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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-00051

Howard F. Curren AWTP Methanol Storage Tank Replacement

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

DECEMBER 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-00051; Howard F. Curren AWTP Methanol Storage Tank Replacement

BID OPENING: 1:30PM, Tuesday, January 21, 2020 **ESTIMATE:** \$1,700,000 **SCOPE:** Furnishing all labor, materials and equipment to remove (1) 100,000 gallon methanol storage tank and install (2) 50,000 gallon methanol storage tanks, modify the existing methanol storage containment area to accommodate the new tanks, demolition and disposal of the existing tanks, adjacent fiberglass brewery waste storage tank , and (9) fiberglass liquid alum storage tanks, with all associated work required for a complete project in accordance with the Contract Documents. **PRE-BID CONFERENCE:** 10:30AM, Tuesday, January 07, 2020. AWTP Maintenance Building Training Room 2700 Maritime Blvd., Tampa 33619. Firms must email names and companies represented for all attendees a minimum of 24 hours in advance to Richard.Birmire@tampagov.net John.Julian@tampagov.net to obtain security clearance. Please include in the email the Contract Number and Name along with the Pre-bid conference date. 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 <http://www.tampagov.net/contract-administration/programs/construction-project-bidding>. **Email Questions to:** contractadministration@tampagov.net .

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Contract 19-C-00051; Howard F. Curren AWTP Methanol Storage Tank Replacement

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NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA
Contract 19-C-00051; Howard F. Curren AWTP Methanol Storage Tank Replacement

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., January 21, 2020, 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, furnishing all labor, materials and equipment to remove (1) 100,000 gallon methanol storage tank and install (2) 50,000 gallon methanol storage tanks, modify the existing methanol storage containment area to accommodate the new tanks, demolition and disposal of the existing tanks, adjacent fiberglass brewery waste storage tank, and (9) fiberglass liquid alum storage tanks as specified in construction plans, 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 Howard F. Curren AWTP Methanol Storage Tank Replacement 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 270 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
23.2% **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 (GFECP) (MBD Form-50) for specific requirements.

GOOD FAITH EFFORT COMPLIANCE PLAN (GFECP) REQUIRED (MBD FORM-50). When a Goal has been established, the Bidder **must submit** with its bid a Good Faith Effort Compliance Plan (GFECP) 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 GFECP (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 **GFECP 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 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.

