. Or equal. Bolted Wire Connectors - Mechanical connectors for all combination of copper and aluminum conductors. It shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hexhead bolts.
1. Burndy - Model KVSU.
 2. Ideal.
 3. IlSCO.
 4. Or equal.
- D. Terminal Blocks - 600 VAC continuous ratings, heavy duty nylon and suitable for channel mounting with end caps, jumpers and mounting channels as required.
- E. Two-way splices, tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.
1. Burndy - Model YS-L "Hylink."
 2. Thomas & Betts Catalog - Model 545.
 3. 3M - Model 10000.
 4. Or equal.
- F. Two-way splices, tubular, compression type for conductors, 1 AWG and smaller, uninsulated and rated 600 VAC.
1. Burndy – Type YSV "Hylink."
 2. Thomas & Betts.

3. 3M.
 4. Or equal.
- G. Branch Circuit Connector and Fixture Connections - Crimp type, 600 VAC connectors with rubber rap insulator.
1. Ideal Catalog - Series 30; Model 410, 411, and 412 with Model 415 and 417 insulator.
 2. Thomas & Betts - Catalog PT66M with PT6 insulator.
 3. 3M.
 4. Or equal.
- H. Bus or Lug Terminals - 600 VAC, crimp type.
1. Burndy - "HYLUG" Catalog, Series YA.
 2. Ideal - Catalog Series CCL and CC.
 3. IlSCO.
 4. Or equal.
- I. Control and Instrumentation - Locking fork, vinyl self-insulated, crimp type connectors.
1. Thomas & Betts - Catalog Series 18RA, 14RB, and 10RC.
 2. Burndy - "VINYLUG" Types TP-LF and BA-EL.
 3. Ideal - Catalog Series 83-7.
 4. Or equal.

2.08. MISCELLANEOUS ACCESSORIES

- A. Electrical Tape:
1. Plastic Tape - All weather vinyl electrical tape having a high dielectric strength and resistant to sun, water, oil, acids, and corrosive chemicals. Tape shall be Tomic No. 85; 3M; Thomas & Betts; or equal.
 2. High Voltage Electrical Tape - Self bonding polyethylene bond tape. Tape shall be Tomic No. 3; 3M; Thomas & Betts; or equal.
 3. High Temperature Tape - A woven glass fabric backing with a thermosetting rubber base adhesive. Tape shall be Tomic No. 77; 3M; Thomas & Betts; or equal.
 4. Underground Splice Tape - An inherent positive moisture seal and insulation for 600-volt conductors consisting of a laminate of EPR and Electro-Seal mastic in roll form.
 5. Manufacturers - Bishop Electric, 3M, Thomas & Betts, or equal.

B. Wire Pulling Lubricant Manufacturers:

1. Ideal.
2. Tomic Electric.
3. 3M.
4. Or equal.

C. Wire Pulling Lubricant - Wire pulling lubricant shall be non-toxic and contain no solvent to attack wire insulation plastic tape or conduits. Lubricant shall leave no residual in conduit, shall be rust inhibited and be non-combustible.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify ductbanks are completed and terminal equipment is in place.
- C. Verify that mechanical work likely to damage wire and cable has been completed.

3.02. PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03. CONDUCTOR SIZING

- A. Power and lighting circuits - Minimum number 12 AWG. Quantity as required for proper operation.
- B. Control Circuits - Use stranded conductor not smaller than 14 AWG. Quantity as required for proper operation.
- C. Neutral Wire - To be equal to ungrounded wires unless specifically otherwise shown.
- D. Ground Wire - Minimum size as required by the NEC Table 250 122.

3.04. CONDUCTOR STRANDING

- A. Conductors shall be stranded as called for in the following table.

USE	SIZE	STRANDED REQUIRED
Wiring within MCC	All	Yes
Control wiring	All	Yes
Instrumentation	All	Yes
Major power	All	Yes
Panelboard circuits	#8 and Larger	Yes

3.05. WIRING METHODS

- A. General - All conductor shall be Type THWN with insulation suitable for use in wet locations and designed for 75 degrees C maximum operating temperature unless otherwise indicated as noted below:
 - 1. Major Power Distribution (as shown on one-line diagram).
 - a. Use XHHW type-conductor for interior applications.
 - 2. Lighting Circuits - Use THW or THWN-type conductor. Switching control shall be as shown on Drawings. Circuiting approximately as shown; minor variations permitted. Install all required conductors for switching and emergency lighting shown. Receptacle Circuits - Use THW or THWN type conductor. Circuiting approximately as shown; minor variations permitted. Six receptacles per circuit unless indicated otherwise. Special receptacle circuits as shown on Drawings.
 - 3. Wet and Corrosive Areas - Use nylon jacketed type except for major power distribution.
 - 4. 90 Degrees F High Ambient Areas (i.e., Furnace Room) - Use conductor with insulation rated 90 degrees C for dry areas, in locations with continuous ambient temperature in excess of 90 degrees F.

3.06. COLOR CODING

- A. All service, feeder, branch, control, and signaling circuit conductors, shall have color coding throughout the entire run.
- B. Grounding Conductors - Shall be green.
- C. Neutral Conductors - Shall be white or gray, except where neutrals of more than one system are installed in the same raceway or box, the other neutral shall be white with a colored (not green) stripe.
- D. The color of the ungrounded conductors in different voltage systems shall match the existing system. When no existing system exists, color coding shall be as follows:
 - 1. 277/480 volt, 3-phase:
 - a. Phase A – Brown.
 - b. Phase B – Orange.
 - c. Phase C – Yellow.
 - 2. 120/208 volt, 3 phase:
 - a. Phase A – Black.
 - b. Phase B – Red.
 - c. Phase C – Blue.
 - 3. dc Power:

- a. Positive Lead – Red.
 - b. Negative Lead – Black.
4. dc Control: All – Blue.
 5. 120V Control Wiring - Single conductor ac control wire shall be Red except a wire entering a motor control center compartment or control panel which is an interlock, shall be color coded Yellow.
 6. 24V Control Wiring - Orange.

3.07. INSTALLATION

- A. Install products in accordance with manufacturers' instructions.
- B. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- C. Do not pull thermoplastic wire at temperatures below 35 degrees F.
- D. Protect exposed cable from damage. For exterior cables, tape ends watertight if terminations are not to be made up immediately after pulling conductors.
- E. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- F. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- G. Circuit arrangements shown on Drawings with regard to electrical loading and design concept shall be followed completely. Actual circuit routing shall be at the electrical installer's option as approved by the Engineer. Circuit numbers labeling home runs on Drawings are for count only and not necessarily for directory purposes.
- H. Wiring Diagrams:
 1. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate only.
 2. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.
 3. Install all work in accordance with certified wiring diagrams.
- I. Conductors installed in wireways shall be grouped and bundled as they exit each conduit run.

In opened areas such as wireways, manholes, etc., wires and cables shall be tied every 12 inches. Provide plastic laminated labels on conductor groupings wrapped to cables.
- J. Electrical trade to provide all power, control and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams.
- K. Where instrumentation cables are installed in panels, etc., arrange wiring to provide maximum

clearance between instrumentation cables and other conductors. Instrumentation cables shall not be installed in the same bundle with conductors of other circuits.

- L. Intrinsically safe conductors shall be in separate conduits both inside and outside the enclosure and shall be terminated on separate terminal strips with barriers. Label the conduit as “intrinsically safe.”
- M. Installation in Manholes and Handholes - Neatly bundle conductors and train them around the outside (long way around) of the manhole. Support conductors from hooks in side of manhole or handhole.
- N. Multi-conductor VFD motor cables shall be installed such that the cable manufacturer’s minimum bend radius specifications are followed. As required and prior information, obtain this information from the cable manufacturer for each size cable installed. See Section 26 05 33 – Raceways

3.08. SPARE CONDUCTORS

- A. As noted on the contract drawings.

3.09. TERMINATIONS CONNECTIONS, SPLICES AND JOINTING

A. General:

- 1. All accessories that use special tools for proper application as recommended by the manufacturer shall be installed only with those tools and in accordance with the established practices and recommendations of the manufacturers.
- 2. Solder joints and hinged connectors will not be permitted.
 - a. The exception of multi bolted direct compression connectors in large wire and cable sizes will be permitted, if compression type fittings are not available or the Engineer determines sufficient space is not available.
- 3. Make splices only in accessible locations and in junction boxes. No splices in pulling fittings, wireways, or MCC wiring spaces.
- 4. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- 5. Clean conductor surfaces before installing lugs and connectors.
- 6. Splices, taps or terminations shall not be made when conductor ends have missing strands or when ends are mutilated in any way.

B. Splices:

- 1. No splices will be allowed in any major power distribution runs or in any underground wiring.
- 2. Insulate the completed splice with insulating putty to approximately match the insulation thickness or approximately 1/8 inch and tape with self-fusing neoprene splicing tape to twice original cable or wire diameter, two half lapped layers minimum.

3. Extend taping at least 1/2 inch over original insulation or two cable diameters, whichever is larger.
4. Exceptions:
 - a. Lighting and Receptacle Circuits - Splice connections shall be wrapped with plastic electrical tape, or use insulated compression connectors.
 - b. Fractional horsepower motors wrap splice with plastic electrical tape or insulated compression fillings.
 - c. For splices in circuits located in high ambient temperature areas, wrap the connection with high temperature tape and cover with plastic tape.
- C. All outdoor splices of 600 volt conductors shall be wrapped with underground splice tape and an outer wrapping of plastic electrical tape.
- D. Taps - Make taps similar to splices described above.
- E. Lug Connections - Use one- or two-bolt indent compression lugs. Insulate the lug barrel and original insulation as for splices.
- F. Motor Connections:
 1. Motors Less than 1 HP - Use wire nut appropriate for the environment where the motor is located.
 2. Motors from 1 HP to 20 HP - Use branch circuit crimp-type connectors.
- G. Terminal Board Terminations - All interconnecting wiring to terminal boards and strips shall be made with insulated crimp type connectors (locking spade type). Stranded wire shall not be directly connected to terminals without the use of connectors unless the terminations are of the locking collar type. No loose strands shall be permitted outside of the connector, whichever is utilized.
- H. Connections:
 1. Connections of conductors to terminal posts or other conductors shall be made with UL approved compression type connectors. Wire nuts shall not be permitted, except for fractional horsepower, single phase motors or elsewhere where specifically approved by the Engineer.
 2. Connections shall insure a thorough connection without damaging the conductor.
 3. Connections shall be for proper cable size.
 4. Copper to aluminum connection shall be made with UL approved aluminum to copper connectors and compound.

3.10. INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 26 05 53 – Electrical System Identification.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.11. FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Sections 01400, Quality Control, and 26 05 00 – Electrical-General.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. Torque values can also be found in the NEC Handbook.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Grounding

1. Items to be grounded include all new work of this Contract, but not be limited to metallic water services, equipment housings, motor frames, metal raceways, grounding terminals of outlets, outdoor lighting fixtures, footing rebar, ductbanks, manholes, pullboxes, and transformer secondary neutrals. In addition to the NEC requirements and the above, the following, where a part of this Project, shall be permanently and effectively grounded:
 - a. All structural metals.
 - b. All metallic panels and conduit.
 - c. Motor frames 10 HP and larger.
 - d. All metallic equipment bases.
 - e. Metallic hand railing and walkways.
 - f. Metallic portions of heating, ventilating, and air conditioning equipment.
2. Take special precautions to ground all equipment in strict accordance with the NEC and as otherwise noted in these specifications.

1.02. RELATED SECTIONS

- A. Section 26 05 00 – ELECTRICAL-GENERAL
- B. Section 16950 - TESTING AND INSPECTION

1.03. REFERENCES

- A. All materials and installations shall be in accordance with the latest revisions of the following:
 1. National Electric Code.
 2. Underwriters Laboratories, Inc.

1.04. SUBMITTALS

- A. Provide submittals and samples in accordance with Section 26 05 00 – Electrical-General.
- B. Shop drawing shall be submitted for only the electrode system and conductors used in connection with the grounding system.
- C. Submit an 18-inch sample of the ground system tin-plated conductor and other samples as may be requested by the Engineer.
- D. Certified test reports of grounding system resistance per Section 16950, Testing and Inspection.

PART 2 MATERIALS

2.01. ELECTRODES

- A. Driven Ground Rods - 3/4-inch diameter x 10 feet long (minimum) steel core copper jacketed. Rods shall be manufactured by Copperweld Steel Company, Thompson Lightning Protection, Inc., or equal.
- B. Ground Plates - 1/4-inch x 24-inch x 24-inch square copper plates.
- C. Drilled Ground Rods:
 - 1. Drilled ground rods shall be a system consisting of 20 foot straight drilled holes containing salt filled copper tubes. The tubes shall be filled with a combination of NaCL and CaCL salts. All electrical connections at the ground rods shall be made via exothermic welding. All cables shall be tin-plated copper. Backfill material shall be composed of hydrous aluminum silicate. Drilling is typically done by a water well driller as a sub to the Contractor.
 - 2. Drilled system shall be UL listed.
 - 3. System access from grade shall incorporate the use of a concrete or polyplastic box for protection with a steel cover. Box shall be installed flush with finish grade. Use concrete when rods are installed in drives or walkways.
 - 4. Manufacturers:
 - a. Superior Grounding Systems, 1-800-747-7925.
 - b. XIT Grounding System, (213) 320-8000.
 - c. Or equal.
 - 5. Guarantee - Contractor and grounding system installer shall jointly guarantee the grounding system for two years.

2.02. CONDUCTOR

- A. Ground Conductor (Above Grade) - Type XHHW insulated wire in conduit or other raceway. Color code insulation per NEC.
- B. Ground System Conductor (Buried) - Soft drawn or soft annealed stranded copper, tinned bare stranded conductor. Note: This type conductor is not always readily available, and long lead times should be anticipated. For conductors run from inside of building to ground system conductor, also, use tinned bare stranded copper.
- C. Equipment Bonding Conductor - For sizes 8 AWG and smaller, solid ASTM B-1. For sizes 6 AWG and larger, stranded ASTM B-8, bare copper.

2.03. CONNECTORS

- A. Compression-Type Fittings:
 - 1. Construction - Two bolts and a minimum of 1-1/2 inches in length.
 - 2. Manufacturers:
 - a. Thomas & Betts.
 - b. Burndy Corporation.

- c. ILSCO.
 - d. Or equal.
- B. Welded Connection:
- 1. Construction - Molded fusion-welding process.
 - 2. Manufacturers:
 - a. Cadweld.
 - b. Thermoweld.
 - c. ILSCO.
 - d. Or equal.
- C. Mechanical Connection:
- 1. Construction - Mechanical lugs securely fastened using silicon bronze hardware.
 - 2. Manufacturers:
 - a. Thomas & Betts.
 - b. Burndy Corporation.
 - c. Or equal.

PART 3 EXECUTION

3.01. GROUND SYSTEM DESCRIPTION

- A. Install ground system or grid as shown on the Contract Drawings. Install such that tops of ground rods are 12 inches below grade. Depth of the conductor system is to be 30 inches minimum with a length as shown on the Drawings. Thermoweld rods to copper grounding conductor.
- B. When driven rods are specified and cannot be driven due to boulders or rock formations, this specification will allow the NEC 250.53G guidelines for the angled ground rods, but not the horizontal rod, and where shown, to install grounding plates below groundwater level or a minimum of 6 feet below finished grade.
- C. Final resistance to ground of completed ground system shall be a maximum of 5 ohms in accordance with Section 16950, Testing and Inspection. If tests indicate higher than 5 ohms resistance, then the Contractor shall install additional rods or plates at no additional cost to Owner to lower the resistance to below 5 ohms.

3.02. CONNECTIONS

- A. Buried Connections - Made with thermal welded fittings specially made for grounding system or compression fitting for buried pipe/plate bonding.
- B. Exposed Connections - Made with grounding system compression-type fittings.
- C. Connections to Metal - Make all connections to water pipes, steel surfaces, etc., using mechanical connectors.

- D. Thoroughly clean all surfaces to bright bare metal to accept ground connections.

3.03. GROUNDING ELECTRODE CONDUCTOR

- A. Services - As shown on the Drawings and as required by the NEC.

3.04. MAIN SERVICE GROUNDS

- A. Bond ground system securely to:

1. Building water service. (If available and if metallic water pipe is used and is of sufficient conductive length to insure continuity, provide jumpers around meters or other removable devices as required.) See Contract Drawings for conductor size and pipe location.
2. Building structural steel (if available), including canopy, roof and hoist supports. One No. 6 minimum two places, opposite corners of building. Buildings over 60 feet in length No. 6 ground at each corner.
3. One No. 6 to foundation (footing) steel reinforcing (20-foot minimum length 1/2-inch rebar).
4. Connect two grounding electrode conductors in conduit to facility grounding grid or system.

3.05. BUILDING GROUND CONNECTION

- A. Connection from main ground to building systems shall be as specified herein as shown and as required. Positively connect equipment housings and conduit system to main service ground, only at main service ground bar.

3.06. INDIVIDUAL GROUNDS

- A. If individual equipment or individual building grounds are made, separate grounding conductors (in earth where possible) shall connect these grounds to main service ground. (This requirement applies only within each system of subsystem fed from a distribution transformer.) Intent is that main ground shall be at the main or incoming power source and not at utilization point unless positively connected to same.

3.07. INTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Electrical integrity of conduit system shall be maintained throughout. Provide bonding jumpers at fittings as required; jumpers shall be no longer than required. Provide a separate ground wire in all conduit systems.

3.08. EXTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Provide separate ground wire for all conduit systems leaving the building interior. Size per NEC 250-122 in NEC or as shown.
- B. Exterior grounding system to be installed in Schedule 80 PVC conduit.

3.09. FEEDERS

- A. Include an insulated grounding conductor, sized per NEC 250-66, in each conduit, sized for total feeder cross-sectional area. Bond all served equipment frames, enclosures, ground bars, etc., to this conductor. Make all conductor terminations and connections using compression lugs or fittings designed and UL labeled for the purposes.

3.10. SEPARATE GROUND

- A. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and connect neutral to ground at the main service grounding point only. Run separate insulated (green) grounding conductors from all grounding points independently back to main service ground. Where ground passes through panels and disconnects, ground lugs shall be brazed or bolted to panel or disconnect housings with neutral bus or lug isolated from same. Ground all metallic conduits at each panel. Clean paint from metal to accept ground lugs.

3.11. METALLIC, NON-CURRENT CARRYING ENCLOSURE

- A. Connect to ground bar at load center supplying same through conduit system using proper fittings at junction boxes, expansion joints, and between ground bushings on each conduit within all sheet metal enclosures.

3.12. SHIELDED CABLE

- A. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer's recommendations.

3.13. CONDUIT SEALS

- A. Where non-metallic conduits protecting grounding conductors enter the building from the exterior, provide watertight wall seals on each conduit and a sealing bushing on the enclosed conductor. Sealing bushings on all conduits penetrating the floor. Make bonding jumper connection to metallic conduit, where equipped with sealing bushings, with water pipe ground connections of proper size. Seal watertight the inside of all conduits entering the building below grade.

3.14. GROUND CONDUIT LABELS

- A. Label all service, equipment frame or motor grounding conduits containing only grounding conductors - "(Fill in Name) ground." Label to identify item being grounded.

3.15. INDEPENDENT GROUND SYSTEMS

- A. The grounding system described here shall be independent from the lightning protection ground system. However, both systems, when available, shall be bonded together.

3.16. INDIVIDUAL MOTOR CONNECTION

- A. Make connections from frames of motors 50 HP and larger directly to the exterior/buried ground system. Motors up to this HP shall be connected to the circuit or raceway grounding system. Where motor is separate from and not mounted on a major equipment frame, bond frame to motor ground. Size of ground shall be per 250-122 for the motor overcurrent device.

3.17. MAJOR EQUIPMENT FRAMES AND TANKS

- A. Make connection from major equipment frames, i.e., but not limited to, dewatering equipment, mechanical screens or grit equipment, and tanks directly to the exterior/buried ground system via a #6 ground. Conductor shall be installed in conduit the full length from the grounded item to outside below grade.

3.18. CONCRETE MANHOLES AND HANDHOLES

- A. Provide one 3/4 inch diameter by 10-foot long driven ground rod or ground plate in or at each manhole and handhole. Provide plates as shown or where ground rod cannot be driven full depth (also see paragraph 3.01.B herein).
- B. Provide No. 6 ground conductor from ground rod to all metallic parts including cable racks and

manhole frame.

- C. Bond ductbank grounds to manhole and handhole ground rod or plate.

3.19. DUCTBANK GROUND CONDUCTOR

- A. Bond ductbank ground conductor to the new building ground system.
- B. Bond ductbank grounds to manhole and handhole ground rod or plates.

3.20. METAL STAIRS AND GUARDRAILS (HAND RAILING)

- A. Provide a No. 6 ground conductor to each stair.
- B. Provide a No. 6 bonding jumper between sections of guardrails including stair guardrails.

3.21. EXTERIOR LIGHT POLES

- A. Provide a No. 6 ground conductor from ground rod to light pole and a No. 6 bonding jumper to conduits.

END OF SECTION

SECTION 26 05 29

ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.02. REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code

1.03. RELATED SECTIONS

- A. Section 26 05 00 – ELECTRICAL-GENERAL
- B. Section 40 95 13 – CONTROL PANELS AND ENCLOSURES

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 26 05 00 – Electrical-General.
- B. Product Data - Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by Product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01. PRODUCT REQUIREMENTS

- A. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products and designing system supports.

2.02. METAL CHANNEL

- A. Non-PVC Coated:
 - 1. Aluminum:

- a. Description – 12 gauge minimum channel designed for use with steel fittings, spring backed washers and nuts.
 - b. Manufacturers:
 - 1) Kindorf.
 - 2) Uni-Strut.
 - 3) B-Line.
 - 4) Globe.
 - 5) Or equal.
2. Stainless Steel:
- a. Description - For the purpose of this Section, all stainless steel shall be Type 316.
 - b. All fasteners, fittings, clamps, saddles and accessories shall be stainless steel.
 - c. Manufacturer:
 - 1) Uni-Strut.
 - 2) B-Line.
 - 3) Or equal.
- B. Polyvinyl Chloride (PVC) Coated Materials:
- 1. Hanger or support shall be hot dipped galvanized including the threads.
 - 2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
 - 3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
 - 4. The PVC coating shall be applied by the liquid fluidized bed method.
 - 5. The coating material shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers or gross, non-uniform characteristics.
 - 6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040 inch (40 mils) and a maximum thickness of 0.045 inch (45 mils).
 - 7. Finished Color - Manufacturer's standard.
 - 8. Manufacturers:
 - a. B-Line Systems, Inc.
 - b. Perma-Cote Industries.
 - c. Robroy Industries (Plasti-Bond Red).

- d. Kor Kap.
- e. OCAL.
- f. Or equal.

2.03. FIBERGLASS CHANNEL

- A. Description - Pultruded materials of glass strands and polyester resins to form rigid, high strength, non-corrosive, non-flammable structural channels, connectors and fasteners.
- B. Manufacturers:
 - 1. Robroy Industries.
 - 2. Enduro.
 - 3. Aickinstrut.
 - 4. Strut Tech.
 - 5. Or equal.
- C. All strut and hanger rods in corrosive areas shall be fiberglass manufactured in a continuous process whereby linear glass strands, continuous mat laminates, and corrosion resistant polyester resins form a uniform rigid thermoset finished shape. The fiberglass parts shall be self-extinguishing with a V-O classification in the UL 94 test for flammability. Hanger rod washers shall be stamped from protruded flat stock. Hex nuts and strut nuts shall be injection molded. Other hardware shall be PVC coated to a nominal 15 mils. The bond between metal and plastic shall be equal to or greater than the tensile strength of the plastic. Manufacturers: Robroy Industries, Kor Kap, or equal.

2.04. TWO-PIECE MALLEABLE IRON CLAMPS

- A. Cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp backs (spacers). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Cadmium plated anchor and washer. Manufacturer - O-Z/Gedney, Thomas & Betts, Appleton, Raco, or equal.
- B. PVC-coated cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp back (spacer). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Stainless steel anchor and washer. Manufacturer - Robroy, Thomas & Betts, Ocal, Perma-Cote Industries, Kor Kap, or equal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. General:
 - 1. Install products in accordance with manufacturer's instructions.
 - 2. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Anchor conduits to or support from structural members only.
 - 3. Fasteners used to wall mount any material or equipment weighing 75 lbs. or more to concrete or masonry shall be adhesive or masonry anchors, Type 316 stainless steel. All floor-mounted equipment and other wall-mounted materials or equipment weighing

less than 75 lbs. may be supported via drilled anchors. See Section 03 30 00 – Cast in Place Concrete and Masonry Anchors.

4. Do not use spring steel clips and clamps.
 5. Do not use powder actuated anchors.
 6. Do not drill or cut structural members.
 7. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel. Obtain the Engineer's written approval of any drilling or cutting on the structure.
 8. Through spaces where surface mounting is not available, install multiple conduits on electrical channel rack, either hung or wall mounted. Provide space on each rack for 25 percent additional conduits.
 9. Support conduit passing through above-grade floors so that sealing sleeves or mechanical link seals do not carry the weight of the conduit.
 10. Install individual surface mounted conduit with two-piece cast malleable iron clamp assembly.
 11. Install surface mounted cabinets and panelboards with minimum of four or six anchors, depending upon the number of normal anchor points. See table at the end of this section.
 12. In all locations, use stainless steel channel supports to stand cabinets, panelboards and mounting panels 1/2-inch (12 mm) off wall.
 13. Finish of all supports shall be compatible with the conduit system applicable for the area classification where installed.
 14. After thorough investigation of architectural, structural and shop drawings related to work to determine how equipment, fixtures, conduit, panelboards, etc. are to be supported, mounted or suspended, provide:
 - a. Extra steel bolts, inserts, pipe stands, brackets, or any other items required for proper support.
 - b. Supporting accessories where required, whether or not shown on Drawings.
 15. Refer to details on the Contract Drawings for free-standing and railing-mounted construction and for any other details of special conditions. For other situations, the Contractor shall, prior to installation, submit mounting details to the Engineer for approval.
- B. Support Applications:
1. Unclassified Areas - Aluminum.
 2. Interior Hazardous Areas - PVC-coated channel.
 3. Interior and Exterior Corrosive Areas - Aluminum.
 4. Interior Wet Areas - Stainless steel channel system.
 5. Exterior Areas - Aluminum channel system.
- C. Anchor and Fastener Application Schedule - See schedule at end of this section.

D. Support Spacing:

1. Metallic Conduit - Not more than 8 feet on center. Types A, A-1, and E within 3 feet of each outlet box, junction box, cabinet or fitting.
2. Non-Metallic Conduit:
 - a. Sizes up through 1-1/4-inches diameter - not more than 3 feet on center.
 - b. Sizes 1-1/2-inches diameter and larger - Not more than 4 feet on center.
 - c. Within 18 inches of each outlet box, junction box, cabinet or fitting.
3. Maximum Deflection:
 - a. Metallic Conduit - 1/100th of span between supports.
 - b. Non-Metallic Conduit - 1/360th of span between supports.

ANCHOR AND FASTENER APPLICATION SCHEDULE

ITEM CATEGORY	MOUNTING SURFACES							SHEET METAL
	WOOD, PLYWOOD	WALLBOARD, GYPSUM, FRP, COMPOSITION	HOLLOW MASONRY	SOLID MASONRY	CAST CONCRETE			
Individual conduit	F	G	D	A	A		E	
Aluminum/Steel/FRP channel	F, I	D	D	A	A		E	
Structures; i.e., conduit rack, cable tray	F, I	D	D	A	A		--	
Devices and equipment less than 75 lbs. (Note 5)	I	Note 1	D	A	A		Note 2	
Devices and equipment 75 lbs. or more (Note 4)	I	Note 2	H	B, H, J	B, C, H		Note 2	
Mounting panels (Note 3)	I	Note 1	D	B, H, J	B, C, H		Note 2	

Key to Anchor Types:

- A - Drilled (lead insert in masonry, expansion bolt in concrete)
- B - Adhesive anchor
- C - Cast-in-place insert
- D - Toggle bolt, hollow wall fastener
- E - Sheet metal screw
- F - Wood screw
- G - Sheet rock screw
- H - Through bolt
- I - Lag screw
- J – Masonry anchor

In wet, exterior, corrosive, or hazardous areas, all fasteners and anchors shall be Type 316 stainless steel. In all unclassified areas, cadmium-plated fasteners shall be used, except grouted anchors shall be Type 316 stainless steel.