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

Howard F. Curren AWTP Methanol Storage Tank Replacement

FY 20 Project 19-C-00051

U-WMBE Availability Contact List

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

This Certified Contact List is the minimum contacts available and may require further searches for certified firms to meet Good Faith Efforts.												
#	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Business Description	FEIN	Type	Ethnicity
1	Excel 4 LLC	813-433-3486	813-433-3486	excel4llc@yahoo.com	318 N. John Young Parkway Suite #6	Kissimmee	FL	34741	Demolition	454149326	BBE	African American
1	Exclusive Contractors, Inc.	863-559-1039	000-000-0000	roadcontractor2@YAHOO.com	277 S. 10th Ave	Bartow	FL	33830	Demolition	92345574	BBE	African American
2	ECO 2000 INC	352-793-5060	352-793-9074	WATERWORKS@ECO2000INC.COM	1611 W C-48	BUSHNELL	FL	33513	Sitework	93648996	BBE	African American
2	MBattle Construction llc	727-214-4301	727-517-3774	moebattle@hotmail.com	470 maple way	safety harbor	FL	34695	Sitework	760840117	BBE	African American
3	DRD Enterprises LLC	813-476-9933	866-850-1332	ddeenah@drdenterprise.com	4104 Yellowwood Dr.,	Valrico	FL	33594	Pipe Supply	204675317	BBE	African American
3	MANZI METALS INC	352-799-8211	352-754-9735	bmanzi@manzimetals.com	15293 FLIGHT PATH DR	BROOKSVILLE	FL	34604	Pipe Supply	93245008	BBE	African American
3	Suca Pipe Supply, Inc.	813-249-7902		slmau44@yahoo.com	4910 Lowell Rd	Tampa	FL	33624	Pipe Supply	92499571	BBE	African American
3	Suca Pipe Supply, Inc. One	813-249-7902		mactwinau1@yahoo.com	4910 Lowell Road	Tampa	FL	33624	Pipe Supply	263669556	BBE	African American
3	Terrell Industries, Inc.	727-823-4424	727-823-3977	gradysterrell@terrellindustries.com	2067 1ST AVENUE NORTH	ST PETERSBURG	FL	33713	Pipe Supply	50530148	BBE	African American
4	All In One Electric Inc	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W WATERS AVENUE	TAMPA	FL	33604	Electrical Contr	43689273	BBE	African American
4	Brown & Brown Electric, Inc.	954-938-8986	954-938-9272	Hermine.Brown@brownandbrowneled	1150 SW 30th Avenue	Pompano Beach	FL	33069	Electrical Contr	92283934	BBE	African American
4	MDH Enterprises, Inc.	386-789-2672	866-681-5026	matize@my-es.com	281 East C Street	Orange City	FL	32763	Electrical Contr	50849332	BBE	African American
5	All In One Electric Inc	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W WATERS AVENUE	TAMPA	FL	33604	Instrumentation	43689273	BBE	African American
5	Brown & Brown Electric, Inc.	954-938-8986	954-938-9272	Hermine.Brown@brownandbrowneled	1150 SW 30th Avenue	Pompano Beach	FL	33069	Instrumentation	92283934	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	Instrumentation	50849332	BBE	African American
6	PAR Development Partners, Inc.	813-374-2856	866-594-2505	ydwilson@aol.com	2109 E Palm Ave	Tampa	FL	33612	Trucking	205657414	BBE	African American
6	Renew Construction Services	813-990-7700	813-315-6279	jrd.renew@gmail.com	5508 N 50th St N	Tampa	FL	33610	Trucking	71907700	BBE	African American
6	Sabrina's Trucking, LLC	813-629-7210	813-986-1124	itrucker151@aol.com	6707 trixie dr	seffner	FL	33584	Trucking	204083765	BBE	African American
6	Wiggins Hauling & Transfer Svc	813-562-3798	813-562-3798	Dooley813@aol.com	1506 Comanche	Tampa	FL	33610	Trucking	205011331	BBE	African American
7	Fletcher Painting, Inc.	407-290-1188	407-290-9309	stacy@fletcherenterprise.com	4355 Fairmont Street Suite 8	Orlando	FL	32808	Painting Contr	93587717	BBE	African American

African American/Black Business Enterprises (BBE) shall count toward the subcontract goal. Refer to MBD Form 70 - Procurement Guidelines.

Howard F. Curren AWWP Methanol Storage Tank Replacement

FY 20 Project 19-C-00051

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	Type	Ethnicity
7	Obi Global, LLC	813-400-8562		obioballc@gmail.com	11507 Dr. MLK Blvd	Mango	FL	33550	Painting Contra	71881723	BBE	African American
7	Pro Construct Services LLC	813-445-4840	813-749-9383	roberta.warren@pro-constructllc.com	6601 Memorial Hwy	TAMPA, FL	FL	33615	Painting Contra	64782775	BBE	African American
8	Allen Masonry & General Contractor, Inc.	813-597-3289	813-436-0999	allenmasonrygc@gmail.com	4710 Dunquin Pl	Tampa	FL	33610	Concrete	93752366	BBE	African American
8	Denson Construction Inc.	863-709-1001	863-709-1071	pete@denson-construction.com	4270 HOLDEN ROAD	LAKELAND	FL	33811	Concrete	93571944	BBE	African American
8	E/S Concrete Service, Inc.	727-560-0957	727-821-5029	enorissysr@yahoo.com	726 E. Harbor Drive	St. Petersburg	FL	33705	Concrete	93119582	BBE	African American
8	Excel 4 LLC	813-433-3486	813-433-3486	excel4llc@yahoo.com	318 N. John Young Parkway Suite #6	Kissimmee	FL	34741	Concrete	54149326	BBE	African American
8	Exclusive Contractors, Inc.	863-559-1039	000-000-0000	roadcontractor2@YAHOO.com	277 S. 10th Ave	Bartow	FL	33830	Concrete	92345574	BBE	African American
8	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St	Tampa	FL	33610	Concrete	03857845	BBE	African American
8	Mason Global LLC	813-323-3648	813-323-3648	alan@masongloballlc.com	6133 Lanshire Dr	Tampa	FL	33634	Concrete	71844251	BBE	African American
8	Provisions Construction & Development	407-985-2442	407-985-2440	marrington@provisionscdi.com	3401 Lake Breeze Drive Bldg 601	Orlando	FL	32808	Concrete	62802435	BBE	African American
8	WC Boxes, Inc.	813-478-1102	813-864-4386	wcindustries2003@gmail.com	17620 Lake Key Drive	Odessa	FL	33556	Concrete	72682190	BBE	African American
9	BUN Construction Co., Inc.	813-931-8270	813-931-9185	bunconstruction@tampabay.rr.com	4135 E. Hillsborough Avenue	Tampa	FL	33610	Sod	93362663	BBE	African American
9	Cutups Lawn Service	813-361-8871	813-238-2397	cutupslawnservice@yahoo.com	3217 East Powhatan Ave.	Tampa	FL	33610	Sod	11412916	BBE	African American
9	David's lawncare	813-334-4096		davidrasheed2@gmail.com	9885 Morris Glen Way	Tampa	FL	33687	Sod	89662164	BBE	African American
9	Dean's Environmental Services, Inc.	863-595-8255	904-791-9060	deank8859@gmail.com	2644 Whispering Trails Dr	Winter Hav	FL	33884	Sod	30461047	BBE	African American
9	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St	Tampa	FL	33610	Sod	03857845	BBE	African American
9	Grass & Landscaping Hunters LLC	813-770-6795		grasslandscapinghunters@hotmail.com	914 Burlwood St	Brandon	FL	33511	Sod	21161283	BBE	African American
9	Moses & Wourman Maintenance Inc.	813-244-7134	813-920-1430	ctmoses11@msn.com	13014 N Dale Mabry Ste 136	Tampa	FL	33618	Sod	50105210	BBE	African American
9	Promise Construction and Repair Solutions	813-988-8633	813-988-1555	promisecarellc@outlook.com	10711 North 53rd Street	TAMPA	FL	33617	Sod	64723775	BBE	African American
9	Twenty-Nine 11 Property Services, LLC	813-420-4987		twentynine11propertyservices@gmail.com	13736 Ogakor Dr	Riverview	FL	33579	Sod	41949792	BBE	African American
9	WC Boxes, Inc.	813-478-1102	813-864-4386	wcindustries2003@gmail.com	17620 Lake Key Drive	Odessa	FL	33556	Sod	72682190	BBE	African American