Notes:

- (1) Support via plywood mounting panel lagged to studs or via electrical channel lagged to studs.
- (2) Do not mount to these surfaces.
- (3) Panels mounted to masonry or concrete surfaces shall have 1/2-inch air space between surface and panel via stainless steel spacers.
- (4) Provide two additional support connections; minimum of four or six, depending on number of normal connection points. This requirement may necessitate fabricating the additional connections. Maintain NEMA rating of enclosure.
- (5) Use adhesive or masonry anchors for all exterior conduit supports.

END OF SECTION

SECTION 26 05 33

RACEWAYS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquid tight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Nonmetal conduit.
- F. Electrical nonmetallic tubing.
- G. Flexible nonmetallic conduit.
- H. Fittings and conduit bodies.
- I. Wireway and wire trough.

1.02. RELATED SECTIONS

- A. Section 03 00 00 - CONCRETE
- B. Section 26 05 00 - ELECTRICAL-GENERAL
- C. Section 26 05 26 - GROUNDING
- D. Section 26 05 13 - CONDUCTORS
- E. Section 26 05 34 - BOXES
- F. Section 26 05 29 - ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS
- G. Section 26 05 53 - ELECTRICAL SYSTEM IDENTIFICATION

1.03. REFERENCES

The following specifications and standards are incorporated herein by reference and form a part of this specification in accordance with the Standard General Conditions of the Construction Contract, paragraph 3.3.1.

- A. Federal Specifications (Fed. Spec.)

W-C-582(1)	Conduit, Raceway, Metal and Fittings: Surface
W-C-583B	Conduit Boxes and Outlet Fittings, Floor (for Rigid Metal Conduit)
W-C-586B(1)	Conduit Outlet Boxes, Bodies and Entrance Caps, Electrical: Cast Metal for Shore Use
W-C-1094A	Conduit and Conduit Fittings Plastic, Rigid
W-F-406B	Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
W-F-408C(1)	Fittings for Conduit, Metal, Rigid (Thick-wall and Thin-wall (EMT) Type)
FF-S-760A(2)	Strap, Retaining (Metal for Conduit, Pipe and Cable)
FF-S-325	Shield, Expansion, Nail, Expansion; and Nail, Drive
WW-C-00540C	Conduit, Metal, Rigid: Electrical, Thin-wall, Steel Type (Electrical Metallic Tubing); Straight Lengths, Elbows and Bends
WW-C-581E	Conduit, Metal, Rigid; and Couplings, Elbow and Nipple, Electrical Conduit: Zinc-coated

B. National Fire Protection Association (NFPA) Publications

No. 70	National Electrical Code (NEC)
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C. Underwriters Laboratories, Inc. (UL) Publications

No. 1	Flexible Metal Electrical Conduit
No. 5	Surface Metal Electrical Conduit
No. 6	Rigid Metal Conduit
No. 467	Electrical Grounding and Bonding Equipment
No. 514	Electrical Outlet Boxes and Fittings
No. 651	Rigid Nonmetallic Electrical Conduit
No. 797	Electrical Metallic Tubing

D. ANSI American National Standards Institute

ANSI C80.1	Rigid Steel Conduit, Zinc Coated
ANSI C80.3	Electrical Metallic Tubing, Zinc Coated
ANSI C80.5	Rigid Aluminum Conduit
ANSI/NEMA FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

E. National Electrical Manufacturer's Association

NEMA RN 1	Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC 80)
NEMA TC 3	PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA TC 6	PVC and ABS Plastic Utilities Duct for Underground Installation
NEMA TC 8	Extra-Strength PVC Plastic Utilities Duct for Underground Installation
NEMA TC 9	Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation

1.04. SUBMITTALS

- A. Submittals and samples shall be made in accordance with Sections 01300, Submittals, and 16050, Electrical-General.
- B. Shop drawings shall be submitted for, but not be limited to, the following:
 - 1. All raceway types, A through J.
 - 2. Conduit fittings.
 - 3. Types K, K-1, and K-2 wireway and trough.
 - 4. Wall sleeves and wall plates.
 - 5. Wall sleeve seals.
- C. Shop drawings shall include dimensions, interior and exterior finish, and location where material is to be installed.
- D. Samples shall be submitted as requested by the Engineer.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Sections 01700, Record Documents, and 26 05 00 – Electrical-General.
- B. Accurately record and indicate the size and location of all conduits into and out from all manholes, handholes, and buried pullboxes. Indicate circuit number, size, quantity, source and destination of all conductors in each circuit. Provide measurements to all boxes, bends in conduit groups, and every 100 feet along straight runs of ductbanks.

1.06. REQUIREMENTS

- A. Trenching, backfilling and concrete shall be provided by the Contractor in accordance with the applicable sections of the Contract Specifications.
- B. Conduit and raceway sizes shall be in accordance with ANSI/NFPA 70 and this section.
- C. All work shall be coordinated with the Owner and Engineer.

1.07. DEFINITIONS

- A. Distribution Runs - Major one-line feeders and power to transformers and panelboards.
- B. Equipment Power and Control Circuits - Power and control for equipment including such items as pumps, mixers, and large fans powered directly from motor control centers or distribution panelboards.
- C. Branch Circuits - Power for all devices and equipment from lighting and equipment panelboards.

PART 2 MATERIALS

2.01. RACEWAYS

- A. The types of materials correspond with the types of raceway as stated in conduit applications.

Type A	Rigid, hot dipped galvanized steel conduit shall conform to ANSI C80-1 and UL No. 6. Manufacturers: Allied, Wheatland, Republic, or equal.
Type A-1	Rigid, hot dipped galvanized intermediate steel conduit shall conform to UL 1242 and Federal Spec. WWC581. Manufacturers: Allied, Wheatland, Republic, or equal.
Type B	Rigid aluminum conduit shall conform to ANSI C80-5. Manufacturers: Allied, Republic, or equal.
Type C	Electric metallic tubing (E.M.T.) shall conform to ANSI C80.3 galvanized steel with interior lacquer and enamel coating, exterior zinc chromate treated and UL No. 797. Manufacturers: Allied, Wheatland, Republic, or equal.
Type D	Rigid, non-metallic conduit shall be Schedule 40 PVC and conform to Federal Specs W-C-1094A and Underwriters Laboratories, Inc., Standard UL-651. Manufacturers: Robroy, Allied, Carlon, or equal.
Type D-1	Similar to Type D, except Schedule 80. Manufacturers: Robroy, Allied, Carlon, or equal.
Type E	<p>PVC-coated, rigid steel conduit shall conform to Federal Specification WWC-581d and NEMA RN1 and be coated with a heat polymerizing adhesive prior to plastic coating. The plastic coating shall be a thickness between 0.035-inch and 0.045-inch applied by the "plastisal" method. Interior coating shall be a factory-applied, two-part, 2 mil thick, chemically cured, hot dipped urethane coating. The coating shall be sufficiently flexible to provide field bending without cracking, splitting or rolling up.</p> <p>At each coupling or fitting, a plastic sleeve shall extend on to the conduit a minimum of one pipe diameter. Plastic sleeves or plastic gaskets shall not interfere with the continuity of ground, vapor-proof, or explosion-resisting characteristics inherent in the fitting. Manufacturers: Robroy, Perma-Cote, KorKap, OCAL, or equal.</p>
Type F	Flexible steel conduit (Greenfield) shall be galvanized steel and conform to U.L. No. 1. Manufacturers: Triangle; Columbia; Porter; or equal.
Type G	Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded polyvinyl chloride jacket. Manufacturers: Robroy; Anonconda; Triangle Conduit; Keystone; O-Z/Gedney; or equal.
Type G-1	Similar to Type G with Type "UA" rating, UL listed as sunlight resistant.
Type G-2	Liquidtight, flexible non-metallic conduit shall conform to UL 1660 consisting of hard PVC spirals with extra flexible thin-wall PVC coating. Manufacturer: Carlon Carflex; Thomas & Betts Xtraflex; Hubbell Poly Tuff; or equal.
Type H	Explosion-proof, flexible conduit shall be flexible core with bronze braid covering and steel end fittings. Manufacturers: Crouse-Hinds; Appleton; Killark; or equal.
Type J	Surface metal raceway shall be painted steel, formed channels with Snap-On covers, sized as required per NEC for conductors used. Manufacturers: Wiremold Company; Walker Division of Butler Manufacturing Company; or equal.
pes K and K-1 - Wireway and Wire Trough	<ol style="list-style-type: none"> 1. Formed steel wireway with hinged cover; full lay-in for entire length. Provide with cover latches or captive screws; latches shall have provisions for a sealing wire in the closed position. Finish shall be gray (ASA 49) electro-coated epoxy baked enamel applied over a corrosion-resistant phosphate primer. Provide an approved grounding bar and install whenever a non-metallic extension is made from a wireway. All lengths and fittings shall have smooth, round edges. Furnish without knockouts. 2. Type K - General purpose wireway covers and troughs shall be constructed from a minimum of 16 gauge steel. Manufacturer: Square D, G.E., Westinghouse, Hoffman, or equal. 3. Type K-1 Oiltight troughs shall be 14 gauge steel with oil-resistant, closed cell cover gasket. Provide oil-resistant neoprene joint gasket between bolted end flanges. Manufacturer: Square D Class 5120 or equal.

Type K-2 – Wireway and Trough	PVC wireway with snap cover, NEMA 12 rated, UL listed for electrical wiring up to 600 volts. UL File No. ULE151021. Gray extruded PVC meeting UL 94V-O. Manufacturers: Carlon or equal.
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2.02. PULLING FITTINGS (CONDUIT BODIES)

A. For Types A and A-1 Conduit:

1. Cast iron alloy or malleable iron.
2. Threaded hubs.
3. Zinc electroplate.
4. Cast iron alloy cover with stainless steel screws and solid neoprene gasket.
5. Comply with UL Standard 514 and ASTM A47-77.
6. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Or equal.

B. For Type B Conduit:

1. Cast copper-free aluminum.
2. Threaded hubs.
3. Aluminum acrylic paint.
4. Cast copper-free aluminum cover with stainless steel screws and solid neoprene gasket.
5. Comply with UL Standard 514.
6. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Or equal.

C. For Type C Conduit:

1. Diecast copper-free aluminum.

2. Hubs with hardened hex head with compression connector. No set screws.
 3. Stamped copper-free aluminum cover with stainless steel screws and solid neoprene gasket.
 4. Manufacturers:
 - a. O-Z/Gedney.
 - b. Appleton.
 - c. Or equal.
- D. For Types D and D-1 Conduit:
1. Cast PVC fitting molded from pure polyvinyl chloride material in conformance with NEMA TC-2 Federal Specifications, WC1094A and UL651 Specifications.
 2. Push-on hubs for use with cement solvent.
 3. Molded PVC cover with stainless steel screws and neoprene gasket.
 4. Manufacturers:
 - a. Carlon.
 - b. Orangeburg.
 - c. Allied.
 - d. Or equal.
- E. For Type E Conduit:
1. Cast iron alloy or malleable iron body with PVC coating.
 2. Tapered threaded hubs.
 3. Each hub shall have an extended PVC collar equal in length to the pipe diameter.
 4. Cast iron alloy cover with PVC coating outside, stainless steel screws and solid neoprene gasket.
 5. Manufacturers:
 - a. Robroy.
 - b. Perma-Cote.
 - c. KorKap.
 - d. OCAL.
 - e. Or equal.

2.03. EXPANSION FITTINGS

- A. All expansion fittings shall:
 - 1. Provide for 4-inch linear movement.
 - 2. Provide a watertight connection.
 - 3. Be UL certified.

- B. For Types A and A-1 Conduit:
 - 1. Zinc-plated malleable iron body.
 - 2. Incorporate bonding jumper.
 - 3. Manufacturers:
 - a. Crouse-Hinds.
 - b. Appleton.
 - c. Thomas and Betts.
 - d. Killark.
 - e. Or equal.

- C. For Type B Conduit - Same as for Type A.

- D. For Type C Conduit:
 - 1. Hot dipped galvanized.
 - 2. Self-contained connectors.
 - 3. Manufacturers:
 - a. O-Z/Gedney Type TX.
 - b. Thomas & Betts.
 - c. Or equal.

- E. For Types D and D-1 Conduit:
 - 1. Two-piece, dual hub.
 - 2. Double O-ring seals.
 - 3. 6-inch movement.
 - 4. Manufacturers:
 - a. Carlon E945 Series.
 - b. Orangeburg.

c. Or equal.

F. For Type E Conduit:

1. PVC-coated iron body.
2. Interior coated.
3. 4-inch expansion.
4. Manufacturers:
 - a. Robroy.
 - b. Perma-Cote.
 - c. KorKap.
 - d. OCAL.
 - e. Or equal.

2.04. EXPANSION-DEFLECTION FITTINGS

A. All expansion-deflection fittings shall:

1. Provide for 3/4-inch linear movement, angular misalignment and parallel misalignment.
2. Provide a watertight connection.
3. Have threaded bronze couplings.
4. Have molded neoprene jacket with stainless steel jacket clamps, plastic inner sleeve and flexible, braided tinned copper grounding straps.

B. Manufacturers:

1. Crouse-Hinds Corporation; Type XD.
2. O-Z/Gedney; Type DX.
3. Or equal.

2.05. ELBOWS

A. Types A, A-1, and E Conduit:

1. Conduit material similar to conduit system.
2. Factory made elbows with tapered thread ends.
3. Manufacturers - Same as conduit system.

B. Type B Conduit:

1. Factory made elbows with threaded ends.

2. Aluminum material.
- C. Type C Conduit:
1. Conduit material similar to conduit system.
 2. Either factory made elbows or field bend as required.
 3. Field bend in accordance with National Electrical Code.
- D. Types D and D-1 Conduit:
1. Conduit material similar to conduit system.
 2. Either factory made elbows or field bend as required.
 3. Field bend only with use of "hot box."

2.06. MISCELLANEOUS FITTINGS AND CONNECTORS

- A. For Types A and A-1 Conduit:
1. Malleable iron.
 2. Zinc or hot dipped galvanized.
 3. Tapered threaded hubs or connections.
 4. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Killark.
 - e. Or equal.
- B. For Type B Conduit:
1. Aluminum.
 2. Malleable iron, zinc.
 3. Tapered threaded hubs or connections.
 4. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.

- d. Killark.
 - e. Or equal.
- C. For Type C Conduit:
- 1. Steel or malleable iron.
 - 2. Compression type (no set screws).
 - 3. Zinc-plated.
 - 4. Manufacturers:
 - a. O-Z/Gedney.
 - b. Thomas and Betts.
 - c. Or equal.
- D. For Types D and D-1 Conduit:
- 1. PVC.
 - 2. Threaded or socket weld.
 - 3. Manufacturer:
 - a. Carlon.
 - b. Orangeburg.
 - c. Or equal.
- E. For Type E Conduit:
- 1. Malleable iron.
 - 2. Zinc-coated or galvanized.
 - 3. PVC overcoat.
 - 4. Two-part, 2 mil thick chemically cured, hot dipped urethane intercoating.
 - 5. Manufacturer:
 - a. Rob-Roy.
 - b. Perma-Cote.
 - c. KorKap.
 - d. OCAL.
 - e. Or equal.

2.07. MISCELLANEOUS

- A. Nipples:
 - 1. Nipples for Types A, A-1, B, and E shall be factory made. Material shall be similar to that in the rest of the system.
 - 2. Nipples for Types C, D, and D-1 shall be cut in the field from material similar to the rest of the system. Trim and debur ends.
- B. Locknuts - Zinc-plated malleable iron.
- C. Insulated Bushings - Threaded, galvanized, cast malleable iron body with thermoplastic insulator for Types A and A-1 conduit.
- D. Unions - Three piece (Erickson) couplings. Zinc plated malleable iron with tapered threads for joining Types A and A-1 conduit sections that cannot be turned as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, or approved equal. Split couplings are not permitted.
- E. Strain Relief Connector - Zinc plated malleable iron body and gland nut with neoprene grommet. Manufacturers: Crouse-Hinds, Series CGB-SG; Hubbell (Kellums Division), or approved equal.
- F. Strain Relief (Wire Mesh) Grip - Woven stainless steel wire mesh sleeve with crimped-on zinc-coated retainer ring at one end for use with neoprene grommet and gland nut. Manufacturers: Crouse-Hinds, Pass & Seymour "Flexcor," Hubbell (Kellums Division), or approved equal.
- G. Support (Wire Mesh) Grip - Heavy duty, single eye closed mesh wire sleeve. Eye shall be reinforced with rolled and crimped galvanized steel bearing strip. Wire mesh shall be stainless steel wire. Select diameter size appropriate for cable being supported. Manufacturers: Hubbell (Kellums Division), O-Z/Gedney, Pass & Seymour "Flexcor," or approved equal.
- H. Wall Sleeves, Masonry Only:
 - 1. Sleeves - Schedule 40 galvanized steel. Size sleeve 1 inch larger than outside diameter of conduit. Cut ends to be filed smooth and galvanized.
- I. Combination Sleeve/Seal - Hot dip galvanized, malleable or cast iron castings and PVC or zinc-coated steel sleeves for use with neoprene sealing grommet and PVC coated steel pressure rings; single-face and double-face seals as required. Manufacturers: O-Z/Gedney, Series FSK (single-face seal, walls or floors up to 12 inches thick); Series WSK (double-face seal, walls or floors 12 inches or more thick).
- J. Sleeve Sealing Systems:
 - 1. Bolted, Conduit Sealing Bushing - Molded slip sealing ring joined by steel compression bolts as manufactured by Thunderline Corporation; Type CSM as manufactured by O-Z Gedney Electrical Manufacturing Company, or approved equal. Compression bolts shall be galvanized in dry, above grade areas; stainless steel in all other areas.
 - 2. Multiple Conduit Wall Seals - Steel frame sized to fit into masonry opening with compressible, elastomeric sections selected to accommodate multiple conduits.
 - 3. Fire-Rated Wall Seal:

- a. Fire Resistant Putty - 3M fire barrier CP 25WB caulk. Fire barrier moldable putty by Dow Corning or Thomas & Betts or approved equal.
 - b. Fire-resistant, modular neoprene/stainless steel seal system. Manufacturer: Thunderline Corporation, Pyro-Pac Series; BICC Pyrotenac; or approved equal.
- K. Mechanical Link-Type Seals - For conduit and sleeve sealing, provide mechanical link-type seal with elastomeric links joined by stainless steel bolts which also serve to expand the seal.

PART 3 EXECUTION

3.01. RACEWAY APPLICATIONS

A. Conduit Types:

A	Rigid galvanized steel (RGS)
A-1	Rigid galvanized intermediate metal conduit
B	Rigid aluminum conduit
C	Electrical metal tubing (EMT)
D	Rigid, non-metallic conduit (PVC), Schedule 40
D-1	Rigid, non-metallic conduit (PVC), Schedule 80
E	PVC-coated rigid steel conduit with interior lacquer coating
F	Flexible steel conduit (Greenfield)
G	Liquid tight, flexible conduit
G-1	Liquid tight, flexible conduit with ultraviolet resistance rating
G-2	Liquid tight, flexible, non-metallic
H	Explosion proof flexible conduit
J	Surface metal raceway
K	Fabricated wireway or wire trough
K-1	Fabricated wireway or wire trough, heavier than Type K and with oil tight cover gasket
K-2	Lay-in PVC wireway or trough with "clip-on" covers

B. Install raceway types according to the schedule below.

1. Interior:

a. Unfinished Areas:

- 1) Unclassified (above-grade; not wet, corrosive, or hazardous areas):
 - a) Use conduit Type B.
 - b) Final Connections - Use conduit Type G.
 - c) Wireways - Use Type K-2.
- 2) Wet Areas (above- and below-grade areas):

- a) Use conduit Type B for above grade
 - b) Use conduit Type E for below grade.
 - c) Final Connections - Use conduit Type G.
 - d) Wireways - Use Type K-2.
- 3) Rooms Below Grade (not wet, corrosive, or hazardous):
- a) Distribution Runs - Use conduit Type B.
 - b) Final Connections - Use conduit Type G-1.
 - c) Wireways - Use Type K-2.
- 4) Hazardous Areas:
- a) Use conduit Type E
 - b) Final Connections - Use Type H.
 - c) No wireways shall be used; use cast junction or pullboxes.
 - d) Install seal off fittings on non-hazardous side and extend Type E conduit a minimum of 18 inches into non-hazardous area.
2. Exterior - Exposed: Use conduit Type E (exposed or on building walls above 18 inches above grade). Type E (conduit stub-ups from ductbanks from 36 inches below grade to a minimum of 18 inches above grade or to first box or enclosure) and Type K-1.
3. Underground Ductbanks - Use conduit Type D for 120V and higher voltage power and control. Use conduit Type A for signal and non-fiber optic communications. All stub-ups from 36 inches below grade shall be Type E.
4. Conduits to Contain Instrumentation Conductors (24 VDC or 4-20 mA):
- a. For Wet Areas - Type B.
 - b. For Corrosive Areas - Type B.
 - c. For Hazardous Areas - Type E.
 - d. For Non-classified Areas - Type B.
5. Exceptions and Restrictions:
- a. No conduit shall be installed within or beneath below-grade slabs or within below-grade walls.
 - b. Type B and C materials are not permitted encased in concrete or below grade or in wet, corrosive, or hazardous environments.
 - c. Do not use gutters or wireways for power or control circuits to major equipment unless shown otherwise.

- d. Do not use Type K or K-1 gutters or wireways outside or in wet, corrosive, or hazardous areas inside.
- e. Specific applications noted on the Contract Drawings shall take precedence over this schedule.

3.02. SYSTEM FABRICATION

A. General:

- 1. All conduits shall be free of indentations, elliptical sections, blisters and other defects.
- 2. Install metallic conduit in accordance with NECA "Standard of Installation."
- 3. Install all conduit in accordance with manufacturer's instructions.
- 4. Arrange supports to prevent misalignment during wiring installation.
- 5. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- 6. Bring conduit to shoulder of fittings; fasten securely.
- 7. Use conduit hubs for exterior locations or sealing locknuts for interior locations to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes without hubs.
- 8. Install no more than equivalent of three 90-degree bends between boxes or pull fittings. Use conduit bodies to make sharp changes in direction, as around beams.
- 9. Avoid moisture traps. In exterior conduit systems and in wet and corrosive areas, provide a junction box with drain fitting at low points in the conduit system or at the bottom of vertical runs more than 8 feet long.
- 10. Provide deflection joint fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
- 11. Provide conduit expansion joints at structural expansion joints, between separate structures, on straight runs of 75 feet or more and where shown on plans. Support conduit on each side of expansion joint.
- 12. Provide 1/8-inch polypropylene pull cord in each interior above-grade spare conduit. Provide 1/4-inch polypropylene pull cord in each underground or concrete-encased conduit.
- 13. Use suitable caps to protect installed conduit, fittings, and boxes against entrance of dirt, moisture, and foreign material.
- 14. Ground and bond conduit under provisions of Section 26 05 26 - Grounding.
- 15. Identify conduit under provisions of Section 26 05 53 - Electrical System Identification, and as shown on the Drawings.
- 16. After conduit run is in place, thoroughly clean the inside of the conduit run and cap each end. Do not remove caps until ready to pull conductors. Install insulated bushings at end of conduit prior to pulling conductor.

17. Attach conduit to electrical equipment such as steel junction boxes, pullboxes, and switches with double steel locknuts. Use threaded insulated bushings on the end of each conduit that terminates in these boxes. Use grounding type insulated bushing for grounding continuity or where required by the N.E.C. Maintain electrical continuity through all connections.
 18. Flexible conduit sections shall not exceed 36 inches long. Fit flexible conduit with conductive connectors to enable ground conductivity. Use jumpers as necessary.
 19. Install all-thread (close) nipples between fittings and electrical equipment so that no threads are exposed.
 20. Do not install conduit runs on the exterior of any building or tank surfaces unless shown on Drawings or approved by the Engineer. Conduit runs up to 10 feet are permitted on concrete process tank walls and structures. Obtain Engineer's approval for installation of conduit runs greater than 10 feet on concrete process tank walls.
 21. In areas where spray insulation is to be applied, provide standoffs and install conduits before the insulation has been applied and provide extensions to all boxes. Boxes and enclosures over 100 cubic inches shall be mounted on electrical channel after the insulation is installed and all connecting conduit shall be offset to connect to boxes or enclosures.
 22. Minimum - Conduit sizes shall be as follows unless specifically shown otherwise:
 - a. 3/4 inch for exposed locations (includes those areas above drop ceiling of lay-in tiles).
 23. Changes of Conduit Size - Made at pull or junction boxes except where specifically shown via a pull fitting.
- B. Conduit Routing:
1. Arrange conduit to maintain headroom of at least 7 feet 6 inches above floors or other walking surfaces and present neat appearance. Provide Engineer-approved supports. Where conduit has to be run on walking surfaces, first contact the Engineer to review and approve installation and, if approved, provide stainless steel pipe guards per Engineer's requirements.
 2. Route exposed conduit parallel and perpendicular to walls.
 3. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
 4. Maintain adequate clearance between conduit and piping.
 5. Where cutting walls or floors is necessary to install conduit, take care not to weaken the structure involved. Do not cut beams or other structural supports under any condition.
 6. Not more than three 90 degree elbows or equivalent bends up to 270 degrees shall be installed in any run between pulling or access fittings. In interior telephone, instrumentation, and signal conduit only two 90 degree bends or equivalent bends up to 180 degrees are allowed between access fitting or boxes.
 7. Maximum spacing between pulling or access fittings shall be 100 feet in any run of

conduit.

8. Group conduit runs wherever possible.
 9. Do not chase block walls which will be left without plaster or tile finish; do not run horizontally in block walls.
 10. All interior conduit shall be installed exposed except in finished areas (only above drop ceilings) or where specifically shown otherwise.
 11. When installing conduit(s) in concrete walls or slabs or beneath slabs on grade, encase conduit with at least 3 inches of concrete on all sides. Allow adequate space for concrete to flow between conduits. No conduits will be permitted within walls below grade, i.e., as in basements or galleries or within or below slabs that are below grade.
 - a. Earth or gravel fill around conduits beneath slab on grade is not acceptable.
 - b. Conduits shall not be installed in concrete unless every applicable section of Section 03 00 00 - Concrete, has been met. No exceptions will be permitted.
 12. In or beneath concrete floor slabs, run conduit from point to point.
 13. Secure conduit installed in poured-in-place concrete to reinforcing with tie wires. Install suitable brackets secured to forms in the absence of reinforcing.
 14. For conduit penetrations through the roof, use openings for piping and ductwork or roof jack with pitch pocket. Coordinate all roof penetrations with roofing installer and follow their required method of installing conduits through roofs. For single conduits, roofing installer may require the use of preformed "boots."
 15. Interior raceway containing instrumentation cable shall be installed to provide the following clearances:
 - a. Raceway parallel to power conductor raceways for distance greater than 20 feet and energized at 120 volts or greater - 36 inches unless otherwise shown.
 - b. Raceway installed at right angles to conductors energized at 120 volts or greater - 8 inches.
 - c. Where practicable, raceway containing instrumentation cable shall cross raceway containing conductors of other system only at right angles.
 - d. Intrinsically safe conductors shall be in separate conduits inside and outside enclosures and to separate terminal strips with barriers.
 16. Conduit shall be installed away from equipment and other devices so as not to encumber maintenance, repair, or replacement of the equipment or device.
- C. Clearances from Heat:
1. Crossing Heated Pipes:
 - a. Insulated Pipes - Maintain 2-inch clearance.

- b. Uninsulated Pipes:
 - 1) Surfaces Less than 104 degrees F - Maintain 4-inch clearance.
 - 2) Surfaces 104 degrees F or Greater - Maintain 8-inch clearance.
- 2. Parallel to Heated Pipes:
 - a. Insulated Pipes - Maintain 4-inch clearance.
 - b. Uninsulated Pipes:
 - 1) Surfaces Less than 104 degrees F - Maintain 6-inch clearance.
 - 2) Surfaces 104 degrees F or Greater - Maintain 12-inch clearance.
- 3. Avoid installing conduit parallel to heated, uninsulated pipe, if possible.
- 4. Do not install conduit above or in front (in path of heated air) of heating or heat producing equipment.
- D. Rigid Conduit Systems (Types A, A-1, B, C, and E):
 - 1. Heating metal conduit to facilitate bending is strictly prohibited.
 - 2. Field bending metal conduit is permitted as follows:
 - a. Types A, A-1, and B - Up to and including 3/4-inch size.
 - b. Type C - Up to and including 1-1/4-inch size.
 - 3. For all rigid metal conduit larger than that above, use manufactured elbows or hydraulic one-shot bender to fabricate bends.
 - 4. Use manufactured elbows for all bends in Type E conduit systems. No field bending is allowed.
 - 5. Make all bends with radius no less than N.E.C. requirement.
 - 6. Do not join conduits of dissimilar metals. Provide an isolation fitting between them.
 - 7. Conduit threads made in the field shall conform to standard NPT sizes and length.
 - 8. Threaded conduit connections shall be screwed tight with only incomplete threads exposed.
 - 9. Do not weld conduit and/or conduit fittings together or to any steel structure.
 - 10. Sealing and Lubricating Compounds:
 - a. Make all screwed ferrous conduit joints with standard couplings and join using copper-type conductive sealing compound.
 - b. Lubricate aluminum conduit thread with graphite.
 - 11. Couplings:

- a. Butt ends of conduit tightly into the coupling.
 - b. In exposed work, where standard couplings cannot be used, three-piece (Erickson) couplings are permitted.
- E. Non-metallic Systems (Types D and D-1):
1. Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
 2. Field bending of Types D and D-1 conduit is permitted only if a "hot box" is used.
 3. Make all bends with radius no less than N.E.C. requirement.
 4. Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.
- F. Underground Conduits:
1. General - Trenching, rock excavation, dewatering, backfilling, compaction, concrete, reinforcing and rough grading shall be provided in accordance with the applicable sections of the Contract Specifications. Finish grading shall be by the General Contractor.
 2. Underground conduit shall consist of parallel runs of conduit as shown.
 3. All underground, vertical conduit bends shall be 36 inch radius; all underground horizontal bends shall be long radius, 48 inches minimum.
 4. Stagger all joints.
 5. Make underground joints as watertight as possible.
 6. Slope ductbank continuously away from buildings at 3 inches per 100 feet to the nearest manhole. Do not install ductbanks with a low point at or between structures.
 7. After all cables have been installed, fill around cables and all unused duct openings with approximately 1-1/2-inch thick oakum or asbestos wick to a depth of 6 inches. Then seal with a non-hardening, plastic compound equivalent to Johns-Manville "Duxseal," O-Z/Gedney "Duct Sealing Compound," or approved equal.
 8. Clean all spare conduits and cap and seal watertight.
 9. At concrete encased ductbank, make pour continuous wherever feasible. Where separate pours must be made, install 48-inch by #6 rebar, three at the top and three at the bottom, inserted 24 inches into the end of the first pour.
 10. Exercise care not to over excavate ductbank trenches. Any low spots must be brought to line with compacted crusher run granular material. When crossing other buried utilities where the backfill is not compact or is "soft," either compact the backfill and fill with crusher run or bridge the trench by concrete encasing and reinforcing ductbank to 5 feet beyond soft area on each side.

11. Terminate all spares in MCCs, distribution panels, panelboards, or pullboxes unless otherwise indicated.
12. Provide a No. 6 ground wire (stranded bare, tinned copper cable) below conduits before backfilling.
13. Conduit Type D shall be terminated in concrete manholes with bell end fittings installed flush with inside manhole walls. For conduit Type E (extends from 24 inches outside manholes to 3 inches inside for Type A systems), use insulated grounding bushings. Seal around conduits with non-shrink grout flush with inside manhole walls.

3.03. CONDUIT SEALING

A. Conduit Sealing Interiors:

1. Perform conduit sealing after all conductors are installed, tested and accepted by the Engineer and the authority having jurisdiction.
2. Seal conduit passing through vapor sealed walls; in all incoming underground conduits terminating in areas below grade; and between warm, humid rooms, and cooler areas.

No water shall enter any building, structure, or electrical equipment through any conduit. This may require adding drains out of manholes or pullboxes.

3. Exterior Waterproof Conduit Sealing - Provide watertight hubs at conduits entering the top or sides of all NEMA 4 and 4X enclosures. Gasketed locknuts are not acceptable as a waterproof conduit seal.

Seal conduits entering the top or sides of interior NEMA 4 and 4X enclosures using gasketed locknuts.

3.04. WALL/FLOOR PENETRATIONS AND SEALING

A. Below Exterior Grade Walls:

1. New Concrete:

- a. Single, Two, or Three Penetrations - Cast-in-place sleeve seals or core drill and seal using link seals.
- b. Multiple - Thru-wall pullbox where shown on the Contract Drawings.

2. Existing Concrete or New Precast Walls - Core drill openings and use modular neoprene/stainless steel "link-type" seal.

B. Above-Grade Exterior Walls:

1. New or Existing Concrete or Masonry:

- a. Core drill all holes for up to six conduits.
- b. Use stainless steel thru-wall pullbox where shown on the Contract Drawings.

2. In concrete walls, seal space around conduit in cored holes with modular neoprene/stainless steel "link-type" seal.

- a. On walls less than 15 inches thick, provide seal on outside face. On walls 15 inches thick or thicker, provide seal on both inside and outside faces.
 3. In masonry walls, seal space around conduit in cored holes with non-shrink grout to within 1/2 inch of wall face. Seal remaining space watertight with silicone or acrylic latex masonry sealant.
 4. Seal all unused spaces in thru-wall barrier with appropriate sized sealing blocks.
- C. Interior Walls:
1. Non-Fire Rated Walls:
 - a. Between Unclassified Areas:
 - 1) No Drop Ceiling or Below Drop Ceiling - Use wall sleeves or core drilled holes.
 - 2) Above Drop Ceiling.
 - a) Air handling space - Core drill holes and seal around conduit.
 - b) Not air handling space - Box out wall for conduits.
 - b. Between Classified or Classified/Unclassified Areas - Use core drilled hole. In masonry wall, seal with non-shrink grout to within 3/4 inch of wall face. Seal gastight and watertight with silicone masonry sealant. Fill hollow masonry voids with grout.

In concrete wall, seal around conduit with modular neoprene links and stainless steel compression bolts.

Use thru-wall barrier as shown on Contract Drawings. Fill unused holes with matching plug.
 2. Fire-Rated Wall Seals:
 - a. Refer to Contract Drawings for location of fire rated walls.
 - b. Masonry Walls:
 - 1) Individual Conduit - Core drill wall and provide galvanized metal sleeve. Fill voids in block prior to installing sleeve. Seal between wall and sleeve with non-shrink grout. Seal around conduit with fire barrier caulk or fire barrier moldable putty.
 - 2) Multiple Conduits - Provide through wall barrier.
 - c. Concrete Walls:
 - 1) Individual Conduit - Core drill wall and provide fire-rated "link seal." Seal around conduit with fire barrier caulk or with fire barrier moldable putty.

END OF SECTION

SECTION 26 05 34

BOXES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Outlet and device boxes.
- B. Pull and junction boxes.

1.02. RELATED SECTIONS

- A. Section 26 05 00 – ELECTRICAL-GENERAL
- B. Section 26 05 26 – GROUNDING
- C. Section 26 05 06 – RACEWAYS
- D. Section 26 27 26 – WIRING DEVICES: Mounting heights of wiring devices and outlets.
- E. Section 40 95 13 – CONTROL PANELS AND ENCLOSURES

1.03. REFERENCES

- A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- B. ANSI/NEMA OS 1 - Sheet steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. NEMA Standards Publication No. 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01300, Submittals, and 26 05 00 - Electrical-General.
- B. Submit:
 - 1. Boxes larger than 100 cubic inches.
 - 2. Pullboxes.
 - 3. Junction boxes.
 - 4. Concrete manholes and handholes. Include detailed drawings showing all reinforcing steel, loadings, concrete strength, and all sizing.
 - 5. Cast iron manhole and handhole covers.
 - 6. Non-metallic polymer concrete handholes.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Sections 01700, Record Documents, and 26 05 00 - Electrical-General.

- B. Accurately record actual locations and mounting heights of pull and junction boxes.
- C. Accurately record and indicate the size and location of all conduits into and out from all manholes, handholes, and buried pullboxes. Indicate circuit number, size, quantity, source, and destination of all conductors in each circuit.
- D. Measure and record ties from permanent structures to the center of each cover or box with two ties 90 degrees apart

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.07. PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of boxes and outlets in all areas prior to rough in.

PART 2 PRODUCTS

2.01. OUTLET AND DEVICE BOXES

- A. Nonmetallic Outlet Boxes - ANSI/NEMA OS 2.
 - 1. Polyvinyl chloride, molded; fiberglass reinforced plastic with molded conduit sockets and mounting flange.
 - 2. Minimum 18 cubic inch capacity.
 - 3. Manufacturers:
 - a. Carlon.
 - b. Allied Moulded Products, Inc.
 - c. Raco, Inc.
 - d. Or equal.
- B. Cast Boxes - NEMA FB 1.
 - 1. Cast, copper-free aluminum or cast iron alloy to match conduit systems.
 - a. For PVC-Coated conduit systems, provide PVC coated boxes and fittings by the same manufacturer as the conduit system.
 - 2. Type FD and FS box with integral mounting lugs and heavy duty threaded hub(s).
 - 3. Provide gasketed cover by box manufacturer.
 - 4. Manufacturers:
 - a. Crouse-Hinds.

- b. Appleton.
- c. Killark.
- d. O-Z/Gedney.
- e. Or equal.

2.02. PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes - NEMA OS 1.
 - 1. Galvanized steel, without knockouts.
 - 2. Finish - Per Section 09 96 00 – High Performance Painting.
 - 3. NEMA rated per Section 40 95 13 – Control Panels and Enclosures.
 - 4. Hinged cover.
 - 5. Gasketed cover in wet areas.
 - 6. Manufacturers:
 - a. Hoffman.
 - b. McKinstry.
 - c. Or equal.
- B. Surface-Mounted Cast Metal Box - NEMA Publication No. 250, Type 4; flat flanged, surface mounted junction box.
 - 1. Material - Cast aluminum.
 - 2. Cover - Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- C. Non Metallic Junction Boxes:
 - 1. Polyester reinforced fiberglass.
 - 2. Closed cell neoprene gasketed door.
 - 3. Screw cover door with stainless steel screws.
 - 4. Nonconductive.
 - 5. Ignition temperature minimum - 520 degrees C.
 - 6. Dimensional stability of 168 hours in accordance with ASTM D1042.
 - 7. Manufacturers - Robroy, Hoffman, Crouse Hinds, Carlon, or equal.

2.03. CONCRETE MANHOLES, HANDHOLES, AND CAST IRON COVERS

- A. Precast concrete boxes shall be in accordance with the details shown on the Contract Drawings.
- B. Pulling irons located adjacent to and below duct windows.
- C. Pulling Irons - 3/4 inch diameter, cold rolled steel, unless otherwise noted.

- D. Manhole Covers in Pavement or Gravel Drives or Where Otherwise Specified - Castiron frames and covers per the Contract Drawings.
- E. A sump shall be provided in each manhole.
- F. Pullbox and Junction Box Covers - Concrete for H-20 loading.
- G. Manufacturers – A PCI, NPCA, or DOT certified plant.
 - 1. Monarch Products.
 - 2. By-Crete.
 - 3. Modern Precast Concrete Products.
 - 4. Or equal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. All boxes shall be installed level and plumb.
- C. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Inaccessible Ceiling Areas - Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.
- F. Junction boxes over 100 cubic inches shall be provided with terminal strips for joining conductors.
- G. Contractor shall size all junction boxes in accordance with the NEC unless otherwise shown or noted.
- H. In all finished areas, device, outlet, and junction boxes may be galvanized sheet metal. In all other areas, device, outlet, and junction boxes shall be cast metal, except NEMA 12 metal boxes may be used in unfinished and unclassified areas.
- I. Boxes in corrosive, wet or explosion proof areas shall be cast aluminum with coatings to match conduit system.
- J. Boxes, where Type D or D-1 conduit is specified or shown, shall be nonmetallic.
- K. Install boxes to preserve fire resistance rating of partitions and other elements.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.
- M. Use flush mounting outlet and device boxes in finished areas.
- N. Do not install flush mounting boxes back to back in walls; provide minimum 6-inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.
- O. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for

surface finish thickness.

- P. Use stamped steel bridges to fasten flush mounting outlet and device boxes between studs.
- Q. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- R. Use adjustable steel channel fasteners for hung ceiling outlet box.
- S. Do not fasten boxes to ceiling support wires.
- T. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches (300 mm) of box. Unless box supports a luminaire, then support the box as well.
- U. Use cast gang boxes where more than one device is mounted together. Do not use sectional box.
- V. Use gang box with plaster ring for single device outlets.
- W. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- X. Large Pullboxes - Boxes larger than 12 inches (300 mm) in any dimension, use hinged cover enclosures under provisions of Section 40 95 13 – Control Panels and Enclosures.

END OF SECTION

SECTION 26 05 53

ELECTRICAL SYSTEM IDENTIFICATION

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Nameplates, signs and labels.
- B. Directory cards.
- C. Wire and cable markers.
- D. Conduit markers.
- E. Underground warning tape.

1.02. RELATED SECTIONS

- A. Section 09 96 00 – HIGH PERFORMANCE COATINGS
- B. Section 26 05 00 – ELECTRICAL-GENERAL
- C. Section 26 09 00 - INSTRUMENTATION

1.03. REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.04. SUBMITTALS

- A. Submittals are not required.
- B. Submit representative samples on all nameplates, signs, markers, and labels for the Owner's approval prior to ordering.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01. NAMEPLATES AND SIGNS

- A. Nameplates and Signs.
 - 1. Nameplates - Engraved three-layer laminated plastic, white letters on black background.
 - 2. Warning Signs - Engraved three-layer laminated plastic, white letters on red background.
- B. Letter Size.
 - 1. 5/16-inch letters for identifying individual equipment and loads.

2. 3/8-inch letters for identifying grouped equipment and loads.
3. 2-inch letters for identifying panelboards, motor control centers, transformers, and switchboards.

2.02. LABELS - EQUIPMENT IN ENCLOSURES

- A. Self-debossing, aluminum foil type.
- B. Material - 0.0002-inch thick aluminum foil.
- C. Typewritten or machine impressed.
- D. Permanent pressure-sensitive adhesive; high temperature adhesive for labels on heat producing devices.
- E. Letter Size - All upper case, minimum 0.1-inch high.
- F. Embossed adhesive strip labels from hand-held dispenser devices are not permitted.
- G. Manufacturer - Seton, Brady, EMED Company, Inc., or equal.

2.03. DIRECTORY CARDS

- A. Typewritten or machine printed in upper-case letters on extra heavyweight paper or card stock.
- B. Locations:
 1. Panelboards.
 2. Load centers.
 3. Distribution panels.

2.04. WIRE AND CABLE MARKERS

- A. Manufacturers:
 1. Thomas & Betts.
 2. Brady.
 3. Seton.
 4. Or equal.
- B. Description - Machine printed polyolefin wire marker sleeves with clear tape overwrap, or sleeve type wire markers. Black print on white background. Each label shall be a single adhesive film or shrink wrap sleeve. Printing that is capable of being rubbed off the wire label is not acceptable.
- C. Legend:
 1. Power and Lighting Circuits - Branch circuit or feeder number indicated on drawings.
 2. Control Circuits - Control wire number shall match that indicated on schematic and interconnection diagrams on shop drawings.

- D. All conductors, including spares, shall be labeled.

2.05. CONDUIT MARKERS

A. Manufacturers:

- 1. Seton.
- 2. Brady.
- 3. EMED Company, Inc.
- 4. Or equal.

B. Description:

- 1. Standard preprinted, flexible or semi-rigid, permanent, plastic sheet extending 360 degrees around conduit; designed for attachment to conduit by adhesive backing, matching adhesive plastic tape, cover with plastic laminate or pretensioned acrylic plastic sheet formed to wrap around conduit and grip without adhesive or mechanical attachment.
- 2. Emergency Powered Circuit Conduit - Black lettering on red background.
- 3. General Conduit 120 Volt System - Black lettering on white background.
- 4. Conduit Up to and including 2-Inch Diameter - Marker color field shall be 8 inches long.
- 5. Conduit Larger Than 2-Inch Diameter - Marker color field shall be 12 inches long.
- 6. Letter Size.

CONDUIT DIAMETER	LETTER HEIGHT
1/2" through 1-3/8"	1/2"
1-1/2" through 2-3/8"	3/4"
2-1/2" and larger	1-1/4"

- 7. All lettering shall be upper case.

C. Color:

- 1. 480 Volt System - Red.
- 2. 208 Volt System - Blue.
- 3. 277 Volt System - Blue.
- 4. Telephone System – Green.

2.06. UNDERGROUND WARNING TAPE

- A. Description - 4 -inch wide plastic tape, detectable type, colored yellow with suitable warning legend describing buried electrical lines as manufactured by Seton, EMED Company, Inc., Brady, or equal.

2.07. ARC FLASH LABELING

- A. Labeling shall be in accordance with NFPA 70E.

- B. Labels shall be prepared in accordance with ANSI Z535.4-1998, Product – Safety Signs and Labels.
- C. Labels shall display the Hazard Risk Category #, along with the proper PPE required.

2.08. PORTABLE LABEL MAKER

- A. Provide a portable label maker in the Contractor's field office trailer.

PART 3 EXECUTION

3.01. APPLICATION SCHEDULE, SIGNS, NAMEPLATES AND LABELS

- A. Signs - As specified herein or as shown on the Contract Drawings and as required by NFPA 70.
- B. Nameplates - All electrical enclosures and operating devices, such as:
 - 1. Power distribution equipment..
 - 2. Transformers.
 - 3. Distribution panels.
 - 4. Panelboards and load centers.
 - 5. Transfer switches.
 - 6. Equipment control panels.
 - 7. Motor starting switches.
 - 8. Safety switches.
 - 9. Disconnect switches.
 - 10. Instrumentation and PLC enclosures.
 - 11. All control panels.
- C. Labels - All electrical devices inside enclosures and control panels, wall switches (where the operated device is not readily identifiable), control stations, and dedicated receptacles.
- D. Label - All dedicated receptacles indicating the full load amps, voltage, and appliance name.

3.02. NAMEPLATES AND LABELS

- A. Install nameplate and label parallel to equipment lines.
- B. On NEMA 1, 1A and 12 equipment, secure plastic laminate nameplate to equipment front using stainless steel rivets. Adhesive mounting is not acceptable.
- C. On NEMA 4X and 7 equipment, use industrial grade double face adhesive tape or glue to permanently bond the nameplate to the mounting surface.
- D. On surface-mounted panelboards, install nameplates on the front of the door centered above or below manufacturer's nameplate.
- E. Labels Inside of Enclosures - Center beneath respective components, clearly visible and

readily associated with the equipment which they are intended to identify.

- F. Inside enclosures and wireways indicate the origin or destination of all connected conduit.

3.03. DIRECTORY CARDS

- A. Permanently fasten directory card in place behind protecting glass or clear plastic cover. Remote equipment names must match directory.

3.04. CONDUIT SYSTEM

- A. Identify conduit numbers as shown on motor control center or power distribution schedule or diagrams and as shown on Contract Drawing E0001.
- B. Provide markers on exposed conduit.
 - 1. At each device.
 - 2. At junction boxes with more than one incoming and outgoing conduit.
 - 3. At each point of entry to or exit from a room.
 - 4. At 50 feet on center in runs exceeding 100 feet.

3.05. WIRE MARKERS

- A. All wiring except primary service conductors and motor power conductors, including spares, shall be labeled at each end of the conductor. Wires shall also be labeled at each junction box, panelboard gutter, pullbox, and load connection.
- B. Contractor shall have a portable label maker in the field at all times.

3.06. OPERATIONAL SAFETY AND WARNING SIGNS

- A. Where detailed instructions or explanations are needed, provide sign with clearly-written messages appropriate for the situation (i.e., at automatically started equipment, sign to read: "Danger, This Equipment Automatically Starts - Stay Back"). Contractor shall provide up to 20 such signs. Actual number and specific wording will be provided to the Contractor.
- B. Provide the following sign on each motor control center's main circuit breaker compartment: "Warning - Circuit Breaker Line Terminals May Be Energized with Circuit Breaker Open."
- C. Provide a warning sign at each motor control center, switchboard, load center, distribution panelboard, or similar device "Danger - High Voltage - Keep Out - Authorized Personnel Only." Add the voltage in a separate sign.

3.07. UNDERGROUND WARNING TAPE

- A. Provide continuous underground warning tape above all ductbank(s) or individual conduits in accordance with ductbank detail.

END OF SECTION

SECTION 26 08 00
COMMISSIONING OF ELECTRICAL
26 08 00-1 thru 26 08 00-missing

SECTION 26 09 00

INSTRUMENTS

PART 1 GENERAL

1.01. SUMMARY

- A. Section Includes: General requirements for instrumentation devices and the Input/Outputs require.

1.02. REFERENCES

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME/ANSI B16.1 (1989) Cast Iron Pipe Flanges and Flanged Fittings

ASME PTC 19.5 (1972) Application Part II of Fluid Meters

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 126 (1993) Gray Iron Castings for Valves, Flanges, and Pipe Fittings

ASTM B 61 (1993) Steam or Valve Bronze Castings

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C700 (1990; Addendum 1991) Cold-Water Meters - Displacement Type, Bronze Main Case

AWWA C704 (1992) Propeller-Type Meters for Waterworks Applications

MILITARY SPECIFICATIONS (MIL)

MIL-P-24441 (Rev. B; Supp. 1) Paint, Epoxy-Polyamide

1.03. RELATED REQUIREMENTS

- A. Division 40 – Process Integration apply to this section with additions and modifications specified herein.

1.04. SUBMITTALS

- A. Submittals required in the sections which refer to this section shall conform to the requirements of Division 40 – Process Integration and to the following additional requirements. Submit the following in accordance with section entitled "Submittal Procedures".
 - 1. Perform calibration and submit test report.

PART 2 PRODUCTS

2.01. MATERIALS AND EQUIPMENT

- A. Unless otherwise specified, all materials and equipment shall be standard commercial products in regular production by the manufacturer and suitable for the required service.

2.02. ULTRASONIC LEVEL SENSOR AND TRANSMITTER:

- A. Acceptable manufacturers:
 - 1. Milltronics – no substitutions are permitted, this unit is to be provided to conform with existing installed units
- B. Materials:
 - 1. Sensor wetted parts: PVC, polypropylene, KYNAR or PVDF.
- C. Design and fabrication:
 - 1. Sensor:
 - a. Emits ultrasonic sound.
 - b. Detects return echo reflected from surface and converts it to electrical energy proportional to level.
 - c. Temperature compensated.
 - d. Operating temperature: -4 to 140 DegF.
 - e. Humidity: 95 percent non-condensing.
 - 2. Transmitter:
 - a. Capable of producing output signal proportional to level of 4-20 mA DC into 500 ohm load.
 - b. Power supply: 120 Vac (+10 percent), 60 Hz.
 - c. Inaccuracy: 0.25 percent of range or 0.24 IN, whichever is greater.
 - d. Resolution: 0.1 percent of span or 0.08 IN, whichever is greater.
 - e. Display: Four-digit LED or LCD scalable to engineering units with selectable decimal point.
 - f. Temperature: -5 to 122 DegF.
 - g. Humidity: 95 percent noncondensing.
 - h. Memory: EEPROM (non-volatile).
 - i. Keypad programmer.

2.03. SPARE PARTS

- A. Provide all standard recommended spare parts as specified in the manufacturer's instruction manuals for each component in the system.
- B. Provide new sensor probes at the end of the contractor warranty period.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Furnish the services of an engineer representative of the manufacturer of the equipment for checking the installation, making the necessary adjustments and calibrations, placing the

equipment in operation, and performing the acceptance tests. The representative also shall be available for not less than 2 days to instruct operating personnel in the use, operation, and maintenance of the equipment during the initial operating period. Install all equipment in accordance with the recommendations of the manufacturer.

3.02. FIELD TESTS AND INSPECTIONS

- A. Test and calibrate in place the equipment to demonstrate that it meets the accuracy requirements for the full range as specified herein. Provide all labor, equipment, and incidentals required for the tests, including electric power and water required for tests. The Contracting Officer will witness all field tests and conduct all field inspections. The Contractor shall give the Contracting Officer ample notice of the dates and times scheduled for tests. Rectify any deficiencies found and retest work affected by such deficiencies at the Contractor's expense. Record data from each field test shall be recorded and documented in a formal field test report.

END OF SECTION

SECTION 40 05 13

COMMON WORK RESULTS FOR PROCESS PIPING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Provide the piping systems indicated, complete and operable, in accordance with the Contract Documents.
- B. The mechanical drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type.
- C. The mechanical drawings are not pipe construction or fabrication drawings.
- D. Where pipe supports and spacing are indicated on the drawings and are referenced to a Standard Detail, the Contractor shall use that Detail.
- E. Where pipe supports are not indicated on the drawings, it is the Contractor's responsibility to develop the details necessary to design and construct mechanical piping systems to accommodate the specific equipment provided, and to provide spacers, adapters, and connectors for a complete and functional system.

1.02. RELATED SECTIONS

- A. Section 40 05 13.19 – Stainless Steel Process Piping
- B. Section 40 05 23 – Common work Results for Process Valves
- C. Section 40 05 23.19 – Stainless Steel Process Valves
- D. Section 43 21 43 – Sump Liquid Pumps.

1.03. REFERENCES

AWS D1.1	Structural Welding Code
ASME, Section 9	Boiler and Pressure Vessel Code
AWWA C207	Steel Pipe Flanges for Waterworks Service
ASME B16.5	Pipe Flanges and Flanged Fittings
ANSI/ASME A13.1	Pipe Labeling
ASTM A325	Structural Bolts, Steel, Heat Treated
AWWA C606	Grooved and Shouldered Joints
AWWA C219	Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe
ASTM D 2000	Classification System for Rubber Products in Automotive Applications
ASTM A 512	Cold-Drawn Buttweld Carbon Steel Mechanical Tubing
ASTM A 513	Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing
ASTM A 576	Steel Bars, Carbon, Hot Wrought, Special Quality
AISI C1012	Carbon Steel
ASME B1.20.1	Pipe Threads, General Purpose

1.04. SUBMITTALS

- A. Furnish submittals in accordance with Section 01 33 00, Submittal Procedures.
- B. Shop Drawings: Shop Drawings shall contain the following information:
 - 1. Drawings: Layout drawings including necessary dimensions, details, pipe joints, fittings, specials, bolts and nuts, gaskets, valves, appurtenances, anchors, guides, and material lists. Fabrication drawings shall indicate spacers, adapters,

connectors, fittings, and pipe supports to accommodate the equipment and valves in a complete and functional system.

2. Thermoplastic Pipe Joints: Submit solvent cement manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.
 3. Gasket Material: Submit gasket manufacturer's catalog indicating that the recommended product is suitable for each fluid service application.
 4. Modular Seals for Pipe: Manufacturer's catalog sheet showing materials and installation procedures.
- C. Samples
1. Performing and paying for sampling and testing as necessary for certifications are the Contractor's responsibility.
- D. Certifications
1. The Contractor shall obtain necessary certificates, test reports, and affidavits of compliance.
 2. A certification from the pipe fabricator that each pipe will be manufactured subject to the fabricator's or a recognized Quality Assurance Program. An outline of the program shall be submitted to the Engineer for review prior to the manufacture of any pipe.

1.06. MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.
- B. Piping materials, fittings, valves, and accessories shall be stored per manufacturer's recommendations.
- C. Defective or damaged materials shall be replaced with new materials.