Howard F. Curren AWTP Methanol Storage Tank Replacement

FY 20 Project 19-C-00051

SLBE Availability Contact List

This Certified Contact List is the minimum contacts available and may require further searches for certified firms to meet Good Faith Efforts.												
#	Business Name	Phone	Fax	Email	Address 1	City	State	Zip	Description	FEIN	Cert. Type	Ethnicity
1	2 Meyer Corp.	813-210-4864	813-645-5634	Renatonjr@aol.com	6308 Lake Sunrise Dr.	Apollo Beach	FL	33572	Demolition	562384669	SLBE	Caucasian
1	Exclusive Contractors, Inc.	863-559-1039	000-000-0000	roadcontractor2@YAHOO.com	277 S. 10th Ave	Bartow	FL	33830	Demolition	592345574	SLBE	African American
1	John Varrati, LLC	813-938-1818	813-260-3725	magnumdemo@live.com	1609 North 31st Street	Tampa	FL	33605	Demolition	727161968	SLBE	Caucasian
1	Johnson's Excavation & Services, Inc.	813-752-7097	813-719-9052	sales@jescontracting.com	1706 East Trappnell Road	Plant City	FL	33566	Demolition	593031174	SLBE	Caucasian
1	Ortak Construction Group, LLC	813-961-6023	813-961-6023	dcastro@ortzak.com	13014 N. Dale Mabry Hwy, Ste 623	Tampa	FL	33618	Demolition	454837502	SLBE	Hispanic American
1	Parking Lot Striping Service Inc.	813-623-1454	813-664-0140	fernandopss@aol.com	3901 E LAKE AVE	TAMPA	FL	33610	Demolition	260324264	SLBE	Hispanic American
1	TNT Environmental, LLC	352-567-1822	352-567-6374	tntenvironmental@gmail.com	17852 Pine Knoll Drive	Dade City	FL	33523	Demolition	263864129	SLBE	Caucasian
2	CMS Crawford Maintenance Services LLC.	727-216-6469	727-216-6524	marina@crawfordmain.com	14028 Palm Way	Largo	FL	33771	Sitework	262249991	SLBE	Hispanic American
2	MBattle Construction llc	727-214-4301	727-517-3774	moebattle@hotmail.com	470 maple way	safety harbor	FL	34695	Sitework	760840117	SLBE	African American
2	Mom & Daughter's Team LLC	727-657-5576		momandaughter@yahoo.com	4706 30th Ave N	St. Petersburg	FL	33713	Sitework	814091364	SLBE	Hispanic American
2	Ortak Construction Group, LLC	813-961-6023	813-961-6023	dcastro@ortzak.com	13014 N. Dale Mabry Hwy, Ste 623	Tampa	FL	33618	Sitework	454837502	SLBE	Hispanic American
2	Paynes Environmental Services, LLC	813-677-6822	866-467-9029	paynestrees@cs.com	5617 Causeway Blvd	Tampa	FL	33619	Sitework	271037046	SLBE	Hispanic American
3	2 Meyer Corp.	813-210-4864	813-645-5634	Renatonjr@aol.com	6308 Lake Sunrise Dr.	Apollo Beach	FL	33572	Pipe Supply	562384669	SLBE	Caucasian
3	Alfonso Communications, Inc.	813-957-3208	813-957-3208	darren@alfonsocommunications.com	3959 Van Dyke Road	Lutz	FL	33558	Pipe Supply	746596888	SLBE	Hispanic American
3	DRD Enterprises LLC	813-476-9933	866-850-1332	ddeenah@drdenterprse.com	4104 Yellowwood Dr.,	Valrico	FL	33594	Pipe Supply	204675317	SLBE	African American
3	Mar Supply Co.	941-286-3240	941-761-6500	info@marsupplyco.com	1660 63rd Avenue East	Bradenton	FL	34203	Pipe Supply	270206845	SLBE	Hispanic American
3	MBE Supply of Florida, Inc.	813-781-6583		mbsupplyofflorida@gmail.com	4306 W. Osborne Avenue	Tampa	FL	33613	Pipe Supply	463284565	SLBE	Caucasian
3	Suca Pipe Supply, Inc.	813-249-7902		simau44@yahoo.com	4910 Lowell Rd	Tampa	FL	33624	Pipe Supply	592499571	SLBE	African American
3	Suca Pipe Supply, Inc. One	813-249-7902		mactwinau1@yahoo.com	4910 Lowell Road	Tampa	FL	33624	Pipe Supply	263669556	SLBE	African American
4	Above Electric LLC	727-726-5484	801-894-3084	aboveelec@gmail.com	13529 Prestige Pl #105	Tampa	FL	33635	Electrical Con	453611228	SLBE	Hispanic American
4	Agulia Electrical Services, Inc.	813-515-6999	813-884-4092	sales@aguliaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	Electrical Con	200818128	SLBE	Hispanic American
4	All in One Electric Inc	813-849-6331	813-514-0473	rjones@aioelectric.com	1201 W WATERS AVENUE	TAMPA	FL	33604	Electrical Con	243689273	SLBE	African American
4	Crevello Electric, Inc.	813-986-6106	813-986-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	Electrical Con	935559003	SLBE	Caucasian
4	Electric World Corp	813-785-5265	866-593-5921	Electricworldcorp@gmail.com	5708 N 56th St	tampa	FL	33610	Electrical Con	311112415	SLBE	Hispanic American
4	ELECTRICAL HANDYMAN SERVICES INC	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	Electrical Con	272406369	SLBE	Hispanic American
4	Manatee Electric, Inc.	813-645-7000	813-654-7568	john@reliableelectricusa.com	845 Thompson Rd.	Lithia	FL	33547	Electrical Con	939454485	SLBE	Caucasian
4	Reliability Consulting Services, Inc.	813-298-2617	813-645-2272	bwoolbright@reliabilityconsulting.net	748 Kingston Ct.	Apollo Beach	FL	33572	Electrical Con	201126584	SLBE	Caucasian
4	ROB MICHAEL INC	813-323-0304	813-968-1036	RJMICHAEL74@AOL.COM	16204 SAGEBRUSH RD	TAMPA	FL	33618	Electrical Con	264389755	SLBE	Caucasian
4	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atrujill@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	Electrical Con	913966630	SLBE	Hispanic American