1.07. EQUIPMENT WARRANTIES AND SPECIAL GUARANTEES

- A. The Contractor shall furnish the manufacturer's written guarantee that the piping comply with the indicated requirements.
- B. The Contractor shall furnish the manufacturer's warranties as published in its literature.

PART 2 PRODUCTS

2.01. GENERAL

- A. Extent of Work
 1. Pipes, fittings, and appurtenances shall be provided in accordance with the requirements as indicated in the Contract Drawings.
 2. Materials in contact with potable water shall be listed as compliant with NSF Standard 61.
- B. Pipe Supports
 1. Pipes shall be adequately supported, restrained, and anchored in accordance with

Section 43 10 52 – Pipe Supports, and as indicated on the Contract Drawings.

C. Coating

1. Application, thickness, and curing of coating on buried pipe shall be in accordance with the applicable Sections of Division 09, unless otherwise indicated.
2. Pipes above ground or in structures shall be coated in accordance with Section 09 96 00 – High-Performance Coatings.

D. Pressure Rating

1. Piping systems shall be designed for the maximum expected pressure as indicated on the Piping Schedule.

E. Inspection

1. Pipe shall be subject to inspection at the place of manufacture.
2. During the manufacture, the Engineer shall be given access to areas where manufacturing is in progress and shall be permitted to make inspections necessary to confirm compliance with requirements.

F. Tests

1. Except where otherwise indicated, materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards.
2. The Contractor shall be responsible for performing material tests.

G. Welding Requirements

1. Qualification of welding procedures used to fabricate pipe shall be in accordance with the provisions of AWS D1.1 - Structural Welding Code or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.
2. Welding procedures shall be submitted for the Engineer's review.

H. Welder Qualifications

1. Welding shall be performed by skilled welders and welding operators who have adequate experience in the methods and materials to be used.
2. Welders shall be qualified under the provisions of AWS D1.1 or the ASME Boiler and Pressure Vessel Code, Section 9, whichever is applicable.
3. Machines and electrodes similar to those used in the Work shall be used in qualification tests.
4. Qualification testing of welders and materials used during testing is part of the Work.

2.02. PIPE FLANGES

- A. Flanges shall be provided with flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless otherwise indicated.
- B. Attachment of the flanges to the pipe shall conform to the applicable requirements of AWWA C207.
- C. Flange faces shall be perpendicular to the axis of the adjoining pipe.

- D. Flanges for miscellaneous small diameter pipes shall be in accordance with the standards indicated for these pipes.
- E. Pressure Ratings
1. 150 psig or less: Flanges shall conform to either AWWA C207 - Steel Pipe Flanges for Waterworks Service--Sizes 4 In. Through 144 In., Class D, or ASME B16.5 - Pipe Flanges and Flanged Fittings, 150 lb class.
 2. 150 psig to 275 psig: Flanges shall conform to either AWWA C207 Class E or Class F, or ASME B16.5 150 lb class.
 3. 275 psig to 700 psig: Flanges shall conform to ASME B16.5, 300 lb class.
 4. Selection Based on Test Pressure
 - a. Do not expose AWWA flanges to test pressures greater than 125 percent of rated capacity.
 - b. For higher test pressures, the next higher rated AWWA flange or an ANSI-rated flange shall be selected.
- F. Blind Flanges
1. Provide blind flanges in accordance with AWWA C207, or as indicated for miscellaneous small pipes.
 2. Blind flanges for pipe sizes 12 inches and greater shall be provided with lifting eyes in the form of welded or screwed eye bolts.
- G. Flange Coating
1. Machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.
- H. Flange Bolts
1. Bolts and nuts shall conform to the requirements of Section 05 50 00 – Metal Fabrications.
 2. Use all-thread studs on valve flange connections where space restrictions preclude the use of regular bolts.
- I. Insulating Flanges
1. Insulated flanges shall be provided with bolt holes 1/4-inch diameter greater than the bolt diameter.
- J. Insulating Flange Sets
1. Provide insulating flange sets where indicated.
 2. Each insulating flange set shall consist of an insulating gasket, insulating sleeves and washers, and a steel washer.
 3. Insulating sleeves and washers shall be one piece when flange bolt diameter is 1-1/2 inch or smaller and shall be made of acetyl resin.
 4. For bolt diameters larger than 1-1/2 inches, insulating sleeves and washers shall be 2-piece and shall be made of polyethylene or phenolic material.

5. Steel washers shall be in conformance with ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 6. Insulating gaskets shall be full-face.
- K. Insulating Flange Manufacturer, or Equal
1. JM Red Devil, Type E
 2. Maloney Pipeline Products Co.
 3. PSI Products, Inc.
- L. Flange Gaskets
1. Gaskets for flanged joints used in general water and wastewater service shall be full-faced type, with material and thickness in accordance with AWWA C207, suitable for temperatures to 700 degrees F, a pH of one to 11, and pressures to 1000 psig.
 2. Blind flanges shall be provided with gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange.
 3. Ring gaskets will not be accepted unless otherwise indicated.
 4. Flange gaskets shall be: John Crane, Style 2160; Garlock, Style 3000; or equal.
 5. Gaskets for flanged joints used in water with chloramines shall be: Gylon, Style 3500 as manufactured by Garlock; or equal.
 6. Gaskets for flanges for PVC and CPVC piping used in general water and wastewater service shall be full-faced, 1/8-inch thick, and made of ethylene propylene rubber (EPR) having a Type A durometer hardness of 50 to 70 when tested in accordance with ASTM D 2240.
 7. When the mating flange has a raised face, provide a flat ring gasket filler between the PVC flange and gasket and the adjacent flange.
 8. Gaskets for flanged joints used in chemicals, air, solvents, hydrocarbons, steam, chlorine and other fluids shall be made of materials compatible with the service, pressure, and temperature.

2.03. THREADED INSULATING CONNECTIONS

A. General

1. Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.

B. Materials

1. Threaded insulating connections shall be constructed of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

2.04. MECHANICAL-TYPE COUPLINGS (GROOVED OR BANDED PIPE)

A. General

1. Provide cast mechanical-type couplings where indicated, conforming to the

requirements of AWWA C606 - Grooved and Shouldered Joints.

2. Bolts and nuts shall conform to the requirements of Section 05 50 00 – Metal Fabrications.
 3. Gaskets for mechanical-type couplings shall be compatible with the piping service and fluid utilized, in accordance with the coupling manufacturer's recommendations.
 4. The wall thickness of grooved piping shall conform to the coupling manufacturer's recommendations to suit the highest expected pressure.
 5. In order to avoid excessive load on equipment caused by pipe movement due to steady state or transient pressure conditions, equipment connections with mechanical-type couplings shall be provided with rigid grooved couplings or flexible type coupling with harness in sizes where rigid type couplings are not available, unless thrust restraint is provided by other means.
 6. Mechanical type couplings shall be bonded.
 7. The Contractor shall have the coupling manufacturer's service representative verify the correct choice and application of couplings and gaskets, and the workmanship, to assure a correct installation.
 8. In order to ensure uniform and compatible piping components, grooved fittings, couplings, and valves shall be furnished by the same manufacturer as the coupling.
 9. Grooving tools shall be from the same manufacturer as the grooved components.
- B. Steel Pipe Couplings Manufacturer, or Equal
1. Gustin-Bacon (Aeroquip Corp.) (banded or grooved)
 2. Victaulic Style 41 or 44 (banded, flexible)
 3. Victaulic Style 77 (grooved, flexible or rigid)
 4. Victaulic Style 07 or HP-70 (grooved, rigid)
- C. Ductile Iron Pipe Couplings Manufacturer, or Equal
1. Gustin-Bacon, (Aeroquip Corp.)
 2. Victaulic Style 31 (flexible or rigid grooving)

Note: Ductile iron pipe couplings shall be provided with flush seal gaskets.

- D. PVC Pipe Couplings Manufacturer, or Equal
1. Gustin-Bacon, (Aeroquip Corp)
 2. Victaulic Style 775

Note: Couplings for PVC pipe shall be furnished with radius cut or standard roll grooved pipe ends.

2.05. SLEEVE-TYPE COUPLINGS

- A. General
1. Provide sleeve-type couplings where indicated.

2. The Contractor will not be allowed to substitute a sleeve-split coupling or any other type in lieu of sleeve coupling unless approved by the Engineer.

B. Construction

1. Sleeve couplings shall be in accordance with AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe.
2. Couplings shall be constructed of steel with steel bolts unless indicated otherwise, without pipe stop.
3. Couplings shall be of sizes to fit the indicated pipe and fittings.
4. The middle ring shall be not less than 1/4-inch thick or at least the same wall thickness as the pipe to which the coupling is connected.
5. If the strength of the middle ring material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
6. The coupling shall be either 5 or 7 inches long for sizes up to and including 30-inch and 10 inches long for sizes greater than 30-inch, for standard steel couplings, and 16 inches long for long-sleeve couplings.
7. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings, and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling.
8. The shape of the follower shall be of such design as to provide positive confinement of the gasket.
9. Bolts and nuts shall be in accordance with the requirements of Section 05 50 00 – Metal Fabrications.
10. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.

C. Pipe Preparation

1. Where indicated, prepare the ends of the pipe for flexible steel couplings.
2. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with an outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe.
3. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, in order to proof-test the weld to the strength of the parent metal.
4. The weld of the middle ring shall be subjected to air test for porosity.

D. Gaskets

1. Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions.
2. Gaskets for wastewater and sewerage applications shall be composed of Buna N, Grade 60, or equivalent suitable elastomer.
3. The rubber in the gasket shall meet the following specifications:

- a. Color: jet black
 - b. Surface: non-blooming
 - c. Durometer Hardness: 74, plus and minus 5
 - d. Tensile Strength: 1000 psi minimum
 - e. Elongation: 175 percent minimum
4. The gaskets shall be immune to attack by impurities normally found in water or wastewater.
 5. Gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as indicated above.
 6. Where sleeve couplings are used in water containing chloramine or other fluids which attack rubber materials, gasket material shall be compatible with the piping service and fluid utilized.
 7. Gasket materials used in water with chloramines shall be: Gylon Style 3500 by Garlock by Crane; or equal.

E. Piping Connection to Equipment

1. Where piping connects to mechanical equipment such as pumps, compressors, and blowers, bring the piping to the equipment connection aligned and perpendicular to the axis of the flange or fitting for which the piping is to be connected.
2. The piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.
3. The Contractor shall assign the responsibility to the equipment manufacturer to review the piping connection to the equipment and submit any modifications to the Engineer for review.

F. Insulating Sleeve Couplings

1. Where insulating couplings are required, both ends of the coupling shall be provided with a wedge-shaped gasket which assembles over a sleeve of an insulating compound material compatible with the fluid service in order to obtain insulation of coupling metal parts from the pipe.

G. Restrained Joints

1. Sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means.
2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.
3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.
4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.

H. Sleeve-Type Couplings Manufacturer, or Equal

1. Dresser, Style 38
2. Ford Meter Box Co., Inc., Style FC1 or FC3
3. Smith-Blair, Style 411

2.06. FLANGED COUPLING ADAPTERS AND DISMANTLING JOINTS

- A. Provide flanged coupling adapters and dismantling joints where indicated.
- B. The Contractor will not be allowed to substitute any other type in lieu of flange coupling adapter or dismantling joint unless approved by the Engineer.
- C. The coupling shall be rated as indicated.
- D. Construction
 1. Flanged coupling adapter and dismantling joint bodies shall be fabricated from steel, ASTM A 512 - Cold-Drawn Butt-weld Carbon Steel Mechanical Tubing or A 513 - Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing with steel bolts, without pipe stop.
 2. Provide flanges in conformance with AWWA C207.
 3. Couplings shall be of sizes to fit the indicated pipe and fittings.
 4. The body shall be not less than 1/4 inch thick or at least the same wall thickness as the pipe to which the coupling is connected.
 5. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe. The follower flange shall be fabricated from steel, ASTM A 576 - Steel Bars, Carbon, Hot Wrought, Special Quality or AISI C1012.
 6. The shape of the follower shall be of such design as to provide positive confinement of the gasket.
 7. Restraint
 - a. For flanged coupling adapters and dismantling joints installed in piping system rated for positive pressure, the coupling shall be restrained with harness bolts or tie rods.
 - b. Other means of restraining the coupling such as set screws will not be accepted.
 8. Bolts and nuts shall be in accordance with the requirements of Section 05 50 00 – Metal Fabrications.
 9. Buried couplings shall be epoxy-coated at the factory as indicated.
- E. Gaskets
 1. Gaskets for flange coupling adapters and dismantling joints shall be composed of a rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions.
 2. Gaskets for wastewater and sewerage applications shall be composed of Buna N, Grade 60, NSF-approved, or equivalent suitable elastomer.
 3. The rubber in the gasket shall meet the following specifications:

- a. Color: jet black
 - b. Surface: non-blooming
 - c. Durometer Hardness: 74, plus and minus 5
 - d. Tensile Strength: 1000 psi minimum
 - e. Elongation: 175 percent minimum
4. The gaskets shall be immune to attack by impurities normally found in water or wastewater.
 5. Gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above.
 6. Where flanged coupling adapters or dismantling joints are used in water containing chloramine or other fluids which attack rubber materials, the gasket material shall be compatible with the piping service and fluid utilized.
 7. Gasket materials used in water with chloramines shall be: Gylon Style 3500 by Garlock by Crane; or equal.
- F. Piping Connections to Equipment
1. Where piping connects to mechanical equipment such as pumps, compressors, and blowers, bring the piping to the equipment connection aligned and perpendicular to the axis of the flange or fitting for which the piping is to be connected.
 2. The piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.
 3. The Contractor shall assign the responsibility to the equipment manufacturer to review the piping connection to the equipment and submit any modifications to the Engineer for review.
- G. Restrained Joints
1. Flange coupling adapters on pressure lines shall be harnessed unless thrust restraint is provided by other means.
 2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.
 3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.
 4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.
- H. Manufacturer, or Equal – Flanged Coupling Adaptors
1. Smith-Blair, Model 975
 2. JCM, Model 309
- I. Manufacturer, or Equal – Dismantling Joint

1. Romac, Model DJ400

2.07. FLEXIBLE CONNECTORS

A. Low-Temperature

1. Flexible connectors shall be installed in piping connections to engines, blowers, compressors, and other vibrating equipment, and where indicated.
2. Flexible connectors for service temperatures up to 180 degrees F shall be flanged-reinforced neoprene or butyl spools, rated for a working pressure of 40 to 150 psig, or reinforced flanged duck and rubber, as best suited for the application.
3. Flexible connectors for service temperatures above 180 degrees F shall be flanged, braided stainless steel spools with inner, annular, corrugated stainless steel hose, rated for a minimum 150-psig working pressure, unless otherwise indicated.
4. The connectors shall be a minimum of 9 inches long and provided with face-to-face flanges, unless otherwise indicated.
5. The Contractor shall submit Shop Drawings and calculations.

B. High-Temperature

1. Install flexible connectors in engine exhaust piping and where indicated.
2. Connectors shall be sufficient to compensate for thermal expansion and contraction and to isolate vibration between the engine and the exhaust piping system.

- C. Connectors shall be stainless steel bellows-type, flanged, and rated for minimum 150 psig, 2000 degrees F.

2.08. PROCESS AIR PIPING EXPANSION JOINTS AND PIPE SUPPORT

- A. Process air piping shall be defined as any piping downstream of process air blowers, whether the use of this piping is for aeration air, air scour air or other purposes as noted on the contract documents.
- B. Process air piping shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures due to thermal expansion and contraction.
- C. The Contractor is responsible for the design of such air systems. The design must be certified by a registered professional Engineer in the state of Florida. Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings.
- D. The Contractor is responsible for supplying and installing any and all supports, whether flexible or fixed, along with any flexible connections as required by the certified design.
- E. Expansion joints shall be suitable for a maximum operating pressure of 50 psi as required by the system, and shall have a temperature rating of 850 degrees F.
- F. Expansion joints shall have a minimum compression of 1.25 inches, and shall have ANSI class 150 flanges.
- G. Where expansion joints are required, they shall be of the metal bellows type unless, otherwise noted.
- H. Expansion joints shall be Model NLC, by Flexicraft Industries, or Equal.

2.09. EXPANSION JOINTS

- A. Piping, other than blower air piping, subject to expansion and contraction shall be provided with sufficient means to compensate for such movement without exertion of undue forces to equipment or structures, accomplished with expansion loops, bellow-type expansion joints, or sliding-type expansion joints.
- B. Expansion joints shall be provided with flanged ends and constructed of stainless steel, Monel, rubber, or other materials best suited for each individual service.
- C. Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and anchors and guides, including information on materials, temperature, and pressure ratings.
- D. Expansion joints shall be Model 231 single arch type, by Proco Products, Inc. or Equal for SS 316L straight pipe sections of 5 - 40 feet of length and have a minimum compression of 1.4 inches. Provide double-arch type expansion joints Model 232, by Proco Products, Inc. or Equal at Area 565- Thickened Sludge Mixing Tanks, as shown in the Contract Drawings. For longer SS hot water pipe runs the Contractor is responsible for performing pipe expansion calculations and selection of appropriate expansion joint. All calculations along with shop drawings shall be submitted to the Engineer for review prior to construction. Expansion joints shall be provided with limit rods and plates. Plates and limit rods shall be as recommended by the expansion joint manufacturer. Sufficient clearance between two pipe flanges shall be provided for installation of expansion joint at nominal length with no compression or elongation to the expansion joint.
- E. Joints shall be furnished with internal liners the same material as the associated pipe. The internal lines shall be precision molded, seamless, and extends through the expansion joints body to the outer edges of both flange faces.

2.10. PIPE THREADS

- A. Pipe threads shall be in conformance with ASME B1.20.1 - Pipe Threads, General Purpose (inch), and be made up with Teflon tape unless otherwise indicated.
- B. Where indicated and where required in order to prevent flow of water or air, the passages of piping through wall sleeves and cored openings shall be sealed with modular interlocking link mechanical closures.
- C. Individual links shall be constructed of EPDM rubber, be suitable for temperatures between minus 40 and plus 250 degrees F, and be shaped to fill the annular space between the outside of the pipe and the inside of the wall sleeve or cored opening.
- D. Assemble the links using Type 316 stainless steel bolts and nuts to form a continuous rubber belt around the pipe.
- E. Pressure plates under each bolt and nut shall be fabricated of a corrosion-resistant composite material.
- F. After the seal assembly is positioned in the sleeve, tighten the bolts against the pressure plates to expand the rubber links and form the watertight seal.
- G. Sizing and installation of sleeves and assemblies shall be in accordance with the manufacturer's recommendations.
- H. Modular Mechanical Seals Manufacturer, or Equal
 - 1. Thunderline Corporation, Link-Seal

PART 3 EXECUTION

3.01. GENERAL

- A. Install piping, fittings, and appurtenances in accordance with the requirements of applicable Sections of Division Division 43.
- B. Proprietary manufactured couplings shall be installed in accordance with the coupling manufacturer's recommendation.
- C. Care shall be taken to insure that piping flanges, mechanical-type couplings, sleeve-type couplings, flexible connectors, and expansion joints are properly installed as follows:
 - 1. Gasket surfaces shall be carefully cleaned and inspected prior to making up the connection.
 - 2. Each gasket shall be centered properly on the contact surfaces.
 - 3. Connections shall be installed to prevent inducing stress to the piping system or the equipment to which the piping is connected.
 - 4. Contact surfaces for flanges, couplings, and piping ends shall be aligned parallel, concentric, and square to each axis at the piping connections.
 - 5. Flange Bolts
 - a. Flange bolts shall be initially hand-tightened with the piping connections properly aligned.
 - b. Bolts shall be tightened with a torque wrench in a staggered sequence to the AISC-recommended torque for the bolt material.
 - 6. Harness, Thrust Restraint, and Tie Rod Bolts
 - a. Harness, thrust restraint, and tie rod bolts used for sleeve couplings, flange coupling adapters, or flexible joints shall be tightened gradually and equally at diametrically opposite sides until snug, in order to prevent misalignment and to insure that all studs carry equal loads.
 - b. In order to prevent induced stress or misalignment, do not over-torque connections to adjoining pump or equipment.
 - 7. Groove ends shall be clean and free from indentations, projections, and roll marks in the area from the pipe end to the groove.
 - 8. After installation, joints shall meet the indicated leakage rate.
 - 9. Flanges shall not be deformed nor cracked.
- D. Lined Piping Systems
 - 1. The lining manufacturer shall take full responsibility for the complete, final product and its application.
 - 2. Pipe ends and joints of lined pipes at screwed flanges shall be epoxy-coated in order to assure continuous protection.
- E. Core Drilling
 - 1. Where core drilling is required for pipes passing through existing concrete, core drilling locations shall be determined by radiograph of concrete construction in order

to avoid damage to embedded raceways and reinforcing bars.

F. Cleanup

1. After completion of the Work, cuttings, joining and wrapping materials, and other scattered debris shall be removed from the Site.
2. The entire piping system shall be handed over in a clean and functional condition.

END OF SECTION

SECTION 40 05 13.19

STAINLESS STEEL PROCESS PIPING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. The Contractor shall provide stainless steel pipe and appurtenances, complete and in place, in accordance with the Contract Documents.
- B. The requirements of Section 40 05 13 - Common Work Results for Process Piping apply to the Work of this Section.

1.02. RELATED SECTIONS

- A. Section 40 05 13 – Common work Results for Process Piping.
- B. Section 40 05 23 – Common Work Results for Process Valves
- C. Section 40 05 23.19 – Stainless Steel Process Valves

1.03. REFERENCES

ASTM A 790	Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
ASTM A 403	Wrought Austenitic Stainless Steel Piping Fittings
ASTM A 409	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
ASTM A 778	Welded, Un-annealed Austenitic Stainless Steel Tubular Products
ASME B 1.20.1	Pipe Threads, General Purpose (inch)
ASME B 16.5	Pipe Flanges and Flanged Fittings
ASME B 16.9	Factory-Made Wrought Steel Butt-Welding Fittings
ASME B 16.11	Forged Fittings, Socket-Welding and Threaded
ASME B 31.1	Power Piping
AWWA C606	Grooved and Shouldered Joints

1.04. SUBMITTALS

- A. Furnish submittals in accordance with Section 01 30 00, Submittal Procedures and Section 40 05 13, Common work Results for Process Piping.

PART 2 PRODUCTS

2.01. PIPE MATERIAL

- A. Unless otherwise indicated, stainless steel pipe shall be in accordance with ASTM A 790 – Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe, Type 316, seamless, Schedule 40, with screwed fittings for sizes up to and including 2-1/2 inches and welded fittings or flanged fittings for sizes 3-inches and larger. Stainless steel pipe 12-inches in diameter and larger shall be in accordance with ASTM A 409 – Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service, or A 778 – Welded, Un-annealed Austenitic Stainless Steel Tubular Products, Type 316, Schedule 10, with welded or flanged joints.

2.02. PIPE JOINTS

- A. Stainless steel pipe for sizes 2-1/2 inches and smaller shall have screwed ends with NPT threads made up with Teflon tape. Stainless steel pipe 3-inches and larger and where

indicated shall have welded joints with socket-welding fittings, butt-welding fittings, or socket welding flanges. Stainless steel flanges shall have 316 stainless steel bolts and nuts.

- B. Where indicated, stainless steel pipe shall have grooved ends for shouldered couplings, except that no pipe with less than Schedule 40 wall thickness shall be grooved.
- C. Where indicated, stainless steel pipe shall have plain ends for sleeve-type couplings.

2.03. FITTINGS

- A. Threaded Fittings: Forged stainless steel fittings conforming to ASME B 16.11 - Forged Fittings, Socket-Welding and Threaded, Type 316.
- B. Socket-Welding Fittings: Forged stainless steel fittings conforming to ASME B 16.11, Type 316.
- C. Butt-Welding Fittings: Wrought stainless steel butt-welding fittings conforming to ASTM A 403 - Wrought Austenitic Stainless Steel Piping Fittings, and ASME B 16.9 - Factory- Made Wrought Steel Butt-Welding Fittings, Type 316.
- D. Grooved Fittings: Wrought stainless steel grooved fittings conforming to ASTM A 403 and ASME B 16.9, with grooving conforming to AWWA C606 - Grooved and Shouldered Joints, Type 316.
- E. Flanged Fittings: Type 316 stainless steel flanged fittings and flanges conforming to ASME B 16.5 - Pipe Flanges and Flanged Fittings.
 - 1. Pressure Class: Fittings shall have the same pressure rating as the pipe.

PART 3 EXECUTION

3.01. INSTALLATION

- A. General: Stainless steel pipe shall be installed in a neat and workmanlike manner, properly aligned and cut from measurements taken at the Site to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipe shall afford maximum headroom and access to equipment, and where necessary piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. Installation shall be free from defects.
- B. Supports and Anchors: Piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 43 10 52 - Pipe Supports. Where necessary to avoid stress on equipment or structural members, the pipe shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature differences.
- C. Valves and Unions: Unless otherwise indicated, connections to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection.

3.02. PIPE PREPARATION

- A. Prior to installation, each pipe length shall be carefully inspected, be flushed clean of any debris or dust, and be straightened if not true. Ends of threaded pipes shall be reamed and filed smooth. Fittings shall be equally cleaned before assembly.

3.03. PIPE JOINTS

- A. Threaded Joints: Pipe threads shall conform to ASME B 1.20.1 - Pipe Threads, General Purpose (inch), and shall be full and cleanly cut with sharp dies. Not more than 3 threads shall remain exposed after installation.
- B. Welded Joints: Welded joints shall conform to the specifications and recommendations of ASME B 31.1 - Power Piping. Welding shall be done by skilled and qualified welders per Section 40 05 13 - Common Work Results for Process Piping.
 - 1. Field welding shall be minimized to the greatest extent possible by use of couplings and prefabrication of pipe systems at the factory. Pipe butt welds may be performed at the Site, providing the butt welds are performed only with an inert gas shielded process and that other indicated welding requirements are followed rigidly.
 - 2. Residue, oxide, and heat stain shall be removed from any type of field weld and the affected areas adjacent by the use of stainless steel wire brushes, followed by cleaning with an agent such as Eutectic Company's Euclean or equal, followed by complete removal of the agent.
- C. Grooved Joints: Grooves for grooved couplings and fittings shall be made with specially designed grooving tools to the manufacturer's recommendations.
- D. AWWA C606. Grooves shall be clean and sharp without flaws, and the pipe ends shall be accurately cut at 90 degrees to the pipe axis.

3.04. INSPECTION AND FIELD TESTING

- A. Inspection: The finished installation shall be carefully inspected for proper supports, anchoring, interferences, and damage to pipe, fittings, and coating. Defects shall be repaired.
- B. Field Testing: Prior to enclosure or burying, piping systems shall be pressure tested as required in the Piping Schedule, for a period of not less than one hour without exceeding the tolerances listed in the Piping Schedule. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure. The Contractor shall furnish test equipment, labor, materials, and devices as part of the Work.
 - 1. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. Fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.
 - 2. Leaks shall be repaired, and the system shall be re-tested until no leaks are found.

END OF SECTION

SECTION 40 05 23

COMMON WORK RESULTS FOR PROCESS VALVES

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. Apply the provisions of this Section to all valves and valve actuators except where otherwise indicated.
- C. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.
- D. Support
 - 1. Where a valve is to be supported by means other than the piping to which it is attached, obtain from the valve manufacturer a design for its support and foundation.
 - 2. Submit the support design, including drawings and calculations sealed by an Engineer, with the Shop Drawings.
 - 3. Provide the support after the design has been approved.
- E. Unit Responsibility
 - 1. Make a single manufacturer responsible for the coordination of design, assembly, testing, and furnishing of each valve; however, the Contractor shall be responsible to the City for compliance with the requirements of each valve Section.
 - 2. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve.
- F. Single Manufacturer
 - 1. Where two (2) or more valves of the same type are required, the valves shall be furnished by the same manufacturer.

1.02. RELATED SECTIONS

- A. Section 40 05 23.19 – Stainless Steel Process Valves

1.03. REFERENCES

MSS SP25	Standard Marking Systems for Valves, Fittings, Flanges and Unions
ASTM A 48	Gray iron Castings
ASTM A 126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 536	Ductile Iron Castings
ASTM A 395	Ferritic Ductile Iron Pressure Retaining Castings for Use at Elevated Temperatures
ASTM A 216	Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service
ASTM A 515	Pressure Vessel Plates, Carbon Steel, for Intermediate and Higher Temperature Service
ASTM B 62	Composition Bronze or Ounce Metal Castings
ASTM B 584	Copper Alloy Sand Castings for General Applications

ASTM A 351	Steel Castings, Austenitic, for High Temperature Service
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1.04. SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00 Submittal Procedures.
- B. Furnish the following information on Shop Drawings:
 - 1. Valve name, size, Cv factor, pressure rating, identification number (if any), and specification section number;
 - 2. Complete information on the valve actuator, including size, manufacturer, model number, limit switches, and mounting;
 - 3. Cavitation limits for control valves;
 - 4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;
 - 5. Complete wiring diagrams and control system schematics; and,
 - 6. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.
- C. Furnish a technical manual containing the required information for each valve, as indicated.
- D. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.
- E. Factory Test Data
 - 1. Where indicated, submit signed, dated, and certified factory test data for each valve requiring certification, before shipping the valve.
 - 2. Furnish a certification of quality and test results for factory-applied coatings.
- F. Guarantees, Warranties
 - 1. The Contractor shall furnish the manufacturer's written guarantee that the valves comply with the indicated requirements.
 - 2. The Contractor shall furnish the manufacturer's warranties as published in its literature.

PART 2 PRODUCTS

2.01. REQUIREMENTS

- A. General
 - 1. Provide valves of new and current manufacture.
 - 2. Provide shut-off valves 6-inch and larger with actuators with position indicators.
 - 3. Provide gate valves 18-inch and larger, or where chain wheel is required, with spur gear and hand wheel.

4. Provide buried valves with valve boxes and covers containing position indicators and valve extensions.
 5. Provide manual shut-off valves mounted higher than 7 feet above the working level with chain actuators.
- B. Protective Coating
1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 4-inch and larger in accordance with the requirements of Section 09 96 00 – High-Performance Coatings.
 2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.
 3. Do not epoxy-coat the flange faces of valves.
- C. Valve Labeling
1. Except when such requirement is waived by the Engineer in writing, provide a label on shut-off valves and control valves except for hose bibs and chlorine cylinder valves.
 2. Furnish a label composed of 1/16-inch stainless steel, a minimum of 2 inches by 4 inches in size, as indicated in and permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.
- D. Valve Testing
1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.
 2. Factory-test valves 4 inches in diameter and larger as follows:
 - a. Hydrostatic Testing
 - 1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.
 - 2) Metallic valves rating pressures shall be at 100 degrees F.
 - 3) Plastic valves rating pressures shall be at 73 degrees F, or at a higher temperature according to material type.
 - 4) During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.
 - 5) Allow a test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - b. Seat Testing
 - 1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.
 - 2) Provide a test duration of at least 10 minutes, in order to allow visual examination for leakage. The leakage rate shall be the more

stringent of the following:

- a) As recommended by the reference standard for that type of valve; or,
- b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves, and drop-tight for resilient seated valves.

c. Performance Testing

- 1) Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

E. Valve Markings

- 1. Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.02. MATERIALS

A. General

- 1. Provide materials suitable for the intended application.
- 2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.
- 3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.
- 4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:
 - a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A 48 - Gray Iron Castings, Class 30, or to ASTM A 126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - b. Ductile Iron: ASTM A 536 - Ductile Iron Castings, or to ASTM A 395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
 - c. Steel: ASTM A 216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service, or to ASTM A 515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
 - d. Bronze: ASTM B 62 - Composition Bronze or Ounce Metal Castings, and valve stems not subject to dezincification shall conform to ASTM B 584 - Copper Alloy Sand Castings for General Applications
 - e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A 351 - Steel Castings, Austenitic, for High-Temperature Service, Grade CF8M, or shall be Type 316 stainless steel
 - f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454
 - g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447

- h. NSF Standard 14: Materials shall be listed for use in contact with potable water.

2.03. VALVE CONSTRUCTION

A. Bodies

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.
2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.
3. Perform welds on welded bodies by certified welders and ground welds smooth.
4. Provide valve ends as indicated, and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.
2. Unless otherwise indicated, valves in chemical systems using PVC/CPVC piping shall be provided with true union connections.
3. Provide valves 3 inches in diameter and larger with flanged end connections.

C. Bonnets

1. Connect valve bonnets to the body by clamping, screwing, or flanging.
2. Provide bonnets of the same material, temperature, and pressure rating as the body.
3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal.

E. Stem Guides

1. Provide stem guides spaced 10 feet on centers, unless the manufacturer can demonstrate by calculation that a different spacing is acceptable.
2. Construct submerged stem guides from Type 304 stainless steel.

F. Internal Parts

1. Provide internal parts and valve trim as indicated for each individual valve.
2. Where not indicated, construct valve trim from Type 316 stainless steel or other best-suited material.

G. Nuts and Bolts

1. Provide nuts and bolts on valve flanges and supports in accordance with the requirements of Section 05 50 00 – Metal Fabrications.

2.04. VALVE ACCESSORIES

- A. Provide valves complete with the accessories required to provide a functional system.

2.05. SPARE PARTS

- A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.
- B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.
- C. Spare parts are intended for use by the City, after expiration of the correction of defects period.

2.06. MANUFACTURERS

- A. Valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the indicated valves.

PART 3 EXECUTION

3.01. VALVE INSTALLATION

A. General

1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.
2. Adequately brace gates in order to prevent warpage and bending under the intended use.
3. Firmly support valves in order to avoid undue stresses on the pipe.

B. Access

1. Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

C. Valve Accessories

1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.
2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

END OF SECTION

SECTION 40 05 23.19

STAINLESS STEEL PROCESS VALVES

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes

1. Materials and installation of general duty stainless-steel valves for process service.

1.02. RELATED SECTIONS

- A. Section 01 40 00 – Quality Requirements
- B. Section 40 05 13 – Common Work Results for Process Piping
- C. Section 40 05 23 – Common Work Results for Process Valves

1.03. REFERENCES

ANSI/ASME B16.5	Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
ANSI/ASME B16.10	Face-to-Face and End-to-End Dimensions of Valves
ASTM A276	Standard Specification for Stainless Steel Bars and Shapes
ASTM A321	Standard Specification for Steel Bars, Carbon, Quenched and Tempered
ASTM A351/A351M	Standard Specification for Castings, Austenitic, for Pressure Containing Parts
MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

1.04. SUBMITTALS

- A. Furnish submittals in accordance with the requirements of Section 01 33 00, Submittal Procedures and Section 40 05 23, Common Work Results for Process Valves.

PART 2 PRODUCTS

2.01. GENERAL

- A. Valves of a single type shall be the product of a single manufacturer, and shall be of a single model number where applicable.
- B. Refer to the valve schedule for information on location and use of valves.

2.02. BALL VALVES

A. Stainless-Steel Ball Valves (2 Inches or Larger):

1. Split body, floating ball, regular port type ball valve.
2. CF8M stainless-steel body, ball, and Type 316 stainless-steel stem conforming to ASTM A351/A351M.
3. Flanged Ends: ASME B16.5 Class 150; rated to a pressure of 150 psig non-shock.
4. Reinforced PTFE seats with both seats in tension or spring loaded to provide a leak tight seal at low and high pressures; include blowout proof stem seal of reinforced

PTFE.

5. Valve operator according to Section 40 05 23, Common Work Results for Process Valves.

B. Stainless-Steel Ball Valves (Under 2 Inch):

1. Top entry, threaded ball valve.
2. CF8M stainless-steel body, ball, and Type 316 stainless-steel stem conforming to ASTM A351/A351M.
3. Threaded Ends: ASME B16.10, Class 3000; rated to a pressure of 150 psig non-shock.
4. Reinforced PTFE seats with both seats in tension or spring loaded to provide a leak tight seal at low and high pressures; include blowout proof stem seal of reinforced PTFE.

2.03. CHECK VALVES

A. Stainless Steel Check Valves (2 Inches or Larger)

1. Ball cone check valve spring loaded for fast closing on backflow, complete with guides, conforming to MSS SP-80.
2. CF8M stainless-steel body, Type 316 stainless-steel stem conforming to ASTM A351/A351M.
3. Flanged Ends: ASME B16.5 Class 150; rated to a pressure of 150 psig non-shock.
4. Reinforced PTFE seats with both seats in tension or spring loaded to provide a leak tight seal at low and high pressures; include blowout proof stem seal of reinforced PTFE.
5. Valve operator according to Section 40 05 23, Common Work Results for Process Valves.

B. Stainless-Steel Check Valves (Under 2 Inch):

1. Ball cone check valve spring loaded for fast closing on backflow, complete with guides, conforming to MSS SP-80.
2. CF8M stainless-steel body, and Type 316 stainless-steel stem conforming to ASTM A351/A351M.
3. Reinforced PTFE check ball.
4. ASTM A276, Type 316 stainless-steel guide.
5. AISI Type 316 stainless-steel spring.
6. Pressure Rating: 400 psig.

2.04. GATE VALVES

A. Stainless-Steel Gate Valve (2 inches or Larger)

1. CF8M stainless-steel body, Type 316 stainless-steel stem conforming to ASTM A351/A351M.

2. Flanged Ends: ASME B16.5 Class 150; rated to a pressure of 150 psig non-shock.
 3. Reinforced PTFE seats with both seats in tension or spring loaded to provide a leak tight seal at low and high pressures; include blowout proof stem seal of reinforced PTFE.
 4. Valve operator according to Section 40 05 23, Common Work Results for Process Valves.
- B. Stainless-Steel Gate Valve (Under 2 Inches)
1. CF8M stainless-steel body, and Type 316 stainless-steel stem conforming to ASTM A351/A351M.
 2. ASTM A276, Type 316 stainless-steel guide.
 3. Threaded Ends: ASME B16.10, Class 3000; rated to a pressure of 150 psig non-shock.
 4. Reinforced PTFE seats with both seats in tension or spring loaded to provide a leak tight seal at low and high pressures; include blowout proof stem seal of reinforced PTFE.

PART 3 EXECUTION

3.01. VALVE INSTALLATION

- A. Install valves per Section 40 05 13 – Common Work Results for Process Piping and Section 40 05 23 – Common Work Results for Process Valves.

END OF SECTION

SECTION 40 95 13

CONTROL PANELS AND ENCLOSURES

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks.
- D. Control stations.
- E. Accessories.

1.02. RELATED SECTIONS

- A. Section 09 96 00 – HIGH PERFORMANCE COATINGS
- B. Section 26 05 00 - ELECTRICAL-GENERAL
- C. Section 26 05 26 - GROUNDING
- D. Section 26 05 13 - CONDUCTORS
- E. Section 26 05 29 - ELECTRICAL SUPPORTS, ANCHORS, AND FASTENERS
- F. Section 26 05 53 - ELECTRICAL SYSTEM IDENTIFICATION
- G. Section 40 97 00 - AUXILIARY CONTROLS AND RELAYS

1.03. REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- B. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems
- C. ANSI/NFPA 70 - National Electrical Code
- D. UL - Underwriters Laboratories, Inc.

1.04. SUBMITTALS

- A. Submit in accordance with Sections 01 33 00, Submittal Procedures, and 26 05 00 – Electrical-General.
- B. Submit shop drawings for all control panels. The submitted information shall be detailed specification information proving compliance to these specifications. Submittals shall include, but not be limited to, the following:
 - 1. Enclosure information including size and NEMA classification.
 - 2. Subpanel layout.
 - 3. Wiring diagrams and elementaries.
 - 4. Bill of materials.

5. Internal components (specification information, cut sheets).
 6. List of nameplate titles.
 7. Dimensions.
- C. Shop drawings shall be submitted for all materials used as enclosures and with the enclosures.
 - D. Submit equipment and material samples as requested by the Engineer. All samples will be returned.
 - E. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.6. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

1.05. DEFINITIONS

- A. Power Wiring - Shall mean conductors, conduit, wireway and connections, and related electrical work to supply electrical power to equipment, including electrical power to supply point for equipment control systems.
- B. Control Wiring - Shall mean conductors, conduit, wireway, construction and related work to connect or interconnect relays, solenoids, contact devices, signal lights and audible signals, as well as any and all other electrical control devices indicated as related to the control functions.
- C. Control Panel (CP) - Is an enclosure used to house logic or power devices such as CPT, starters, contactors, relays, timers, and may also contain pilot devices.
- D. Control Station (CS) - Is an enclosure used to house pilot devices only, such as pushbuttons, indicating lights, and selector switches.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or third-party testing firm acceptable to the authority having jurisdiction as suitable for purpose specified and shown.

1.07. EXTRA MATERIALS

- A. Furnish in accordance with Sections 01 33 00, Submittal Procedures, and 26 05 00 – Electrical-General.
- B. Provide two of each cabinet key.
- C. Provide a box of each size and type of control circuit fuses.

PART 2 PRODUCTS

2.01. MANUFACTURERS - NEMA 4X STAINLESS STEEL

- A. Hoffman - Model Series A4S wall or free standing.
- B. Hammond 1418 N4 SS Series wall mounted or 1422 NA SS floor mounted.
- C. McKinstry.
- D. Saginaw

E. Or Equivalent.

2.02. MANUFACTURERS - NEMA 4X NON-METALLIC

A. Carlon - Model "Himeline" Series HL.

B. Hammond PJ Series.

C. Hoffman.

D. Or Equivalent.

2.03. MANUFACTURERS - NEMA 4X ALUMINUM

A. Hoffman - Model ALLP.

B. Hammond.

C. Or Equivalent.

2.04. MANUFACTURERS - NEMA 7

A. Appleton - Model EXB.

B. Crouse-Hinds.

C. Or Equivalent.

2.05. MANUFACTURERS - NEMA 12 SINGLE DOOR

A. Hoffman - Model Series A12.

B. Hammond - Series 1418.

C. McKinstry.

D. Or Equivalent.

2.06. MANUFACTURERS - NEMA 12, TWO-DOOR AND FREE STANDING

A. Hoffman - Model Series AR and A4L.

B. Hammond - Series 1422.

C. McKinstry.

D. Or Equivalent.

2.07. MANUFACTURERS – NEMA 7/4 ENCLOSURES

A. Akron Electric.

B. Crouse-Hinds.

C. Or Equivalent.

2.08. SHEET METAL ENCLOSURE FABRICATION

A. After fabrication and assembly of all sheet metal enclosures, grind all welds smooth, and then thoroughly degrease and clean.

Apply at least two coats of rust inhibiting primer or undercoat of the manufacturer's standard quality followed by at least two coats of baked enamel or epoxy finish. For exterior enclosures utilizing an epoxy finish, the enclosure shall have a final overcoat of clear acrylic polyurethane.

- B. Finish Color of All Enclosures - ANSI 61 Light Gray.
- C. Turn back edges and file all sharp corners smooth.
- D. Enclosure Opening:
 - 1. Roll lips on all sides.
 - 2. Provide neoprene gasket.
 - 3. Provide drip shield kits for exterior enclosures.
- E. Doors:
 - 1. Rolled lips on unhinged sides (three sides).
 - 2. Full length piano-type hinges.
 - 3. Provide all front or rear panel doors with door holders sized appropriately for the weight of the equipment on the door.
 - 4. NEMA 4, 4X, and 12 Door Latches - Quick release, 1/4 turn operation.
 - 5. Hinged doors over 24 inches high shall have latching device at three points.
 - 6. Provide mechanical interlock between door and panel power disconnect mechanism. The interlock is to prevent the door from opening while the disconnect switch is closed. Provide an unlabeled defeater mechanism to permit qualified personnel access to panel while it is powered. Panel disconnecting means operator shall be flange mounted for three phase panels, internal for single phase. Do not use through-the-door operators.

2.09. ACCESSORIES

- A. Manufacturer - Cable Ties:
 - 1. Thomas & Betts - Model Nylon TY-WRAPs.
 - 2. Burndy Products.
 - 3. Or Equivalent.
- B. Manufacturer - Terminal Blocks:
 - 1. Buchanan - Model 0241.
 - 2. Connectron - Model N553.
 - 3. Or Equivalent.
- C. Manufacturer - Wire Duct:
 - 1. Stahlin Brothers - Model XT-Panel Channel.
 - 2. Panduit Corporation - Model Type E-Dark Grey.
 - 3. Carlon.

4. Or Equivalent.
- D. Manufacturer - Grounding Terminals:
1. Burndy - Model OA4C-AB.
 2. ILSCO Corporation.
 3. Thomas & Betts.
 4. Or Equivalent.
- E. Provide one drawing pocket in the panel, minimum size 10 inches wide by 10 inches high by 1/2 inch deep, panel manufacturer's standard material and finish.
- F. Stainless steel sunshields, either provided by the enclosure manufacturer or shop fabricated, shall be provided for all exterior-mounted control panels and enclosures.

PART 3 EXECUTION

3.01. ELECTRICAL CONTROL

- A. Shall be in accordance with Section 40 97 00 – Auxiliary Controls and Relays.

3.02. NAMEPLATES

- A. Provide nameplates on the exterior of each enclosure identifying the application or function of the enclosed equipment.
- B. Nameplates and labels per Section 26 05 53 – Electrical System Identification.

3.03. EQUIPMENT HOUSING TYPES

- A. Enclosure, Control Panel or Device Applications
 1. Exterior Locations - NEMA 4X stainless steel.
 2. Interior Wet Locations - NEMA 4x stainless steel.
 3. Corrosive Areas - NEMA 4X non-metallic (fiberglass).
 4. Hazardous Locations – NEMA 7/4
 5. All Other Areas - NEMA 12 painted.
- B. All door-mounted devices shall be equal to the NEMA rating of the enclosure.

3.04. CONTROL PANEL CONNECTIONS

- A. Regardless of who furnishes or installs the various panels, all are connected electrically under this section unless specifically shown or specified otherwise.

3.05. FINISH REPAIR

- A. Repair damage to the factory finish in accordance with Section 09 96 00 – High Performance Coatings. Depending on the extent of damage to the factory-finish and/or the closeness of the color match of any field-applied paint, a complete repainting may be ordered by the Owner at his discretion.

3.06. DOOR QUANTITY

- A. Provide two doors if panel is larger than 36 inches wide.

3.07. CONTROLS AND ASSOCIATED CIRCUITRY

- A. Each control panel shall contain all applicable disconnects, including a single main power disconnect (unless specifically shown otherwise on the drawings); motor circuit disconnect - one for each motor; necessary control pushbuttons; timers; relays; door interlock switches; indicator lights; selector switches; alarms; instruments and associated circuitry to monitor and control the associated equipment. Main power disconnect operating mechanisms shall be flange mounted not through the door.

3.08. CONTROL PANEL WIRING

- A. Wire Type - See Section 26 05 13 – Conductors.
- B. Wire Duct - Used for wiring between devices that are mounted on the back panel of control panels.
- C. Wire Bundling - Where it is not possible to run wire in wire duct, such as wire run from devices located in the back of a panel to devices mounted on the door of a panel, the wire is to be bundled. Wire lacing or twine is not acceptable.

Bundles are to be wrapped by a spiral plastic protective sheath. Secure bundles to the panel structure for a stable support with a spacing of no less than every 8 inches.

A wire bundle which must cross a hinge shall run along the hinge as far as possible or have a large loop in bundle and be secured at both ends so that the twisting is taken over the longest length of hinge possible. Wire shall not be split off from the bundle along this length.

- D. Wiring and Termination Methods - Interior wiring to be point-to-point with no splices. All wiring from and to the control panel to be through terminals located in the panel. Solderless insulated crimp-type locking fork lugs shall be used for terminations to screw-type terminals. Where screw-type terminals are not used, terminals shall be of the tubular clamp type. Install lugs such that no uninsulated wire is visible at the wire entry point, and wire strands are not protruding from the screw connections end. Use solderless connectors or tubular clamp connectors for all connections to terminals and equipment.
- E. Shielded Wire - Separate from other wires and equipment with suitable barriers and with terminal blocks for continuous shield grounding to the connecting cables.
- F. Separate intrinsically safe wiring from all other wiring with barriers.
- G. Furnish panels factory-wired and tested with all equipment and appurtenances mounted thereon.
- H. Wire Labeling - Mark wires at both ends with numbers from Engineer-approved elementaries per Section 26 05 53 – Electrical System Identification. Color coding per Section 26 05 00 – Electrical-General.
- I. Panel Wiring - All panel wiring shall be installed by the panel manufacturer.
- J. Lamp Test Switch - For panels with more than five indicating lights, provide a single lamp test switch in lieu of push-to-test type indicating light.

3.09. TERMINAL BLOCKS

- A. Arrange terminals in alphabetic and numeric order in columns on removable subplates. Locate columns at least 4 inches from any edge of the subplate and space 6 inch on centers and at least 2 inches from a wiring duct.
- B. Provide marked terminals with wire number from Engineer-approved elementaries. Locate

terminals with the same wire number adjacent to each other and jumpered.

- C. Make a maximum of two connections to each side of a terminal, including jumpers.
- D. Provide an additional 20 percent spare terminals with the following as minimum requirements:
 - 1. Power Terminals - Three spares.
 - 2. Control Terminals - Tens pares.
- E. At least one position on a terminal block must be reserved for termination of each incoming wire. Locate all such positions on the same side of the column of terminals. A wiring duct to feed the terminals must be sized to include wires for these positions.
- F. Connect all ground terminals of power receptacles solidly to the frame of the panel. Provide the control panel with one grounding terminal. Mount grounding terminals to the frame of the panel or rack.

3.10. WIRING DUCT

- A. Size wiring duct at 60 percent fill according to the maximum number of wires at any cross section, including field wiring terminations and spares. Wiring duct must be plastic.

3.11. CONTROL PANEL INSTALLATION

- A. Wall mount panel enclosures that are up to 48 inches in height; floor mount larger panel enclosures.
- B. Furnish control panels, where shown, with power disconnect switches which will de energize the power supply to the panel.
- C. Ground Panels - Connect all equipment and circuits in the panels shown or required to be grounded to the grounding conductors.
- D. Install panels where shown. Provide conduit entry as shown or specified or as required for the installation.
- E. Upon completion of installation, the equipment manufacturer's representative shall check panels and make necessary adjustments.
- F. Panel manufacturer to mount all equipment shown or specified to be furnished with a panel. Furnish panels as completely assembled units.
- G. For all wall mounted panels, provide a minimum of four brackets designed for wall mounting.

3.12. MOUNTING HEIGHT

Mount control panels such that:

- A. No disconnect handle is higher than 5 feet 6 inches to the highest part of handle. Mount all separately enclosed disconnect switch handles 4 feet 6 inches from floor or other working surface unless otherwise indicated (5 feet to the top of enclosure).
- B. Top of wall-mounted enclosures shall not be higher than 6 feet.
- C. No pilot device shall be higher than 5 feet 6 inches.
- D. No operator interface device (i.e., graphic display screen, etc.) is higher than 5 feet 0 inches to the centerline of the device, measured from the floor or walking surface in front of the panel.

3.13. ENCLOSURE INSTALLATION METHODS

- A. Support - Adequately support all enclosures from walls, structure, or on support panels or plates independently of the conduit system. Provide additional supports for seismic restraint.
- B. Support Material - Size fasteners utilizing a safety factor of 5.
- C. Mounting Accessories - Section 26 05 29 – Electrical Supports, Anchors and Fasteners.
- D. All panels and enclosures shall be installed level and plumb.

END OF SECTION

SECTION 40 97 00

AUXILIARY CONTROLS AND RELAYS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Pushbutton.
- B. Selector switches.
- C. Indicating pilot lights.
- D. Contact blocks.
- E. Control power transformers.
- F. Fuse blocks.
- G. Limit switches.
- H. All timers.
- I. Time delay relays.
- J. Relays.
- K. Liquid level sensors (floats).
- L. Uninterruptible power supplies.
- M. Alarm horn.

1.02. RELATED SECTIONS

- A. Section 40 95 13 – CONTROL PANELS AND ENCLOSURES
- B. Section 26 05 53 – ELECTRICAL SYSTEM IDENTIFICATION

1.03. REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control Systems
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems
- D. NEMA ST 1 - Standard for Specialty Transformers (Except General Purpose Type)

1.04. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01 33 00, Submittal Procedures.
- B. Submit shop drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
- C. Submit product data under provisions of Section 01 33 00, Submittal Procedures.

- D. Submit product data for each component specified. The submittal shall be included as part of the system in which the component is specified.
- E. Submit manufacturer's installation instructions under provisions of 01 33 00, Submittal Procedures.
- F. Submit samples as requested by the Engineer.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01 70 00, Execution and Closeout Requirements.
- B. Accurately record actual locations of control equipment. Revise diagrams included in Drawings to reflect actual control device connections.

1.06. OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Section 01 70 00, Execution and Closeout Requirements.
- B. Include instructions for adjusting and resetting time delay relays, timers, and counters.
- C. Submit maintenance data under provisions of Section 01 70 00, Execution and Closeout Requirements.
- D. Include recommended preventive maintenance procedures and materials.

PART 2 PRODUCTS

2.01. PILOT DEVICES

- A. General:
 - 1. Pilot devices shall include indicating light, pushbuttons, and selector switches.
 - 2. Heavy-duty, industrial type, construction.
 - 3. Area Classification:
 - a. Non-Classified Area Device Rating - NEMA 13 oil-tight.
 - b. Wet Area or Exterior Device Rating - NEMA 4 and NEMA 13 oil-tight and watertight.
 - c. Corrosive Area Device Rating - NEMA 4X, non-metallic.
 - 4. Provide extra-large nameplates in accordance with Section 26 05 53 – Electrical System Identification, for all door or enclosure front-mounted devices.
 - 5. Controls and relays shall be by one manufacturer wherever possible.
 - 6. Provide enclosure for field mounted devices and individual controls in accordance with Section 40 95 13 – Control Panels and Enclosures.
 - 7. 30-millimeter diameter.

8. Retaining ring and boot type.

B. Pushbuttons and Selector Switches (PB) and (SEL SW):

1. Lockout feature as indicated.
2. Color – Red for stop or terminate function; black for all others.
3. Operators:
 - a. Provide “gloved hand” knobs for selector switches.
 - b. Provide “mushroom head” button on emergency stop pushbuttons.
 - c. Emergency stop pushbuttons shall be of the push-pull type unless specifically noted otherwise.
4. Stackable contact blocks as required.
5. Devices shall be either momentary, maintained, spring return, push-pull, or other operational types as shown or otherwise specified.
6. Manufacturer NEMA 4 and 13 Oil and Water Tight – General Electric, Schneider Electric (Square D) Type K, Cutler-Hammer, or equal.
7. Manufacturer NEMA 4X, Non-Metallic – Allen-Bradley Type 800H, Schneider Electric (Square D) Type SK, Cutler-Hammer, or equal.

C. Indicating Pilot Lights (IL):

1. Glass or plastic lens.
2. 120-volt LED transformer type.
3. Push-to-test type. When six or more pilot lights are used in control panels, a single lamp test switch can be used in lieu of all lamps being push-to-test.
4. Lens color shall be as follows:

Function	Color
Motor running	Green
Malfunction/alarm	Amber
Ready	Red
Power On	White

5. Manufacturers – General Electric, Schneider Electric (Square D), Crouse-Hinds, Allen-Bradley, Cutler-Hammer, or equal.

2.02. CONTACT BLOCKS

- A. Molded of an amorphous transparent polyamide material with high impact resistance and resistant to carbon tracking.
- B. Contacts – Double break silver type rated at 10 amp at 120 VAC continuous.

2.03. CONTROL POWER TRANSFORMER (CPT)

- A. Standard industrial control type, VA size as required for the powered load.
- B. Dual voltage primary, with 120V ac, single phase secondary. All primary connections fused; size as required for the transformer.
- C. Secondary control fuse with capacity for the control circuit indicated.
- D. Can be DIN-rail mounted type in control panels.
- E. Manufacturer – Schneider Electric (Square D), General Electric, Acme, or equal.

2.04. FUSE BLOCKS

- A. General purpose Class H, K, and R phenolic fuse block for dual-element cartridge fuses.
- B. Can be DIN-rail mounted in control panels.
- C. Manufacturer – Buchanan, Connectron, 3M, or equal.