Howard F. Curren AWTP Methanol Storage Tank Replacement

FY 20 Project 19-C-00051

SLBE Availability Contact List

#	Business Name	Phone	Fax	Email	Address 1	City	ate	Zip	Description	FEIN	Cert. Type	Ethnicity
5	Above Electric LLC	727-726-5484	801-894-3084	aboveelec@gmail.com	13529 Prestige Pl #105	Tampa	FL	33635	Instrumentat	453611228	SLBE	Hispanic American
5	Aguila Electrical Services, Inc.	813-515-6999	813-884-4092	sales@agulaelectrical.com	5708 N 56TH ST	Tampa	FL	33610	Instrumentat	200818128	SLBE	Hispanic American
5	All In One Electric Inc	813-849-6331	813-514-0473	ijones@aioelectric.com	1201 W WATERS AVENUE	TAMPA	FL	33604	Instrumentat	043689273	SLBE	African American
5	Crevello Electric, Inc.	813-986-6106	813-986-9633	crevelloelectric@gmail.com	2401 Procchi St	Plant City	FL	33563	Instrumentat	93559003	SLBE	Caucasian
5	Electric World Corp	813-785-5265	866-593-5921	Electricworldcorp@gmail.com	5708 N 56th St	tampa	FL	33610	Instrumentat	331112415	SLBE	Hispanic American
5	ELECTRICAL HANDYMAN SERVICES INC	813-901-8185	813-884-5060	ehs915@aol.com	7046-B West Hillsborough Ave	Tampa	FL	33634	Instrumentat	272406369	SLBE	Hispanic American
5	Manatee Electric, Inc.	813-645-7000	813-654-7568	john@reliableelectricusa.com	845 Thompson Rd.	Lithia	FL	33547	Instrumentat	93454485	SLBE	Caucasian
5	Reliability Consulting Services, Inc.	813-298-2617	813-645-2272	bwoolbright@reliabilityconsulting.net	748 Kingston Ct.	Apollo Beach	FL	33572	Instrumentat	201126584	SLBE	Caucasian
5	ROB MICHAEL INC	813-323-0304	813-968-1036	RIMICHAEL74@AOL.COM	16204 SAGEBRUSH RD	TAMPA	FL	33618	Instrumentat	264389755	SLBE	Caucasian
5	TAMCO Electric, Inc.	813-918-8489	813-986-5979	atruijll@tampabay.rr.com	4022 W South Avenue	Tampa	FL	33614	Instrumentat	91396630	SLBE	Hispanic American
6	Cordova Transport Inc	813-284-6953	813-284-6952	cordovatransport@aol.com	7006 E. 9th Ave.	Tampa	FL	33619	Trucking	272503834	SLBE	Hispanic American
6	Jansay Trucking, LLC	813-300-1846	813-885-4214	jansayTrucking@gmail.com	2021 N 61st Street	Tampa	FL	33619	Trucking	272179144	SLBE	Hispanic American
6	Odessa Trucking Inc	813-918-1715	813-920-8673	odessatrucking@msn.com	18136 GUNN HWY	ODESSA	FL	33556	Trucking	93334628	SLBE	Hispanic American
6	Ortzak Construction Group, LLC	813-961-6023	813-961-6023	dcastro@ortzak.com	13014 N. Dale Mabry Hwy, Ste 623	Tampa	FL	33618	Trucking	454837502	SLBE	Hispanic American
6	PAR Development Partners, Inc.	813-374-2856	866-594-2505	ydwilson@aol.com	2109 E Palm Ave	Tampa	FL	33612	Trucking	205657414	SLBE	African American