2.05. LIMIT SWITCHES (LS)

- A. Contacts – Silver-to-silver snap-acting where practicable and in all cases where the motion is slow.
- B. Switches – Operated by levers, plungers, or pushrods, depending on the application.
- C. Rollers – Provided where excessive wear due to a sliding action would result.
- D. Manufacturer – General Electric Class CR215G, Schneider Electric (Square D) Class 9007 Type C, Allen-Bradley, or equal.

2.06. ELAPSED TIME METERS (ETM)

- A. Minimum six-digit, non-resettable hour meter panel mounted.
- B. For operation on 120 volts.
- C. Manufacturer – General Electric, Yokagowa, Schneider Electric (Square D), or equal.

2.07. PROGRAMMABLE TIMERS

- A. Microprocessor-based digital controller with two channels with up to 20 on/off setpoints, repeatable every day.
- B. Program entries shall be made by mechanical pushbutton and an acknowledgement of each entry into the unit shall be by audible signal.
- C. Override switches shall be provided for continuous On or Off, automatic and visual indicators for each channel.

- D. Controller shall provide 7-day, 24-hour programming.
- E. Maintained output contacts.
- F. Plain English self-prompting display.
- G. Timing sequences shall be fully detailed in the operations and maintenance manuals for the respective equipment controlled.
- H. Timer shall be Tork EWZ201 or equal.

2.08. TIME DELAY RELAYS (TR)

- A. Solid-state type with calibrated dial head or dip switch adjustment, encapsulated coil, snap-action switch assembly of number of poles indicated.
- B. "On-Delay," "Off-Delay," or "On-Off Delay" dual head type as indicated; timing range intervals as shown or specified.
- C. Bases shall have captive screws for locking fork solderless connectors, single tier design, with relay retainer clips.
- D. Dust-tight construction.
- E. Provide auxiliary contacts where indicated.
- F. Contacts rated 10 amps resistive at 120 VAC.
- G. Manufacturer - Diversified Electronics Series "TD;" Schneider Electric (Square D), Type JCK; Timemark 300 Series; or equal.

2.09. GENERAL PURPOSE CONTROL RELAYS (CR)

- A. Units shall be plug-in type.
- B. Use in all control panels.
- C. Number of poles and arrangement as shown or specified.
- D. Contacts:
 - 1. Shall be rated 10 amps at 240 volts AC.
 - 2. Material shall be silver cadmium oxide.
- E. Coils shall be rated continuous duty.
- F. Sockets:
 - 1. Supply with relay retainer clip.
 - 2. Terminal connections with captive screw to accept locking fork solderless connectors.
 - 3. Single tier design.
- G. Manufacturers – Schneider Electric (Square D) Class 8501 Type K relay and Type NR socket; Potter-Brumfield; or equal.

2.10. INDUSTRIAL CONTROL RELAYS (ICR)

- A. Industrial machine tool type.
- B. Use – Shall be used in motor control centers or used to control equipment with power requirements, such as solenoid valves.
- C. Contacts:
 - 1. Double break field convertible.
 - 2. Rated 10 amps at 600 volts AC.
 - 3. Rated 5 amps at 250 volts DC.
- D. Coil shall be encapsulated, continuously rated of the voltage rating indicated on the plans.
- E. Number of poles as indicated on Contract Drawings, but not less than four.
- F. Holding and Operating Mechanism:
 - 1. Electrically held, electrically operated, General Electric Company CR-120A; Schneider Electric (Square D) Class 8501, Type X; Cutler-Hammer; or equal.
 - 2. Mechanically held/electrically held relay with mechanically-held attachment.
 - 3. Time Delay - Pneumatic timer attachment for electrically-held delay; “on delay” or “off delay” as indicated on plans.

2.11. UNINTERRUPTIBLE POWER SUPPLY (UPS)

- A. Minimum Watt Capacity – As required to maintain power to equipment for normal operation for a period of 1/2 hour.
- B. Battery energy storage.
- C. Automatic recharging of batteries.
- D. Four 120-volt, 5-15R, output receptacles.
- E. Alarms – Battery backup operation, low run time remaining, and overload.
- F. Automatic current and overvoltage output protection.
- G. Operating Input Voltage – 88 VAC - 138 VAC.
- H. No interruption (no transfer time for normal power to battery backup) of power to the connected true “on-line” load.
- I. Efficiency – 95 percent.
- J. Brown-out protection for input voltages of 88 VAC without the use of the batteries.
- K. Lightning and Surge Protection – ANSI/IEEE C62.41 Categories A and B with 0.3 percent to 0.7 percent.
- L. Radio Frequency Noise Isolation – 38 Db common mode, 47 Db normal mode.
- M. Provide a minimum of a NEMA 4 wall-mounted enclosure for external mounted UPS.

- N. Manufacturer – Best, Liebert, Sola/Hevi-Duty, or equal.

2.12. ALARM HORN

- A. Lightweight, compact, wall-mounted, signal device with gain control. UL listed for indoor and outdoor use.
- B. Operating on 120-volt, 60 Hertz, with a maximum current draw of 0.5 amps.
- C. Signal Type – Horn, 110 dB at 10 feet.
- D. Housing – Speaker cone and projector made of spun aluminum. Internal amplification circuitry including gain control contained in diecast aluminum housing.

PART 3 EXECUTION

3.01. GENERAL

- A. Mount all individual controls in a suitable enclosure as specified per Section 40 95 13 – Control Panels and Enclosures.
- B. Identify all auxiliary controls per Section 26 05 53 – Electrical System Identification.
- C. General purpose control relays shall be used in manufactured or custom-built control panels. Their use in motor control centers is prohibited. The Contractor shall use control relays as described in Article 2.10 to control equipment with power requirements, such as solenoid valves.

3.02. CONTROL POWER TRANSFORMER

- A. Provide individual control power transformers for each control circuit.
- B. Size as required by control circuit.

3.03. FUSE BLOCKS

- A. Size as indicated on Drawings or as required.

3.04. LIMIT SWITCHES

- A. Limit switches shall be provided where specified and where it is required to convert a mechanical motion into the control of an electric circuit.

3.05. PUSHBUTTONS AND SELECTOR SWITCHES

- A. Units shall be back-mounted wherever possible.

END OF SECTION

SECTION 43 10 52

PIPE SUPPORTS

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

- A. Furnish and install pipe supports, hangers, guides, anchors, and all other required accessories in accordance with the Contract Documents.

1.02. RELATED SECTIONS

- A. Section 33 05 19 – Ductile Iron Piping.
- B. Section 33 90 01 – Reclaimed Water Mains and Appurtenances.
- C. Section 40 05 51 – Process Valves and Appurtenances.

1.03. REFERENCES

AISC	Manual of Steel Construction
ASTM A 36	Carbon Structural Steel
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 307	Carbon Steel bolts and Studs, 60,000 psi Tensile Strength
ASTM B 31.1	Power Piping
ANSI/AWS D1.1	Structural Welding Code - Steel

1.04. SUBMITTALS

- A. Provide in accordance with Section 01 33 00, Submittal Procedures, and as supplemented herein. Submittals shall include, but not be limited to, the following:
1. Shop Drawings
 - a. Drawings of pipe supports, hangers, anchors, and guides.
 - b. Calculations for special supports and anchors, stamped and signed by a registered professional engineer.

PART 2 PRODUCTS

2.01. GENERAL REQUIREMENTS

- A. Code Compliance
1. Piping systems and pipe connections to equipment shall be properly anchored and supported in order to prevent undue deflection, vibration, and dislocation due to seismic events, line pressures, pipe weight, fluid weight, liquid movement, thermal changes, vibration, probable forces applied during construction, and stresses on piping, equipment, and structures.
 2. Supports and parts thereof shall conform to the requirements of ASME B31.1 - Power Piping, except as supplemented or modified in this Section.
 3. Supports for plumbing piping shall be in accordance with the latest edition of the applicable plumbing code or local administration requirements.

B. Structural Members

1. Wherever possible, pipes shall be supported from structural members.
2. Where it is necessary to frame structural members between existing members, such supplementary members shall be provided by the Contractor.
3. Supplementary members shall be in accordance with the requirements of the Building Code and the American Institute of Steel Construction, and shall be as acceptable to the Engineer.

C. Pipe Hangers:

1. Pipe hangers shall be capable of supporting the pipe in operation, allowing free expansion and contraction of the piping and preventing excessive stress on equipment.
2. Hangers shall have a means of vertical adjustment after erection.
3. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe.
4. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of safety valves shall include hydraulic shock suppressors.
5. Hanger rods shall be subjected to vertical loading only.

D. Hangers Subject to Horizontal Movements:

1. At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement.
2. Where horizontal pipe movement is greater than 1/2 inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the cold-to-hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

E. Spring-Type Hangers:

1. Spring-type pipe hangers shall be provided for piping subject to vibration or vertical expansion and contraction, such as engine exhausts and similar piping.
2. Spring-type hangers shall be sized to the manufacturer's printed recommendations and the loading conditions encountered.
3. Variable spring supports shall be provided with means to limit misalignment, buckling, eccentric loading, or to prevent overstressing of the spring, and with means to indicate the compression of the spring.
4. Supports shall be capable of accommodating at least 4 times the maximum travel due to thermal expansion.

F. Thermal Expansion:

1. Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or expansion joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely away from the anchored points.
2. Components shall be structurally suitable to withstand the imposed loads.

G. Heat Transmission:

1. Supports, hangers, anchors, and guides shall be designed and insulated such that excessive heat will not be transmitted to the structure or to other equipment.

H. Riser Supports:

1. Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

I. Freestanding Piping:

1. Freestanding pipe connections to equipment such as chemical feeders and pumps shall be firmly attached to steel frames fabricated from angles, channels, or I-beams anchored to the structure.
2. Exterior, freestanding overhead piping shall be supported on fabricated pipe stands consisting of pipe columns anchored to concrete footings, or with horizontal, welded steel angles, and U-bolts or clamps securing the pipes.

J. Materials of Construction:

1. Non-submerged pipe support assemblies, including framing, hardware, and anchors, shall be FRP, galvanized steel, or stainless steel in accordance with the area designation table at the end of this Section, unless otherwise indicated (Use 316 SS anchors with FRP support assemblies where FRP anchors are not appropriate). This table should not be used for determining corrosive environments based on electrical codes. For corrosive ratings of electrical equipment refer to electrical drawings.
2. Submerged supports, as well as piping, conduits, and equipment in hydraulic structures within 24 inches of the water level, shall be supported with support assemblies, including framing, hardware, and anchors constructed of Type 316 stainless steel, unless otherwise indicated.
3. Where there are dissimilar metals between the pipe and pipe support, the Contractor shall provide neoprene insulating material.

K. Point Loads:

1. Meters, valves, heavy equipment, and other point loads on PVC, FRP, or other plastic pipes, shall be supported on both sides, according to manufacturer's recommendations, in order to avoid undue pipe stresses and failures.
2. In order to avoid point loads, the supports on PVC, FRP, or other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields.

L. Concrete Anchors:

1. Refer to Section 05 50 00, Metal Fabrications. Unless otherwise indicated, concrete anchors for pipe supports shall be according to the following table.
2. Contractor shall determine anchor embedment.

Pipe Support Application	Type of Concrete Anchor
--------------------------	-------------------------

New Concrete	Use embedded concrete insert anchors on a grid pattern. Use Grinnell (Anvil International), Tolco, or equal.
Existing Concrete	Use non-shrink grouted anchors, metallic type expansion anchors, or epoxy anchors. Exceptions: Metallic type expansion anchors and epoxy anchors are not permitted for pipe supports subject to vibrating loads. Epoxy anchors are not permitted where the concrete temperature is in excess of 100 deg F or higher than the limiting temperature recommended by the manufacturer. Epoxy anchors are not accepted where anchors are subject to vibration or fire.
Vibratory Loads and High-Temperature Conditions	Use non-shrink grouted anchors.

M. Noise Reduction:

1. In order to reduce the transmission of noise in piping systems, copper tubes in buildings and structures shall be wrapped with a 2-inch wide strip of rubber fabric or similar suitable material at each pipe support, bracket, clip, or hanger.

2.02. SUPPORT SPACING

- A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads.
- B. Pipe support spacing shall not exceed the maximum indicated spans.
- C. For temperatures other than ambient temperatures or those listed, and for other piping materials or wall thicknesses, the pipe support spacing shall be modified in accordance with the pipe manufacturer's recommendations.
- D. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of loading effects.
- E. Steel Pipe:
 1. Install supports for steel pipe in accordance with the requirements of AWWA: Manual of Practice MOP-11.
 2. For steel pipe sizes not indicated, the support spacing shall be designed such that the stress on the pipe does not exceed 5,000 psi.
 3. Where support spacing is not indicated on the Contract Drawings, the Contractor shall use the spacing indicated in the following schedule, for the indicated support condition:

PRACTICAL SPANS FOR SIMPLY SUPPORTED PIPE IN 120-DEGREE CONTACT SADDLES, FEET ¹										
Nominal Pipe Diameter, inches	Pipe Wall Thickness, inches									
	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1

6	36	40	44						
8	38	42	45						
10	39	43	46						
12	40	44	47						
14	40	44	47						
16	41	45	48						
18	41	46	49	52					
20	42	46	50	53					
22	42	46	51	54					
24	42	48	52	55	58	60			
26	43	48	52	56	59	61			
28	43	48	53	56	59	62			
30	43	49	53	57	60	63			
32	44	49	54	57	61	64			
34	44	49	54	58	61	64			
36	44	50	54	58	62	65	70		
38	44	50	55	59	62	65	70		

PRACTICAL SPANS FOR SIMPLY SUPPORTED PIPE IN 120-DEGREE CONTACT SADDLES, FEET ¹										
Nominal Pipe Diameter, inches	Pipe Wall Thickness, inches									
	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
40	44	50	55	59	63	66	71			
42	44	50	55	59	63	66	72			
45		51	55	60	63	67	72			
48		51	56	60	64	67	73	78		
51		51	56	60	64	68	74	79		
54		51	56	61	65	68	74	79		
57		51	57	61	65	69	75	80		
60		51	57	61	65	69	75	80		
63		52	57	62	66	69	76	81		
66		52	57	62	66	70	76	81	86	90
72		52	58	62	66	70	77	82	87	92
78			58	62	67	71	77	83	88	93
84			58	63	67	71	78	84	89	94
90			58	63	67	71	78	84	90	94
96			58	63	68	72	79	85	90	95

¹Reference: AWWA MOP 11, Table 7-1

F. Ductile Iron Pipe:

1. Install supports for ductile iron pipe in accordance with the recommendations of the Ductile Iron Pipe Research Association (DIPRA) Design of Ductile Iron Pipe on Supports.
2. As a minimum, where support spacing is not indicated on the Contract Drawings, the Contractor shall use the spacing indicated in the following schedule:

Nominal Pipe Diameter, inches	Support Configuration
All diameters	Two supports per pipe length, with one of the two supports located at a joint

G. Other Pipe Materials:

1. Support spacing for pipe constructed of other materials shall be based on design temperature and in accordance with the pipe manufacturer's recommendations.

2.03. MANUFACTURED SUPPORTS

A. Stock Parts:

1. Where not specifically indicated, designs that are generally accepted as exemplifying good engineering practice and using stock or production parts shall be utilized wherever possible.
2. Such parts shall be locally available, new, of best commercial quality, and designed and rated for the intended purpose.

B. Manufacturers, or Equal:

1. Basic Engineers Inc.
2. Bergen-Paterson Pipe support Corp.
3. Grinnell Corp. (Anvil International)
4. NPS Products, Inc.
5. Power Piping Company
6. Tolco Incorporated

2.04. COATING

A. Galvanizing:

1. Unless otherwise indicated, fabricated pipe supports other than stainless steel or non-ferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. Other Coatings:

1. Other than stainless steel or non-ferrous supports, supports shall receive protective coatings in accordance with the requirements of Section 09 96 00, High-Performance Coatings.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install in accordance with the Contract Documents and the manufacturer's written instructions.
- B. Field verify all dimensions and elevations. Notify Engineer of specific differences.
- C. Install equipment as described in the Contract Documents, as shown on the approved shop drawings, and as recommended by the manufacturer.
- D. Pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's printed instructions.
- E. Concrete inserts for pipe hangers and supports shall be coordinated with the formwork, where applicable.
- F. Pipe supports and hangers shall be positioned in order to produce an orderly, neat piping system.
- G. Hanger rods shall be vertical, without offsets.
- H. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and

venting, as close to ceilings or roofs as possible, and without interference with otherwork.

- I. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available.
- J. Fabricated supports shall be neat in appearance without sharp corners, burrs, or edges.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The scope of this section defines the work and materials included in each bid item in the specifications for the rehabilitation and repainting of Ferric Sulfate Tank 1 (Center) for the City of Tampa, Florida (hereinafter "CITY"). Payment will be made based on the specified items included in the description in this section for each bid item.
- B. This tank is a 70,000-gallon, welded, steel tank. The following information was observed:
- | | |
|-------------------|--------------|
| Diameter: | 24 ft. |
| Height: | 27.5 ft. |
| Height to Bottom: | 12 ft. 8 in. |
| Material: | A36 Steel |
- C. The overall project consists of providing all labor, materials, supervision, power, equipment and supplies for:
1. Replace corrosion damaged sections of the roof and shell.
 2. Replace exterior ladder and platform.
 3. Remove existing liner, abrasive blast entire interior, and apply a new rubber liner to all interior surfaces.
 4. Abrasive blast the entire exterior and apply new coatings to all exterior surfaces, except as noted. *Note: the contractor is responsible for containing all spent abrasives and coating splatter from surrounding property.*
 5. Apply hazard diamond decals to Ferric Sulfate Tanks #1 and #2.

1.02 RELATED DRAWINGS

- A. 11-0592-R1 – General Elevation
- B. 11-0592-R2 – Shell and Roof Repair
- C. 11-0592-R3 – Ladder/Platform Replacement
- D. 11-0592-R4 – Structural Steel Standard Ladder

1.03 INSPECTION REPORT

- A. This tank was inspected in July 2011 by *Tank Engineering And Management Consultants, Inc.* A copy of the report is available for review. Bidders should familiarize themselves with the report and the condition of the structure at the time of the inspection. The inspection was performed to determine the condition of the structure and to determine the condition of the coatings. The report describes conditions existing at the time of the inspection. The inspection report is for information purposes only and is not considered as part of these specifications.

1.04 SUBMITTALS

- A. Pre-Job Submittals

1. Before mobilizing to the jobsite, the CONTRACTOR shall submit to the ENGINEER for the ENGINEER'S approval, a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the ENGINEER may require. This schedule, unless objected to by the ENGINEER, shall be used as a basis for reviewing the CONTRACTOR'S application for Payment. However, the CONTRACTOR shall provide a realistic schedule of values and CONTRACTOR shall be prohibited from assigning a disproportionately high allocation to early phases of the work (also commonly called "front-end loading"). It shall be a material breach of this Agreement if Contractor front-end loads the Agreement. Mobilization and demobilization will NOT be paid as a separate line item. The CITY will not pay for materials on site until they are applied or installed on the tank.
2. Prior to the commencement of any work hereunder the CONTRACTOR shall submit the following plans, or proof that such plans are in effect:
 - a) Materials Disposal Plan: The CONTRACTOR shall submit a planned course of action to dispose of all waste, spent abrasives, unused coating materials, paint thinner, etc., including hazardous and non-hazardous waste. All disposal shall be in accordance with federal, state, and local government requirements, laws, and ordinances. All waste, including spent abrasives, shall be contained within the work area and disposed of according to the submitted plan.
 - b) Hazardous Communication Plan: CONTRACTOR agrees to communicate to his employees all information regarding chemicals, substances and other hazards to which CONTRACTOR'S employees foreseeably could be exposed while performing work on the premises, and to properly inform, educate and train all employees performing work hereunder as to all applicable Safety and Health laws and Regulations including, but not limited to, the Hazard Communication Standard, 29 CFR, Part 1910.1200 issued by Occupational Safety and Health Administration, U.S. Department of Labor.
 - c) Lock-Out/Tag-Out Plan: CONTRACTOR shall provide a plan, locks and tags for locking out and tagging of equipment as may be necessary.
 - d) Health & Safety Policy: CONTRACTOR shall submit a copy of the Health & Safety Policy, and take the necessary steps to ensure that subcontractors, if any, comply with all safety policies, all Federal and State job safety and health regulations including, but not limited to, the Hazard Communication Standard, 29 CFR, Part 1910.1200.
 - e) Confined Space Entry: CONTRACTOR shall submit a plan for Confined Space Entry in accordance with 29 CFR 1910.146. CONTRACTOR shall also provide confined space entry attendant(s), and LEL/O₂ monitor as required by the Confined Space Entry plan.
 - f) Hurricane Preparedness Plan:
 - i) Within thirty (30) days of the date of Notice to Proceed, the CONTRACTOR shall submit to the ENGINEER/CITY a Hurricane Preparedness Plan. The plan should outline the necessary measures that the CONTRACTOR proposes to perform at no additional cost to the CITY in case of a hurricane warning.
 - ii) In the event of inclement weather, or whenever the ENGINEER/CITY shall direct, the CONTRACTOR will, and will

cause the Subcontractors to, protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the ENGINEER/CITY, any portion of work or materials have been damaged or injured by reason of failure on the part of the CONTRACTOR or any Subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the CONTRACTOR.

3. Prior to mobilizing on site, the CONTRACTOR shall submit a plan to the CITY for satisfying damage claims on surrounding property such as buildings, automobiles, landscaping, sidewalks, etc., as a result of paint spatter, abrasive blast materials, mechanical damage, etc.
4. Reference each section of these specifications for additional submittal requirements.

B. Post-Job Submittals

1. 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 observation. Provide submittals to the ENGINEER that are required by governing or other authorities. The CONTRACTOR shall submit all documentation to the OWNER and ENGINEER necessary for proper completion of the Project. This documentation shall include but not be limited to all manifests, abrasive testing results, other testing results, etc. Submit Application for Final Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
2. Drawings shall be supplied to the ENGINEER/CITY upon submittal of final invoice. CONTRACTOR-supplied as-built drawings shall include four (4) copies, one (1) reproducible for each drawing, and a disk copy using ACAD or other format as approved by the ENGINEER/CITY.
3. Reference each section of these specifications for additional submittal requirements.

1.05 SITE CONDITIONS

- A. The CITY will provide a staging area within the confines of the site.
- B. Equipment and material required for daily work may be stored at the tank but cannot unreasonably encumber the job site with material or equipment. Storage will be at the risk of the CONTRACTOR. No responsibility will be assumed by the CITY or the ENGINEER for the security of stored material and equipment. All hazardous material must be stored in locked containers.
- C. Coordination of access to the tank must be arranged with the CITY prior to accessing the construction area.
- D. All waste material, including spent abrasives, shall be contained within the designated work area, and disposed of according to the submitted plan.
- E. **The CONTRACTOR shall take a video of the tank site prior to beginning work to document the condition and placement of equipment and structures.**
- F. At the completion of this project, the areas surrounding the tank shall be restored to a condition equal to or better than conditions prior to this project. Any grass, shrubbery, trees, etc., damaged by CONTRACTOR personnel or equipment, or as a result of work performed shall be replaced at the CONTRACTOR's expense. All damaged grass shall be replaced with sod of the same type as the existing grass.

- G. The CONTRACTOR shall be responsible for any damage to any surrounding structures such as buildings, cars, landscaping, sidewalks, etc., as a result of paint spatter, blast abrasive, mechanical damage, etc. All damage shall be repaired to the satisfaction of the property owner making the claim at no additional cost to the CITY or ENGINEER.

1.06 GENERAL INSTRUCTIONS FOR WORK TO BE PERFORMED

- A. All fabrication, installation, abrasive blasting, and coating or lining application shall be done by experienced personnel. The awarded contractor shall be able to provide proof of five successful projects as prime contractor on projects of similar size, completed in the last five years. Similar projects shall be a minimum of 5,000-gallon tank size in sulfuric acid service.
- A. The CONTRACTOR shall furnish all labor, materials, equipment, tools, services and incidentals to complete all work required by these specifications and as shown on the drawings.
- B. The CONTRACTOR shall perform the work complete, in place, and ready for continuous service, and shall include, repairs, testing, permits, cleanup, replacements, and restoration required as a result of damages caused during this construction.
- C. All materials, equipment, skills, tools and labor which are reasonably and properly inferable and necessary for the proper completion of the work in a substantial manner and in compliance with the requirements stated or implied by these Specifications or Drawings shall be furnished and installed by the CONTRACTOR without additional compensation, whether specifically indicated in the Contract Documents or not.
- D. The CONTRACTOR shall comply with all Municipal, County, State, Federal, and other codes which are applicable to the proposed construction work.

1.07 SAFETY AND RIGGING

- A. All rigging shall meet OSHA requirements, and shall be operated in a safe manner, and will conform to industry standards. All tank appurtenances that are used for rigging purposes shall be carefully checked for structural integrity before use in climbing or rigging. Deficiencies shall be reported and corrected before use.

1.08 SUBSTANTIAL COMPLETION

- A. The work, or any separable parts thereof, identified herein shall be deemed Substantially Completed at such time that all incidental requirements necessary to enable the CITY to continuously and successfully fill the tank with product for the purposes of which it is intended are completed.
- B. The Contract Times of Substantial Completion for the work shall be as indicated.

1.09 FINAL COMPLETION

- A. Project shall be deemed fully completed when the designated Coating Inspector, CITY Inspectors, and the ENGINEER agree that all work required by this specification has been completed satisfactorily to the intent of these documents.
- B. The parties mentioned above shall make a final inspection walk-through and submit a written acceptance to the contractor before final payment is made.

1.10 WORK SEQUENCE

- A. All work to be done under these specifications shall be done with minimum interference to the existing utility service and water systems operation and adjacent

land uses. The CONTRACTOR shall coordinate his work with the CITY such that the facilities are maintained to the maximum extent possible.

- B. Construct work in stages to accommodate the CITY use of the premises during the construction period; coordinate the construction schedule and operations with the CITY representative.

1.11 CONSTRUCTION AREAS

- A. CONTRACTOR shall limit his use of the construction areas for work and storage, to allow for:
 - 1. Work by other Contractors
 - 2. CITY use
- B. Contractor shall coordinate use of work site under direction of ENGINEER.
- C. CONTRACTOR shall assume full responsibility for the protection and safekeeping of all materials and equipment under this contract, stored on site.
- D. CONTRACTOR shall move and store products under CONTRACTOR'S control, which interfere with operations of the CITY or separate CONTRACTORS.
- E. CONTRACTOR shall obtain and pay for the use of additional storage or work areas needed for operations.

1.12 CITY OCCUPANCY

- A. The CITY will have full access to and use of all existing utilities during the entire period of construction for the conduct of its normal operations. CONTRACTOR shall cooperate with the CITY representative in all construction operations to minimize conflict, and facilitate CITY usage.
- B. CONTRACTOR shall at all times conduct his operations as to insure the least inconvenience to the facility.

1.13 PLANS AND SPECIFICATIONS

- A. SPECIFICATIONS
 - 1. Each section consists of three (3) parts: PART 1, GENERAL; PART 2, PRODUCTS; and PART 3, EXECUTION. The General part contains general requirements, which govern the work. Products and Execution modify and supplement these by detailed requirements of the work and shall always govern whenever there appears to be a conflict.

1.14 INTENT

- A. All work called for in the specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like affect as if shown or mentioned in both. Work not specified in either the plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the CONTRACTOR as though it were specifically delineated or described.
- B. The apparent silence of the specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these specifications shall be made upon that basis.
- C. The inclusion of the General Requirements (or work specified elsewhere), in the General part of the specifications is only for the convenience of the

CONTRACTOR, and shall not be interpreted as a complete list of related specification sections.

1.15 DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS

- A. In case of any discrepancy between the drawings and specifications, the more stringent requirement shall apply. The CONTRACTOR will not be held responsible for the discovery of such discrepancy, but any work done on the item involved after such discovery, and prior to authorization by the ENGINEER, will be done at the CONTRACTOR'S risk and expense.

1.16 PRE-CONSTRUCTION CONFERENCE

- A. A joint meeting shall be held with representatives of the CONTRACTOR and major subcontractors, the ENGINEER, the CITY, and other invited parties or government agencies which may be affected by or have jurisdiction over the Project.
- B. This meeting is intended to introduce the various key personnel from each organization and discuss the Contract Documents, the start of the construction, order of work, labor and legal requirements, insurance requirements, names of major subcontractors, method of payment, shop drawing requirements, protection of existing facilities and other pertinent items associated with the project. The CONTRACTOR shall bring to this conference six (6) copies of a proposed work schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

- END OF SECTION 01010 -

SECTION 01330

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section specifies the procedures for submittals for the work to be performed in accordance with these specifications. Submittals covered by this section include manufacturers' information, shop drawings, test results, samples, requests for substitutions, and miscellaneous work-related submittals. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, and piping and conduit details. The CONTRACTOR shall furnish all drawings, specifications, descriptive data, certificates, samples, test methods, schedules, and manufacturer's installation and other instructions as specifically required in the contract documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.

1.02 RELATED SECTIONS

- A. 01010 Summary of Work

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITIES

- A. The CONTRACTOR shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment, or method of work shall be as described in the submittal. The CONTRACTOR shall verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment, which are being submitted for review. All extraneous materials shall be crossed out or otherwise obliterated. The CONTRACTOR shall ensure that there is no conflict with other submittals and notify the ENGINEER/CITY in each case where his submittal may affect the work of another CONTRACTOR or the CITY. The CONTRACTOR shall coordinate submittals between his SUB-CONTRACTOR'S and suppliers.
- B. The CONTRACTOR shall coordinate submittals with the work so that work will not be delayed. He shall coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly scheduled submittals. The CONTRACTOR shall not proceed with work related to a submittal until the submittal process is complete. This requires that submittals for review and comment shall be returned to the CONTRACTOR stamped "No Exceptions Taken" or "Make Corrections Noted."
- C. The CONTRACTOR shall certify on each submittal document that he has reviewed the submittal, verified field conditions, and complied with the contract documents.

- D. The CONTRACTOR may authorize in writing a material or equipment supplier to deal directly with the ENGINEER/CITY with regard to a submittal. These dealings shall be limited to contract interpretations to clarify and expedite the work.

3.02 CATEGORIES OF SUBMITTALS

A. GENERAL

1. Submittals fall into two general categories: submittals for review and comment, and submittals that are primarily for information only. Submittals, which are for information only, are generally specified as PRODUCT DATA in **PART 2** of the applicable specification sections.
2. At the beginning of work, the CONTRACTOR shall furnish the ENGINEER/CITY lists of those submittals specified in the project manual. Two separate lists shall be provided: submittals for review and comment and product data (submittals) for information only.

B. SUBMITTALS FOR REVIEW AND COMMENT

1. All submittals except where specified to be submitted as product data for information only shall be submitted by the CONTRACTOR to the ENGINEER/CITY for review and comment.

C. SUBMITTALS (PRODUCT DATA) FOR INFORMATION ONLY

1. Where specified, the CONTRACTOR shall furnish submittals (product data) to the ENGINEER/CITY for information only.

3.03 SUBMITTAL PROCEDURES

- A. Within 15 days after award of Contract, the CONTRACTOR shall submit a list of shop drawings by Specification Section, and include a list of dates submittals are expected to be made. The CONTRACTOR shall:

1. Deliver submittals at least five business days prior to the scheduled start date. No contract time extensions will be granted for correction of submittals.
2. Submit shop drawings electronically in AutoCAD Release 2000 or a later format, or as an alternate, one reproducible and three prints, as directed by the ENGINEER/CITY.
3. In addition to the usual, or normal, shop drawings, submit the following for approval when requested:
 - a) Sequence of operations.
4. Submit three samples of materials, unless otherwise specified.

3.04 RESUBMISSION REQUIREMENTS

A. Shop Drawings:

1. The CONTRACTOR shall review drawings and indicate revision date as required, and resubmit as specified for initial submittal.
2. I The CONTRACTOR shall indicate on drawings any changes that have been made other than those requested by the ENGINEER/CITY.

- B. Product data and samples: The CONTRACTOR shall submit new data and samples as required for first submittal.

3.05 CONTRACTOR'S RESPONSIBILITIES - The CONTRACTOR shall:

- A. Review shop drawings, product data, and samples prior to submission to the ENGINEER/CITY.
- B. Verify field measurements, field construction criteria, catalog numbers, and similar data.

- C. Coordinate each submittal with work of the Project and Contract Documents.
- D. Be held responsible for errors and omissions in submittals or deviations from Contract Documents. Such responsibility is not relieved by the ENGINEER/CITY'S review of submittals.
- E. Be held responsible for deviations in submittals from requirements of Contract Documents. Such responsibility is not relieved by the ENGINEER/CITY'S review of submittals, unless the ENGINEER/CITY gives written acceptance of specific deviations.
- F. Notify the ENGINEER/CITY in writing of deviations from requirements of Contract Documents at time submittals are made.
 - 1. A "deviation" shall be construed to mean a minor change to the sequence indicated by the drawings or specification.
 - 2. A "deviation" is not intended to allow substitutions or product options.
 - 3. In addition to notifying the ENGINEER/CITY in writing of deviations, circle deviations on shop drawings.
- G. Not begin work that requires submittals until submittals have been returned with the ENGINEER/CITY'S stamp and initials or signature indicating review and approval.

3.06 CITY'S RESPONSIBILITIES - The CITY will:

- A. Review submittals within 5 business days, unless noted prior to submittal.
 - 1. Attention is directed to the fact that the ENGINEER/CITY'S review is only to check for general conformance with the design concept of the project and general compliance with Contract Documents. The ENGINEER/CITY assumes no responsibility for correctness of dimensions, details, quantities, or procedures shown on shop drawings or submittals.
 - 2. Omission in shop drawings of any materials indicated in Contract Drawings, mentioned in Specifications, or required for proper execution and completion of work, does not relieve the CONTRACTOR from responsibility for providing such materials as indicated in Contract Documents.
 - 3. Approval of a separate or specified item does not necessarily constitute approval of an assembly in which this item functions.
- B. Affix stamp and initials or signature acknowledging review of submittal as follows:
 - 1. No exceptions taken.
 - 2. Make corrections noted. Do not resubmit.
 - 3. Make corrections noted. Resubmit.
 - 4. Rejected. Resubmit in accord with Contract Documents.
- C. Return submittals to CONTRACTOR for distribution.

- END OF SECTION 01330 -

SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 GUARANTEE

- A. All work covered under these specifications shall be guaranteed for a period of two (2) years after Final Completion and acceptance of the work. A Second Anniversary inspection will be scheduled by the CONTRACTOR, during the 23rd month following acceptance of the work. A report shall be furnished to the CITY describing the condition of the coating and liner system and other work covered under this Contract. Tank draining shall be coordinated with the CITY representative. Any latent defects found during this inspection shall be promptly repaired by the CONTRACTOR. Any location where coats of paint have peeled off, bubbled or cracked coatings or lining, and any location where rusting is evident, shall be considered a failure of the coating or lining system. The CONTRACTOR shall make repairs at all points where failures are observed as per these Technical Specifications. The CONTRACTOR shall submit a schedule and plan outlining the repair procedures.
- B. Failure on the part of the CONTRACTOR to schedule this warranty inspection will not relieve him of warranty responsibility. Any defects found by the CITY, after the normal warranty period, will be assumed to have occurred during the time the warranty was in effect.

1.02 COATING & LINING

- A. The CONTRACTOR shall comply with the above section and also shall provide Manufacturer's standard warranty for all materials and labor for a period of two (2) years after the date of final acceptance by the CITY.

1.03 SUBMITTALS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Number of original signed copies required: six (6) each.
- C. Table of Contents. Neatly typed in orderly sequence.
- D. Provide complete information for each item:
 - 1. Product or work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond, or service and maintenance contract.
 - 5. Duration or warranty, bond, or service and maintenance contract.
- E. Provide the following information for CITY personnel:
 - 1. Proper procedure in case of failure.
 - 2. Instances which might affect the validity of warranty or bond.
 - 3. Contractor, name of responsible principal, address and telephone number.

1.04 FORM OF SUBMITTALS

- A. Prepared in duplicate packets.
- B. Format:
 - 1. Size 8-1/2-inches x 11-inches, punch sheets for standard 3-post binder.

2. Fold larger sheets to fit into binders.
- C. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS." List:
 1. Title of Project
 2. Name of Contractor
 3. Tank Name
 4. Tank Address
- D. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2-inches. If more than one volume, identify volume number on spine and cover.

1.05 WARRANTY SUBMITTAL REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the CONTRACTOR'S for one (1) year, unless otherwise specified, commencing at the time of final acceptance by the CITY.
- B. The CONTRACTOR shall be responsible for obtaining certificates for equipment warranty for all major equipment which has a 1 HP motor or which lists for more than \$1,000. The ENGINEER reserves the right to request warranties for equipment not considered to be "major" in the CONTRACTOR'S one-year warranty period even though certificates of warranty may not be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

- 3.01 The CONTRACTOR shall perform the following duties at the Second Anniversary Inspection:
- A. The CONTRACTOR shall perform the inspection, and shall furnish an experienced foreman, laborer, and rigging person for the inspection.
 - B. The CONTRACTOR shall wash out the interior of the container for the evaluation the day prior to the evaluation. All debris from the interior of the container shall be legally disposed of by the CONTRACTOR at no additional cost to the OWNER.
 - C. The CONTRACTOR shall be prepared to perform minor touch-up operations.
 - D. Spot repairs shall be made by the CONTRACTOR before returning the tank to service. Repairs requiring extensive Work and rigging may be delayed until a time mutually agreeable to the OWNER and CONTRACTOR.
 - E. All costs associated with the Second Anniversary Inspection, including the wash-out, rigging, lighting, and other costs, shall be included in the Base Bid price. The performance of this inspection and/or any remedial Work shall not relieve the CONTRACTOR of any responsibility for defects in materials or workmanship that may or may not be evident during the Second Anniversary Inspection.

- END OF SECTION 01740 -

SECTION - 09900

EXTERIOR PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section pertains to the exterior painting of the Ferric Sulfate Tank 1 (Center).
- B. All surfaces encompassed by this specification shall be cleaned, prepared and coated with the designated paint system as specified herein. All coating shall be applied in strict accordance with the manufacturer's instructions.

1.02 RELATED SECTIONS

- A. 01010 Summary of Work
- B. 01330 Submittal Procedures
- C. 01740 Warranties And Bonds

1.03 REFERENCED STANDARDS

- A. SSPC Steel Structures Painting Council
- B. NACE National Association of Corrosion Engineers

1.04 QUALITY ASSURANCE

A. INSPECTION PROGRAM

1. Throughout the duration of the work, a formalized inspection program will be developed and maintained by the CITY/ENGINEER in accordance with NACE standards. The CONTRACTOR will be familiarized with the inspection program and the Project line of authority at the Pre-Construction Conference.
2. It shall be the CONTRACTOR'S responsibility to provide the CITY, through the ENGINEER, with clear, accurate information necessary for the required inspection reports.
3. The CONTRACTOR shall fill out a daily inspection report form. This form will be furnished by the ENGINEER. No request for payment will be processed unless accompanied by completed inspection report forms. Inspections will be performed by the ENGINEER or his designee. It is expected that information furnished on the CONTRACTOR'S inspection reports shall coincide with the information recorded during the ENGINEER'S inspections.
4. The CONTRACTOR shall notify the INSPECTOR when an area is ready for inspection. No work will be approved until the INSPECTOR has performed all required tests and inspections.
5. The CONTRACTOR shall provide for the INSPECTOR all necessary rigging required to complete the inspection and testing operations. The CONTRACTOR shall assist the INSPECTOR in making all required tests and inspections. Deficient areas such as pinholes, holidays, embedded contamination, sags, dry spray, mechanical damage, high / low mils, shall be repaired to meet the requirements of this specification.
6. The CITY will provide part-time coating inspection for the duration of the project. The INSPECTOR shall be on site at critical points in the operation including holiday tests and touch-up work.

B. INSPECTION AUTHORITY

1. The CITY has ultimate responsibility for Contract administration and inspection for this project. Field inspection responsibilities will be assigned to the INSPECTOR.
2. The INSPECTOR can stop the job if the CONTRACTOR is deviating from the specifications. The CONTRACTOR'S field supervisor shall be advised verbally to stop work. Work can resume after the deviation is corrected to the satisfaction of the CITY and INSPECTOR.
3. Each step of the construction is subject to approval by the INSPECTOR prior to proceeding with a subsequent step.
4. During the progress of the work and up to the date of final acceptance, the CONTRACTOR shall at all times afford representatives of the CITY, County, State, and Federal agencies having jurisdiction, every reasonable, safe, and proper access for observation of the work done or being done at the site and also at the place of manufacture or preparation.

C. TEST EQUIPMENT FURNISHED BY CONTRACTOR

1. The CONTRACTOR shall have the following test equipment available for use by the INSPECTOR at the job site at all times during the progress of the work:
 - a) Sling Psychrometer
 - b) Surface Temperature Gauge
 - c) Wet Film Thickness Gauge
 - d) Dry Film Thickness Gauge (Properly Calibrated)
 - e) National Bureau of Standards thickness plates.
 - f) SSPC VIS-1- Pictorial Surface Preparation Standard
 - g) Holiday Detector. Low voltage type such as Tinker & Razor Model M-1, Series 9533
 - h) Keane-Tator Surface Comparator Number 372 or equal

D. CONTRACTOR FURNISHED INFORMATION

1. The following information will be part of the information required for the inspection reports:
 - a) Compressor: Size, Manufacturer, Moisture and Water separators, Air Drier, Cleanliness of Air, Number of Blast Nozzles.
 - b) Safety Equipment: Protective Cloths, Respirators, and Breathing Equipment.
 - c) Paint Equipment: Paint Pump, Spray Gun, and other essential items deemed necessary.
 - d) Materials: Abrasive: (Size, Type, Source, Cleanliness)
 - e) Paints: Type, Manufacturer, Batch No., other information deemed necessary.
 - f) Thinners: Type, Manufacturer, Batch No., and other information deemed necessary.
 - g) Inhibitors: Type, Manufacturer, Batch No., and other information deemed necessary.
 - h) Grouts: Type, Manufacturer, and other information deemed necessary.
 - i) Contractor Personnel: Name, Address, and Phone Number of Supervisor. Name, Address, and Phone Number of Foreman. Name of each Crewmember or Laborer.
 - j) Caulking: Type, Manufacturer, and other information deemed necessary.

E. CONTRACTOR REQUEST FOR INSPECTION

1. The CONTRACTOR shall notify the INSPECTOR 24 hours in advance that portions of the work are ready for inspection and will assist the INSPECTOR in making all necessary tests and inspections.
2. No rigging and/or staging shall be removed before required inspection and approval is made. The CONTRACTOR shall assist the INSPECTOR in the use and operation of all equipment for access to the surfaces to be tested.
3. The CONTRACTOR shall make all necessary rigging available to the INSPECTOR, and assist in the operation of rigging during any and all testing operations.
4. Approval by the INSPECTOR of an area does not release the CONTRACTOR from providing the quality and workmanship provided by this Specification.

F. COATING THICKNESS AND CONTINUITY:

1. The specified coverage rates of the coatings are minimums. The first coat on metal surfaces refers to the first paint coat and not to conditioning or other pretreatment applications. Coating shall be applied to the thickness specified, and in accordance with these specifications. The minimum dry film thickness at any spot measurement shall not be less than 80% of the specified thickness. Unless otherwise specified, not less than two (2) coats shall be applied. The CONTRACTOR shall furnish a wet film thickness gauge, a dry film thickness gauge, and certified thickness calibration standards for the INSPECTOR use. Dry film thickness gauges shall be Mikrotest III, Elcometer Inspector III, Positest, or Positector.
2. After each coat has been allowed to dry, the dry film thickness will be measured by the INSPECTOR. The CONTRACTOR shall not apply a successive coat until the dry film thickness of the preceding coat or coats has been approved by the INSPECTOR.
3. Coating system thickness is the total thickness of all the required coats of paint, and does not include passivators or sealers.
4. Measurement of dry paint thickness over steel surfaces will be done in accordance with SSPC-PA 2.

1.05 PRODUCT HANDLING

A. STORAGE

1. All coating materials shall be protected from direct sunlight and stored in a separate structure provided by the CONTRACTOR. The structure shall be constructed of non-combustible materials. It shall have sufficient ventilation to prevent the concentration of fumes and vapors.
2. Coating storage environmental conditions shall conform to the coating manufacturer's recommendations. The CONTRACTOR shall be solely responsible for the protection of all the material stored by him at the job site.
3. Coating materials shall be delivered to the job site in the original and unopened containers, with legible labels, marked with the proper designation of the product, as well as the manufacturer.
4. All coating materials at the job site shall be subject to inspection.
5. An approved environmental paint spill kit and container shall be located near the paint storage area.
6. All coating components will be delivered in unopened containers. They will be protected from freezing and overheating during shipment.

7. All coating components must be stored at temperatures above freezing and out of the weather. The containers must remain unopened until they are ready to be used.

B. MIXING

1. Mechanical mixers or shakers shall be used to mix the coating after properly measuring the required components. Catalysts, thinners, and other components shall only be added in exact quantities and at the times specified by the coating manufacturer. Containers used for mixing shall be clean and dry. Mixed materials that are not used prior to expiration of the pot life shall be discarded.
2. All coatings materials shall be mixed and thinned in the presence of the INSPECTOR. Plural component materials will not be approved for application unless the INSPECTOR can verify the proper proportions were mixed, and they had proper Induction time after mixing.
3. An approved environmental paint spill kit and container shall be located near the paint mixing area.
4. An appropriate type of fire extinguisher shall be kept nearby.

1.06 SUBMITTALS

- A. The following information shall be provided in accordance with these specifications. Information on each coating system shall be delivered to the ENGINEER two (2) weeks before applying that coating system. A list of materials proposed to be used under this section shall be provided within ten (10) days of the Notice to Proceed.
- B. For each primer, intermediate, and finish coating the CONTRACTOR shall provide the Manufacturer's Application Instructions and the data listed below:
 1. Surface preparation recommendations.
 2. Primer, intermediate, and finish coating, pot life and specific mixing instructions.
 3. Induction time after mixing.
 4. Minimum and maximum dry and wet film thickness per coat.
 5. Minimum and maximum curing time between coats including atmospheric conditions for each.
 6. Curing time before submergence in liquid.
 7. Thinner and thinning ratios to be used with each paint.
 8. Ventilation requirements.
 9. Allowable atmospheric conditions during which the paint may be applied, including ambient temperature, relative humidity and surface temperature.
 10. Allowable applications methods.
 11. Maximum allowable moisture content of surface to be painted.
 12. Maximum storage life.
 13. Manufacturer's certification that painting materials are in accordance with the appropriate reference standards.
 14. Material Safety Data Sheets and cautions concerning health hazards.

1.07 COLOR SELECTION

- A. All colors are as specified by the CITY's color schedule after submittal of the manufacturers color charts.
- B. The CONTRACTOR shall submit a color chart, from the specified coating manufacturer, to the CITY to select a color for the exterior tank and logo. The CITY shall submit their choice to the CONTRACTOR in writing before application of coatings.

1.08 DAMAGE CLAIMS

- A. The CONTRACTOR shall be responsible for all damages that may be caused by this painting operation to surrounding property.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The products referenced in this section are presented as a standard of comparison. Products manufactured by other manufacturers may be substituted upon request. Requests for substitution shall be in accordance with PART 1.06 above. Only products of one manufacturer shall be used in a particular coating system.
- B. Materials, supplies and articles provided shall be the standard products of manufacturers. Paints in a particular coating system shall be the products of a single manufacturer unless otherwise specified.
- C. No lead containing coatings shall be used.

2.02 COATING MATERIALS

- A. Each of the following manufacturers is capable of supplying the industrial coating materials specified in this specification. Where manufacturers and paint numbers are listed, it is to show the type and quality of coatings that are required. Proposed substitute materials for the paint numbers shown must be proven to satisfy the material descriptions and to equal or exceed the properties of the listed materials.
 - 1. Tnemec Co., Inc.
 - 2. Sherwin Williams Co., Inc.
 - 3. Carboline Co., Inc.
- B. Standard products of manufacturers other than those specified will be accepted when it is demonstrated to the Engineer that they are equal in composition, durability, usefulness and convenience for the purpose intended. The written acceptance by the CITY shall be obtained before any such alternate products are ordered by the CONTRACTOR. Request for substitution will be considered provided the following minimum conditions are met:
 - 1. The proposed coating system shall use an equal or greater number of separate coats to achieve the required dry film thickness.
 - 2. The proposed coating system shall use coatings of the same generic type.
 - 3. Request for substitution shall have the directions for application and description literature, which includes generic type, nonvolatile content by volume, and information confirming that the substitution is equal to the specified coating system.
 - 4. The contractor shall provide certified laboratory data sheets showing the results of complete spectrographic and durability tests performed on the proposed substitute. A laboratory which conforms to the provisions of ASTM E329 and which is a member of the American council of Independent Laboratories shall perform tests. Costs incurred in the testing program shall be borne by the contractor.
- C. No extra contract time for tank out of service will be granted for evaluation of substitute materials.

2.03 EXTERIOR COATINGS:

- A. **Exterior Service:**

1. **Coating:** One (1) full coat of aromatic urethane, zinc-rich primer, one (1) full coat of aliphatic acrylic polyurethane intermediate coat, and (1) one full coat of advanced thermoset fluoropolymer polyurethane.

2.04 ABRASIVE BLAST MATERIALS

- A. All abrasive blast material shall be "Black Beauty" or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

- A. All work shall be accomplished by skilled workmen in a professional manner.
- B. All abrasive blasting, coating or lining application shall be done by experienced personnel. The awarded CONTRACTOR shall be able to provide proof of five successful projects as prime contractor on projects of similar size, completed in the last five years.
- C. All work shall comply with Local, County, State, and Federal regulations concerning abrasive blasting and pollution control.
- D. All rigging shall meet OSHA requirements, and shall be operated in a safe manner, and will conform to industry standards. All rods and other tank appurtenances that are used for rigging purposes shall be carefully checked for structural integrity before use in climbing or rigging. Deficiencies shall be reported and corrected before use.
- E. The CONTRACTOR shall test all coating to be removed to assure that the coating will meet environmental requirements for removal and disposal.
- F. Prior to abrasive blasting, the CONTRACTOR shall demonstrate that the fill and drain piping is plugged sufficiently as to not fill or clog the piping with abrasives.
- G. **The close proximity of CITY property shall require containment of blast abrasives, paint over-spray, and spatter.**
- H. **All waste material, including spent abrasives and chemicals, shall be disposed of in accordance with the CONTRACTOR submitted Waste Disposal Plan.**
- I. Surfaces to be coated shall be cleaned in accordance with SSPC-SP1 (Solvent Cleaning). Before applying coating or surface treatments, oil, grease, dirt, rust, loose mill scale, old weathering coatings, and other foreign substances shall be removed, except as specified. Oil and grease shall be removed before mechanical cleaning is started. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free of contaminants, which might interfere with the adhesion and performance of the coatings. Blast abrasive shall be "Black Beauty" or approved equal, capable of achieving a surface profile of 1 to 3 mils (unless otherwise recommended by the paint manufacturer). The CONTRACTOR shall furnish for the INSPECTOR's use, a Keane-Tator Surface Comparator Number 372 or equal.
- J. Clean cloths and clean fluids shall be used in solvent cleaning. Cleaning and painting shall be scheduled so that dust and spray from the cleaning process does not fall on wet, newly painted surfaces.
- K. Preparation of metallic surfaces shall be based upon comparison with SSPC-VIS 1 (ASTM D2200), and as described herein. The CONTRACTOR shall furnish the photographic standards. To facilitate inspection, the CONTRACTOR shall, on the first day of abrasive blasting operations, abrasive blast metal panels to the standards specified. Plates shall measure a minimum of 8.5 inches by 11 inches. Panels

meeting the requirements of the Specifications shall be initialed by the CONTRACTOR and CITYYS Representative and coated with a clear non-yellowing finish. One of these panels shall be prepared for each type of abrasive blasting and shall be used as a comparison standard throughout the project.

- L. Compressed air for blast cleaning shall be clean, dry, and oil free as confirmed by a blotter test each day prior to beginning blasting. Test air quality by directing the air stream from the blast nozzle without abrasive onto a clean piece of blotter paper for 1 minute. Inspect the blotter for contamination.
- M. All abrasive and dust from the blasting operation shall be removed from the surfaces before the painting application has begun.
- N. Abrasive blasted surfaces shall be coated the same day that blasting was done, and before any rust bloom occurs.
- O. All painting equipment shall be maintained in good working order and shall be comparable to that described in the coating manufacturer's most recent application instructions. It shall be thoroughly cleaned and inspected daily.
- P. Worn nozzles, tips, etc., shall be replaced regularly. Effective oil and water separators shall be used and serviced on all air lines.

3.02 SAFETY

- A. The CONTRACTOR shall be responsible for fall protection and confined space entry on this project.
- B. All applicable OSHA requirements shall be followed.
- C. All personnel entering the tank shall be certified for confined space entry.

3.03 PROTECTION OF AREAS NOT TO BE COATED

- A. All areas that are not specified to be coated or repaired shall be adequately protected to avoid any damage or overspray during all repairs, washing, blasting, and painting operations. The CONTRACTOR shall confer with the CITY before conducting any work, to clarify these areas.
- B. The areas NOT to be coated include:
 - 1. All conduit and instrumentation.
 - 2. All stainless steel and any unpainted piping.
 - 3. Concrete foundation and containment area.
- C. Tank surfaces under items that are not to be coated shall be coated. Items not to be coated shall be temporarily relocated while the area is coated. After coating has cured, the relocated equipment shall be returned to its original location.
- D. Any damage shall be repaired at the CONTRACTOR's expense.

3.04 APPLICATION

- A. Unless otherwise specified, the application of paint shall be in accordance with SSPC-PA-1 latest edition and the paint manufacturer's printed instructions for surface preparation, mixing, thinning, and paint application unless otherwise specified herein. The CONTRACTOR shall fully comply with all recommendations and instructions set forth by the paint manufacturer. All coatings shall be applied before the shelf life of the coating expires.
- B. Paint shall only be applied over thoroughly dry surfaces, with a surface temperature that conforms to the manufactures minimum - maximum limits, and the relative humidity shall not exceed 85%. The surface temperature must be at least 5 degrees above the dew point. Paint shall not be applied to a condensing surface. Paint shall

not be applied 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.

- C. Except where otherwise specified, thinning shall only be done when necessary for the workability of the coating material and then only in accordance with the coating manufacturer's most recent printed application instructions. Use only approved manufacturer's thinner. Thinner shall only be added in the exact quantities as recommended by the manufacturer.
- D. Paint shall be applied in a uniform layer, with a 50% over-lap pattern. All runs and sags shall be brushed out immediately or the paint will be removed and surface recoated.
- E. All fasteners, welded seams, edges, holes, etc. shall have special care taken in applying the prime and topcoat. These areas shall be brush coated before applying the coating to remaining surfaces. This is to insure proper dry film thickness on these areas.
- F. Areas inaccessible to spray shall be brushed. If inaccessible by brush, daubs or sheepskins may be used if approved by the manufacturer. Top quality, properly styled brushes and rollers shall be used. 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.
- G. Drying time between coats shall adhere to the coating manufacturer's recommendation with conditions of temperature and humidity taken into account. All paint and coating materials shall be stored prior to application under cover and at temperature within 10 degrees F. of the anticipated application temperature.
- H. The dry film thickness of each coat and the entire system shall follow the coating manufacturer's recommendations and this specification. The number of coats specified shall be a minimum to achieve the specified film thickness.
- I. All paint damaged areas, which shall be touch-up painted, shall be feathered after surface preparation to provide a smooth, even surface before priming. Touch-up systems will be the same as the original specification. Manufacturer's complete touch-up recommendations shall be followed.

3.05 VENTILATION

- A. The CONTRACTOR shall provide forced air ventilation while work is being done inside the tank, after each coat is applied and continue after completion of painting for a minimum period of seven days to insure proper cure of the coating. Air shall be exhausted from the lowest portions of the tank with the top openings kept open and clear. Ventilation requirements will be in strict accordance with the manufacturer's recommendations, this Specification and all OSHA requirements as applicable.