6	Renew Construction Services	813-990-7700	813-315-6279	jrd.renew@gmail.com	5508 N 50th St N	Tampa	FL	33610	Trucking	71907700	SLBE	African American
6	Sabrina's Trucking, LLC	813-629-7210	813-986-1124	jtrucker151@aol.com	6707 trixie dr	seffner	FL	33584	Trucking	204083765	SLBE	African American
6	Suarez Grading Enterprises, Inc.	813-663-9037	813-620-4158	lsuarez@suarezgrading.com	3215 36th Ave SE	Ruskin	FL	33570	Trucking	841681751	SLBE	Hispanic American
6	TULIPAN TRUCKING LLC	786-768-0925		tulipantrucking@gmail.com	4051 Benson Avenue North	St. Petersburg	FL	33713	Trucking	61844694	SLBE	Hispanic American
6	Wiggins Hauling & Transfer Svc	813-562-3798	813-562-3798	Dooley813@aol.com	1506 Comanche	Tampa	FL	33610	Trucking	205011331	SLBE	African American
7	C&C Painting Contractors Inc.	813-886-7100	813-886-7102	carlos@ccpainting.com	8372 Standish Bend Dr.	Tampa	FL	33615	Painting Cont	93617521	SLBE	Hispanic American
7	COLORS PAINTING CONTRACTORS LLC	813-855-7424		JimmyG@colorspaintingcontractors.com	12036 ABBYWOOD LANE	TAMPA	FL	33626	Painting Cont	62331210	SLBE	Hispanic American
7	Diversified Coatings & Finishes, Inc.	813-494-5543	352-567-1718	bobcookdctf@gmail.com	12540 Green Oak Lane	Dade City	FL	33525	Painting Cont	93460053	SLBE	Caucasian
7	Elite Industrial Painting, Inc.	727-940-6001	727-279-2827	Tula@eipainting.com	621 Hibiscus St #3	Tarpon Sprin	FL	34689	Painting Cont	00658000	SLBE	Caucasian
7	Federico's Painting Corp	813-908-1404	813-908-1404	federico_de_la_pava@hotmail.com	6615 Winding Oak Dr.	Tampa	FL	33625	Painting Cont	203279278	SLBE	Hispanic American
7	Harry's Painting Enterprises, Inc.	727-848-1950	727-847-3474	kathryn@harryspainting.com	5250 Avery Road	New Port Rid	FL	34652	Painting Cont	92820441	SLBE	Caucasian
7	Island Painting & Waterproofing Inc.	813-500-3869	813-500-4001	info@islandpaintingtb.com	5608 N Church Avenue	Tampa	FL	33614	Painting Cont	204840500	SLBE	Hispanic American
7	Obi Global, LLC	813-400-8562		obi.globalllc@gmail.com	11507 Dr. MLK Blvd	Mango	FL	33550	Painting Cont	71881723	SLBE	African American
7	Pro Construct Services LLC	813-445-4840	813-749-9383	roberta.warren@pro-constructllc.com	6601 Memorial Hwy	TAMPA, FL	FL	33615	Painting Cont	64782775	SLBE	African American
7	Shepard Contractors Inc	813-855-1115	813-513-3281	shepardcontractors@hotmail.com	Piney Lane Dr	Tampa	FL	33625	Painting Cont	93708146	SLBE	Caucasian
7	Sunstate Coatings, Inc.	813-598-0802	813-672-6172	sunstatecoatings@msn.com	11501 Mellowood Drive	Riverview	FL	33569	Painting Cont	202618835	SLBE	Caucasian