3.06 SURFACE PREPARATION

A. EXTERIOR

1. The CONTRACTOR shall remove all chalk, loose paint, deposits, or other surface contamination by High Pressure Water Wash (min. 4000 psi) of the entire exterior prior to abrasive blast cleaning.
2. The CONTRACTOR shall abrasive blast clean the entire exterior to SSPC-SP6 (Commercial Blast).
3. Abrasive blast all flanges on the Inlet Pipe under Ferric Sulfate Tank #1.

4. **The CONTRACTOR shall take every precaution necessary to contain dust from the abrasive blasting operation blowing towards the surrounding buildings and passing traffic.**

3.07 COATING SYSTEMS

A. EXTERIOR

1. The CONTRACTOR shall submit coating manufacturer's color charts to the ENGINEER within ten (10) days after Contract Award. Finish colors will be selected by the CITY.
2. Each coat shall be of a contrasting color to facilitate application and inspection.
3. A one-gallon kit of the finish coat of paint shall be supplied to the CITY as touch-up paint. This kit shall be "fresh" at the time of final acceptance of the tank. The touch-up kit shall have a minimum shelf life of one (1) year.
4. The CONTRACTOR shall be responsible for all damages that may be caused by this painting operation to surrounding property and to vehicles traveling on and parked on adjacent properties and roadways.
5. The CONTRACTOR shall clean all exterior surfaces as applicable in Section 3.06.A 'SURFACE PREPARATION, EXTERIOR'.
6. The exterior coating system shall be applied to all exterior surfaces of the tank, including all nozzles, appurtenances, ladders, and all flanges on the Inlet Pipe.
7. The CONTRACTOR shall apply the following Exterior Coating System:
 - a) PRIME COAT: Apply by brush, roller, or spray, to all exterior surfaces Tnemec Company's Series 90-97 Theme-Zinc at a dry film thickness of 2.5 mils to 3.5 mils.
 - b) INTERMEDIATE COAT: Apply by brush, roller, or spray, to all exterior surfaces Tnemec Company's Series 73 Endura-Shield at a dry film thickness of 2.0 mils to 3.0 mils.
 - c) TOP COAT: Apply by brush, roller, or spray, to all exterior surfaces, one coat of Tnemec Company's Series 700 Hydroflon, at a dry film thickness of 2.0 mils to 3.0 mils.
8. COVERAGE RATES: Maximum coverage rates shall not exceed manufacturer's recommendations per coat. The total dry film thickness of the exterior system shall be no less than 7.0 mils.
9. **The CONTRACTOR shall take every precaution necessary to avoid paint splatter blowing toward the street or any surrounding structures, including the parking area and buildings. This also includes vehicles driving near the tank.**

- END OF SECTION 09900 -

SECTION - 09910

RUBBER LINING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section pertains to the interior rubber lining of the Ferric Sulfate Tank 1 (Center).
- B. All surfaces encompassed by this specification shall be cleaned, prepared and covered with the designated lining as specified herein. All lining shall be applied in strict accordance with the manufacturer's instructions.

1.02 RELATED SECTIONS

- A. 01010 Summary of Work
- B. 01330 Submittal Procedures
- C. 01740 Warranties And Bonds

1.03 REFERENCED STANDARDS

- A. SSPC Steel Structures Painting Council
- B. NACE National Association of Corrosion Engineers

1.04 QUALITY ASSURANCE

- A. After application, but before curing, the lining shall be checked for blisters, physical damage, looseness of splices, etc.
- B. Defective areas shall be repaired and the lining shall be retested and inspected after cure.
- C. Before the Curing Process begins, the following instrumentation shall be installed to monitor temperatures:
 - 1. Internal temperature and pressure measuring devices
 - 2. Internal temperature recorder
 - 3. Outside steel temperature measuring devices
- D. Contractor may use a multi point recorder to measure temperatures required on the "Record of Temperature During Cure" log sheet. These readings are to be recorded hourly, every shift during temperature warm-up and throughout the entire cure cycle.
- E. A durometer (Shore "A") hardness survey shall be made of the cured lining. A sufficient number of readings shall be taken at all elevations to assure all areas of the lining are properly cured.
- F. Entire lining shall be spark tested with a spark tester adjusted to 10,000 to 15,000 volts, in accordance with NACE standards.

1.05 PRODUCT HANDLING

A. STORAGE

- 1. All materials shall be protected from direct sunlight and stored in a separate structure provided by the CONTRACTOR. The structure shall be constructed of non-combustible materials. It shall have sufficient ventilation to prevent the concentration of fumes and vapors.

2. Lining storage environmental conditions shall conform to the lining manufacturer's recommendations. The CONTRACTOR shall be solely responsible for the protection of all the material stored by him at the job site.
3. Lining materials shall be delivered to the job site in the original and unopened containers, with legible labels, marked with the proper designation of the product, as well as the manufacturer.
4. All lining materials at the job site shall be subject to inspection.
5. An approved environmental paint spill kit and container shall be located near the paint storage area.
6. All lining components will be delivered in unopened containers. They will be protected from freezing and overheating during shipment.
7. All lining components must be stored at temperatures above freezing and out of the weather. The containers must remain unopened until they are ready to be used.

1.06 SUBMITTALS

- A. The following information shall be provided in accordance with these specifications. Information on each lining system shall be delivered to the ENGINEER two (2) weeks before applying that lining system. A list of materials proposed to be used under this section shall be provided within ten (10) days of the Notice to Proceed.
- B. The CONTRACTOR shall provide the Manufacturer's Application Instructions and the data listed below:
 1. Surface preparation recommendations.
 2. Primer pot life and specific mixing instructions.
 3. Induction time after mixing.
 4. Minimum and maximum dry and wet film thickness per coat.
 5. Minimum and maximum curing time.
 6. Curing time before submergence in liquid.
 7. Ventilation requirements.
 8. Allowable atmospheric conditions during which the liner may be applied, including ambient temperature, relative humidity and surface temperature.
 9. Allowable applications methods.
 10. Maximum allowable moisture content of surface to be painted.
 11. Maximum storage life.
 12. Manufacturer's certification that materials are in accordance with the appropriate reference standards.
 13. Material Safety Data Sheets and cautions concerning health hazards.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The products referenced in this section are presented as a standard of comparison. Products manufactured by other manufacturers may be substituted upon request.
- B. No lead containing coatings shall be used.

2.02 ALTERNATE MATERIALS

- A. Standard products of manufacturers other than those specified will be accepted when it is demonstrated to the Engineer that they are equal in composition, durability, usefulness and convenience for the purpose intended. The written acceptance by the

CITY shall be obtained before any such alternate products are ordered by the CONTRACTOR. Request for substitution will be considered provided the following minimum conditions are met:

1. The proposed lining system shall use linings of the same generic type.
2. Request for substitution shall have the directions for application and description literature, which includes generic type and information confirming that the substitution is equal to the specified lining system.
3. The contractor shall provide certified laboratory data sheets showing the results of complete spectrographic and durability tests performed on the proposed substitute. A laboratory which conforms to the provisions of ASTM E329 and which is a member of the American council of Independent Laboratories shall perform tests. Costs incurred in the testing program shall be borne by the contractor.
4. No extra contract time for tank out of service will be granted for evaluation of substitute materials.

2.03 ABRASIVE BLAST MATERIAL

- A. All abrasive blast material shall be "Black Beauty" or approved equal.

2.04 INTERIOR LINING SYSTEM:

- A. PRIMER: Lord Chemlok 205.
- B. ADHESIVE: Lord Chemlok 238.
- C. LINING: ¼" thick chlorobutyl rubber liner as manufactured by Blair Rubber Company (Product LS582).

PART 3 - EXECUTION

3.01 GENERAL

- A. All work shall be accomplished by skilled workmen in a professional manner.
- B. All abrasive blasting, coating or lining application shall be done by experienced personnel. The awarded CONTRACTOR shall be able to provide proof of five successful projects as prime contractor on projects of similar size, completed in the last five years.
- C. All work shall comply with Local, County, State, and Federal regulations concerning abrasive blasting and pollution control.
- D. All rigging shall meet OSHA requirements, and shall be operated in a safe manner, and will conform to industry standards. All tank appurtenances that are used for rigging purposes shall be carefully checked for structural integrity before use in climbing or rigging. Deficiencies shall be reported and corrected before use.
- E. The CONTRACTOR shall test all coating to be removed to assure that the coating will meet environmental requirements for removal and disposal.
- F. Prior to abrasive blasting, the CONTRACTOR shall demonstrate that the fill and drain piping is plugged sufficiently as to not fill or clog the piping with abrasives.
- G. **The close proximity of CITY property shall require containment of blast abrasives, paint over-spray, and spatter.**
- H. **All waste material, including spent abrasives and chemicals, shall be disposed of in accordance with the CONTRACTOR submitted Waste Disposal Plan.**
- I. Surfaces to be lined shall be cleaned in accordance with SSPC-SP1 (Solvent Cleaning). Before applying coating or surface treatments, oil, grease, dirt, rust, loose

mill scale, and other foreign substances shall be removed, except as specified. Oil and grease shall be removed before mechanical cleaning is started. Where mechanical cleaning is accomplished by blast cleaning, the abrasive used shall be washed, graded and free of contaminants, which might interfere with the adhesion and performance of the coatings. Blast abrasive shall be "Black Beauty" or approved equal. The CONTRACTOR shall furnish for the INSPECTOR's use, a Keane-Tator Surface Comparator Number 372 or equal.

- J. Clean cloths and clean fluids shall be used in solvent cleaning. Cleaning and painting shall be scheduled so that dust and spray from the cleaning process does not fall on wet, newly painted surfaces.
- K. Preparation of metallic surfaces shall be based upon comparison with SSPC-VIS 1 (ASTM D2200), and as described herein. The CONTRACTOR shall furnish the photographic standards.
- L. Compressed air for blast cleaning shall be clean, dry, and oil free as confirmed by a blotter test each day prior to beginning blasting. Test air quality by directing the air stream from the blast nozzle without abrasive onto a clean piece of blotter paper for 1 minute. Inspect the blotter for contamination.
- M. All abrasive and dust from the blasting operation shall be removed from the surfaces before the coating application has begun.
- N. Abrasive blasted surfaces shall be coated the same day that blasting was done, and before any rust bloom occurs.
- O. All equipment shall be maintained in good working order and shall be comparable to that described in the lining manufacturer's most recent application instructions. It shall be thoroughly cleaned and inspected daily.
- P. Worn nozzles, tips, etc., shall be replaced regularly. Effective oil and water separators shall be used and serviced on all air lines.

3.02 SAFETY

- A. The CONTRACTOR shall be responsible for fall protection and confined space entry on this project.
- B. All applicable OSHA requirements shall be followed.
- C. All personnel entering the tank shall be certified for confined space entry.

3.03 SURFACE PREPARATION

- A. Existing rubber lining shall be mechanically stripped in accordance with contractor's standard practice.
- B. All rubber not removed in the initial stripping operation must be removed by buffing. No rubber shall remain after completion of this operation.
- C. All metal damage incurred by air hammers from the stripping operation will be ground to a suitable finish for relining at the completion of this operation.
- D. All buffing dust and debris shall be removed from the vessel and disposed of by the Contractor.
- E. The CONTRACTOR shall abrasive blast clean the entire interior to SSPC-SP5 (White Metal Blast).
- F. Surface profile shall be 1.5 mils to 3.0 mils as determined by using a Keane Tator Comparator
- G. The CONTRACTOR shall take every precaution necessary to contain dust from the abrasive blasting operation blowing towards the surrounding buildings.

- H. Any irregular surfaces defined by the CITY, including but not limited to surface protrusions, burrs, fitting scars, sharp edges or corners, weld spatter, weld overlap and rough weld beads shall be removed from the interior surfaces of the tank, including appurtenances, by chipping and/or grinding these irregular surfaces to a smooth curve. The protruding parts of lugs or brackets shall be removed and ground flush. The objective of chipping and/or grinding is to eliminate irregular surfaces to provide a surface that is sufficiently smooth for the application of a uniform thickness lining without voids and free from defects. Payment for chipping and/or grinding shall be made from the Owner's Contingency Item.
- 3.04 APPLICATION – PRIMER – The CONTRACTOR shall:
- A. Apply primer meeting the Materials Specifications beginning a maximum of four (4) hours after blasting of a given section of tank interior is complete.
 - B. Prime all surfaces to be lined in one continuous operation, allowing no drips or runs and stopping only when all bare surfaces are coated with primer.
 - C. Allow primer to cure at ambient temperature according to manufacturer's instructions.
- 3.05 APPLICATION – ADHESIVE – The CONTRACTOR shall:
- A. Apply adhesive cement meeting the Materials Specifications to all surfaces to be lined.
 - B. The steel substrate temperature during the adhesive application shall be maintained between 60°F and 90°F.
 - C. The temperature of the substrate shall be maintained at least 5°F above the dew point.
 - D. Apply cement in a consistent manner to provide smooth, uniform coverage.
 - E. Allow cement to dry to form a dry or tacky film.
 - F. Keep all cemented surfaces free from all contamination.
- 3.06 APPLICATION – RUBBER LINING – The CONTRACTOR shall:
- A. Prepare sections of rubber lining material meeting the Materials Specifications by measuring and using patterns as necessary.
 - B. Cut sections such that skives will be "closed" and will prevent the tank contents from contacting the backing of the rubber sheets.
 - C. Rubber lining shall extend through all tank nozzles and penetrations, and terminate outside the tank. No bare steel shall be exposed to the product after completion of this project.
 - D. After cement has dried as specified above, apply tack cement to the prepared sections of lining and allow it to dry.
 - E. Apply the sections of rubber lining to the tank, using rollers and stitchers to eliminate all air from between the rubber and steel and from between overlapping sections of rubber.
 - F. Stagger all seams such that there are never more than three (3) layers of rubber at any given point.
 - G. Any air not removed by rolling shall be removed with a hypodermic needle.
 - H. Each needle puncture is to be capped with a patch. All patches must have 45 degree beveled edges and be a minimum of 2 square inches. This repair procedure shall be the absolute last resort. Every effort shall be made to prevent an entrapment when stitching the lining in place.

- I. The rubber lining shall extend out on all flanges, manholes, and nozzles.
- J. Circumferential joints in nozzles shall be located so as not to restrict the opening.

3.07 CURING OF RUBBER LINING – The CONTRACTOR shall:

- A. Use exhaust steam to cure the liner.
- B. Cover openings, allowing steam to escape from one or more openings at the bottom of the tank.
- C. Drain condensate during the cure to prevent accumulation of water at the bottom of the tank.
- D. Record external temperatures to ensure there is an even distribution of heat.
- E. Use a sparger system to distribute steam within the tank.
- F. Protect the exterior of the tank from cool temperatures and rain such that a complete cure is accomplished.
- G. Supply external indirect heat as necessary and control humidity inside the tank such that a complete cure is accomplished.
- H. Cure times may have to be adjusted in accordance with data or curves on outside metal surface temperature vs. time provided by the lining manufacturer.

3.08 VENTILATION

- A. The CONTRACTOR shall provide forced air ventilation while work is being done inside the tank. Air shall be exhausted from the lowest portions of the tank with the top openings kept open and clear. Ventilation requirements will be in strict accordance with the manufacturer's recommendations, this Specification and all OSHA requirements as applicable.

- END OF SECTION 09910 –

SECTION 13010

REPAIRS & RENOVATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All repairs and renovations to be performed are as listed herein.

1.02 RELATED SECTIONS

- A. 01010 Scope of Work
- B. 01740 Warranties and Bonds
- C. 09900 Painting

1.03 REFERENCED STANDARDS

- A. AWS D1.1 American Welding Society
- B. SSPC Steel Structure Painting Council
- C. NACE National Association of Corrosion Engineers
- D. MSS SP-69 Manufacturers Standard Society Standard Practice

1.04 SUBMITTALS – The CONTRACTOR shall include in the submittals the following:

- A. Structural: Submit detailed fabrication and erection drawings. Indicate all dimensions, method of assembly, connections and bill of materials.
- B. Should more than one submittal be required, later submittals should clearly identify all changes.
- C. Indicate all shop and erection dimensions and details, including cuts, copes, connections, holes, threaded fasteners and welds.
- D. Indicate all shop and field welds by AWS A2.0 "Welding Symbols".
- E. Revise original approved shop and erection drawings to correspond with changes made in the field.
- F. Submit Product data, (manufacturer's literature), Specifications and installation instructions for manufactured items.
- G. Upon completion of all work, "as built" drawings shall be submitted. These drawings shall be marked up to show all changes or modifications made that deviate from the approved submittal drawings. Final payment will not be processed until the "as built" drawings are submitted.

1.05 TANK REPAIR REQUIREMENTS

- A. Shell Section Replacement: Replace corroded sections of the tank shell starting near the ladder and extending to the south. All existing corroded steel shall be cut out and removed. New section shall use A36 steel, rolled to match the tank radius, and butt welded to the existing shell. All fabrication, fit-up, and welding details shall be performed in accordance with API-653 Standards. See drawings for more details.
- B. Roof Section Replacement: Replace corroded sections of the tank roof starting near the ladder and extending to the south. All existing corroded steel shall be cut out and removed. New section shall use A36 steel, butt welded to the existing roof. All fabrication, fit-up, and welding details shall be performed in accordance with API-653 Standards. See drawings for more details.

- C. Replace External Ladder and Platform: The existing ladder and upper platform shall be completely removed from the tank, including stand-offs. New ladder and platform shall be fabricated entirely from A36 steel. All joints shall be welded, unless otherwise directed by the project drawings.
1. New ladder shall meet current OSHA required dimensions, and be installed in the same location as the existing ladder. New ladder shall bolt to the floor using existing same anchor points, unless it is determined that the existing anchors are damaged or otherwise unusable. In that case, new anchors shall be installed per ENGINEER's instructions.
 2. New platform shall be fabricated and installed as shown on the project drawings. The new handrail shall be a minimum of 42" high and shall include mid-rail and toe plates as required by current OSHA standards.
- D. Roof Hatch: Remove existing roof hatch, including cover, neck, and hinges. The new hatch shall be the same dimensions as the existing hatch, fabricated from A36 steel, and installed in the same location as the existing hatch. Design of the new hatch shall meet typical API-653 standards with a neck, overlapping cover, two hinges, one handle, and a lockable hasp. The new hatch shall open in the same direction as the existing hatch. See drawing for more details.
- E. Roof Vent Nozzle: Remove existing nozzle in the center of the roof, and replace with a larger flanged nozzle to match the vent pipe size. The new nozzle shall be installed in accordance with API-653 Standards for roof nozzles. New pipe shall be ASTM A53, Schedule 40, with an ASTM A105, 150# flange.
- F. Inlet Pipe: Cut off existing inlet pipe approximately 12 inches below the roof inside the tank. Install a butt-welded 45° elbow and 24 inches of straight pipe, positioned to direct inlet flow away from roof hatch and tank shell. New pipe sections shall be fabricated from 316 stainless steel, schedule 40S wall thickness pipe.
- G. Fill Line Isolation Valve: Replace the Fill Line Isolation Valve with a new valve, which will be supplied by the CITY. The valve is a 3" Dia-Flo Diaphragm valve. This connection cannot be open for more than 24 hours.
- H. Lettering: Following completion of the exterior coating procedures, The CONTRACTOR shall furnish and install lettering on the exterior of the tank in a location as specified by the ENGINEER, as follows:
- a) Material for lettering shall be Trendfilm 6500 premium cast vinyl as supplied by Gregory in Buhler, KS.
 - b) All letters shall be upper case, Arial (sans serif) font, 8 inches high.
 - c) Lettering shall read "FERRIC SULFATE TANK #1".
- I. Hazard Diamond: Apply one hazard diamond decal to Ferric Sulfate Tanks #1 and #2, similar in size, material, and location to the decal on Tank #3.
- 1.06 **QUALITY ASSURANCE** – The CONTRACTOR shall use the following standards for construction and personnel:
- A. Design Criteria: API-653 (current edition)
 - B. Qualifications of Suppliers and Personnel:
 1. Steel Fabricator: Not less than 5 years continuous experience in the fabrication of structural steel.
 2. Steel Erector: Not less than 5 years continuous experience in the erection of tanks or similar structures.
 3. Welding: All welding shall be performed by welders who are currently qualified by tests as prescribed in AWS D1.1 "Qualification Procedure".

4. Use experienced riggers to erect steel. Carefully plan and lay out work so that a minimum of cutting and removal of undamaged material will be necessary.

1.07 WARRANTY

- A. All material and workmanship covered under this section shall be guaranteed as outlined in Section 01740.

1.08 EXTRA WORK

- A. Any potential work items that are found after the work has begun shall be brought to the attention of the ENGINEER in writing via formal RFI. Submittal by e-mail is acceptable. These out of scope items shall be processed by Directive only.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials shall be new and shall be in conformance with API-653 Standards.
- B. Structural steel shapes, plates and bars: ASTM A36.
- C. Machine bolts: Use ASTM A307 machine bolts at all connections not indicated on Drawings as high-strength or stainless steel.
- D. Pipe Flanges: ANSI B16.5 standard flanges.
- E. Welding electrodes:
 1. Mild steel-covered arc welding electrodes for A36 steels: AWS A5.1, E70XX Series, low hydrogen, having a minimum yield point of 60,000 psi.

2.02 MATERIAL HANDLING

- A. Storage of Materials
 1. Store steel to be incorporated into this project above ground on platforms, skids or other approved supports.
 2. Protect steel from corrosion.
 3. Store welding electrodes in accordance with AWS D12.1.

PART 3 - EXECUTION

3.01 WELDING

- A. Welding procedures shall be qualified in accordance with the requirements of ASME Section IX and the additional requirements of API 650 and API 653.
- B. Written Welding Procedure Specifications (WPS's), along with supporting Procedure Qualification Records (PQR's) shall be submitted to the CITY for review at least 14 days prior to their being employed. Only those WPS's which will be used on this contract shall be submitted.
- C. All welders and welding operators shall be certified in accordance with ASME, Section IX or AWS D1.1-96 (tests as described in AWS B2.1) to the procedures and processes required to accomplish the Work. Welder's certification papers shall be furnished to the CITY for review prior to commencement of welding on the tank.
- D. All filler materials must be kept in a clean, dry, warm area.

- E. Immediately after removal from sealed containers, carbon and low alloy steel, and low hydrogen electrodes shall be placed in hot holding ovens maintained at 250°F to 300°F, issued for use in hot portable ovens maintained at the same temperature range, or issued in small quantities which will be used within the appropriate exposure limit.
- F. All welding to the interior or exterior of the tank is to be made prior to all priming and lining operations. Any resulting burrs, weld spatter, sharp edges, corners or rough welds which would cause difficulty in applying a holiday-free lining shall be ground smooth. This grinding is considered incidental to the welding repair Work. After grinding, these areas shall be cleaned to produce the profile recommended by the manufacturer of the coating system.
- G. It shall be necessary to remove the coating prior to the welding of the new items to the tank. All areas that have been welded and/or ground smooth shall be cleaned prior to painting to provide proper profile for the coating system. Areas to be welded shall be welded prior to the final cleaning and painting of surfaces within the heat-affected zone. The heat-affected zone includes the opposite side of the plate or member being welded.
- H. The CONTRACTOR shall have a trained employee equipped with proper fire suppression equipment stationed on the ground at all times that personnel are cutting, welding, or grinding on the tank or structure.
- I. No welding or flame cutting through the existing coating system shall be permitted, unless adequate worker protection is provided in accordance with the instructions in ANSI Z49.1, “Safety in Welding and Cutting”.
- J. After the initial abrasive blast cleaning, any pits defined for pit welding by the CITY shall be repaired by welding. All areas of apparent seam deterioration shall be initially abrasive blast cleaned, and any seam corrosion or undercut defined by the CITY shall be repaired by arc-gouging or grinding the deteriorated weld seam (if determined necessary by the CITY) and welding. Payment for repair welding shall be made from the Owner’s Contingency Item.

3.02 FABRICATION

- A. All fabrication shall be done by manufacturers who are regularly engaged in the manufacture of the type of work herein specified.

3.03 SCHEDULE

- A. All repair and renovation work shall be accomplished prior to start of any painting operations.

3.04 ERECTION

- A. All work shall be accomplished by skilled workmen in a workmanlike manner. All welders shall hold current AWS certification and shall submit all credentials to the Engineer prior to starting work. All welding will be subject to testing in accordance with ASME Section V.

Miller AirCore™ Steel and Aluminum Harnesses

Description

Patent-pending Miller AirCore™ Harnesses feature world-class, breathable padding and specially-formulated elastomer webbing that stretches to maximize comfort, improve safety and increase productivity.

Materials

Webbing (DuraFlex®): Stretchable Polyester (green or blue)
Cam Buckle: Anodized black aluminum
Elastic Keepers: Elastic
Thread: Polyester
Grommets: Stainless Steel
***Hardware:** Clear Chromate, Finished Carbon Steel or Aluminum with Clear Chromate

Back, Belt, Shoulder

Pads: Nylon, Polyester, Polyurethane, Poly Pro
Back Mesh Shield: Polyester mesh
Label Pack: Evoprene, Nylon

*All hardware meets ASTM (50) fifty-hour salt spray

Technical

Max. Working Load: 400 lbs (181.4 kg)
 Webbing Min. Tensile: 5,000 lbs. (22 kN)
 *D-Ring Min Tensile: 5,000 lbs (22 kN)
 *Buckle Min Tensile: 4,000 lbs. (18 kN)

Certification

Harness meets OSHA 1926.502, ANSI A10.32, ANSI Z359.11-14 and CSA Z259.10-12 requirements.



AAF-QCBDPUG
AirCore™ Aluminum
Harness with
Front and Side D-Rings
(Universal Green)



AC-QC/UGN
AirCore™ Steel
Harness
(Universal Green)



ACF-QCBDPUG
AirCore™ Aluminum
Harness with
Front and Side D-Rings
(Universal Green)



AC-QC/UBL
AirCore™ Steel
Harness (Universal Blue)

AirCore™ Harnesses with Front D-Ring

Miller AirCore™ Steel Harness with Front D-Ring

Model Number	Front D-Ring	Side D-Rings	Chest Strap	Leg Strap	Lumbar Pad	Removable Belt	Weight
ACF-QCUG	Yes	No	Quick-Connect	Quick-Connect	No	No	4.1 lbs. (1.86 kg)
ACF-TBUG	Yes	No		Tongue	No	No	4.1 lbs. (1.86 kg)
ACF-QCDUG	Yes	Yes		Quick-Connect	No	No	4.8 lbs. (2.18 kg)
ACF-TBDUG	Yes	Yes		Tongue	No	No	4.8 lbs. (2.18 kg)
ACF-QCBDPUG	Yes	Yes		Quick-Connect	Yes	Yes	6.2 lbs. (2.81 kg)
ACF-TBBDPUG	Yes	Yes		Tongue	Yes	Yes	6.2 lbs. (2.81 kg)

Miller AirCore™ Aluminum Harness with Front D-Ring

AAF-QCUG	Yes	No	Quick-Connect	Quick-Connect	No	No	3.6 lbs. (1.63 kg)
AAF-TBUG	Yes	No		Tongue	No	No	3.6 lbs. (1.63 kg)
AAF-QCDUG	Yes	Yes		Quick-Connect	No	No	4.0 lbs. (1.81 kg)
AAF-TBDUG	Yes	Yes		Tongue	No	No	4.0 lbs. (1.81 kg)
AAF-QCBDPUG	Yes	Yes		Quick-Connect	Yes	Yes	5.4 lbs. (2.45 kg)
AAF-TBBDPUG	Yes	Yes		Tongue	Yes	Yes	5.4 lbs. (2.45 kg)

Model numbers listed are for size **L/XL**. Harnesses are also available in **XS** through **4XL** by replacing the "U" in the model number with "XS" for Extra Small; "SM" for Small/Medium; "23X" for 2/3 XL; and "4X" for 4XL. To order a blue harness simply replace the "G" in the model number with "B" (ex. ACF-QCUB). All listed models include a back D-ring end sub-pelvic strap.