Howard F. Curren AWTP Methanol Storage Tank Replacement

FY 20 Project 19-C-00051

SLBE Availability Contact List

#	Business Name	Phone	Fax	Email	Address 1	City	ate	Zip	Description	FEIN	Cert. Type	Ethnicity
8	Allen Masonry & General Contractor, Inc.	813-597-3289	813-436-0999	allenmasonrygc@gmail.com	4710 Dunquin Pl	Tampa	FL	33610	Concrete	593752366	SLBE	African American
8	CARIA CONSTRUCTION, INC	813-304-7158		Carly@puleosconcrete.com	18803 cherrybirch cir	ultz	FL	33558	Concrete	463665283	SLBE	Caucasian
8	E/S Concrete Service, Inc.	727-821-5029	727-821-5029	enorrisysr@yahoo.com	726 E. Harbor Drive	St. Petersburg	FL	33705	Concrete	5931119582	SLBE	African American
8	Exclusive Contractors, Inc.	863-559-1039	000-000-0000	roadcontractor2@YAHOO.com	277 S. 10th Ave	Bartow	FL	33830	Concrete	592345574	SLBE	African American
8	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St	Tampa	FL	33610	Concrete	203857845	SLBE	African American
8	JNandalal Maintenance Services of Brandon, L	813-679-7769	813-654-7675	JamesNandalal@msn.com	3008 King Phillip Way	Sefner	FL	33584	Concrete	760821164	SLBE	Caucasian
8	MASONRY & CONSTRUCTION SERVICES, INC	813-981-0196		masonrylg@hotmail.com	13452 N. Florida Ave	Tampa	FL	33613	Concrete	262240950	SLBE	Hispanic American
8	Parking Lot Striping Service Inc.	813-623-1454	813-664-0140	fernandopiss@aol.com	3901 E LAKE AVE	TAMPA	FL	33610	Concrete	260324264	SLBE	Hispanic American
8	Quick Construction Solutions, LLC	813-377-9997	813-374-5849	quickcs@outlook.com	4501 N. Saint Vincent St.	Tampa	FL	33614	Concrete	900972890	SLBE	Hispanic American
8	WC Boxes, Inc.	813-478-1102	813-864-4386	wcindustries2003@gmail.com	17620 Lake Key Drive	Odessa	FL	33556	Concrete	272682190	SLBE	African American
9	AGRO-TURF CORP.	813-267-8156	813-741-9253	beatriz@agroturf.org	11810 Bullfrog Creek Rd	Gibsonton	FL	33534	Sod	205501762	SLBE	Hispanic American
9	Baron's Landscaping Services, Inc.	813-404-1509	813-476-6255	baronslawncare@aol.com	P.O. Box 4047	Tampa	FL	33677	Sod	50837654	SLBE	Hispanic American
9	BUN Construction Co., Inc.	813-931-8270	813-931-9185	bunconstruction@tampabay.rr.com	4135 E. Hillsborough Ave	Tampa	FL	33610	Sod	593362663	SLBE	African American
9	Cardinal Landscaping Services of Tampa, Inc.	813-915-9696	813-915-9695	Mark@cardinalandscape.com	817 E. Okaloosa Ave.	Tampa	FL	33604	Sod	593394554	SLBE	Caucasian
9	Cutups Lawn Service	813-361-8871	813-238-2397	cutupslawnservice@yahoo.com	3217 East Powhatan Ave.	Tampa	FL	33610	Sod	611412916	SLBE	African American
9	D & J LAWN SERVICES OF LAKELAND LLC	863-859-3525	863-853-1044	DANDJLAWNSERVICES@HOTMAIL.COM	575 OLD POLK CITY ROAD	LAKE LAND	FL	33809	Sod	273279070	SLBE	Hispanic American
9	Davids lawncare	813-334-4096		davidrasheed2@gmail.com	9885 Morris Glen Way	Tampa	FL	33687	Sod	189662164	SLBE	African American
9	Dean's Environmental Services, Inc.	863-595-8255	904-791-9060	deank8859@gmail.com	2644 Whispering Trails Dr	Winter Have	FL	33884	Sod	830461047	SLBE	African American
9	Evolve Professional Landscape Management,	863-537-7537	863-223-0275	jillian.evolve@gmail.com	897 E. Lemon Street	Bartow	FL	33830	Sod	272323571	SLBE	Caucasian
9	Florida Natives Nursery, Inc.	813-754-1900	813-754-4001	office@floridanativesnursery.com	4115 NATIVE GARDEN DR	PLANT CITY	FL	33565	Sod	593561539	SLBE	Caucasian
9	Fresh Start Development, Inc.	813-758-5345	813-333-5949	freshstartdevelop@yahoo.com	5508 N 50th St	Tampa	FL	33610	Sod	203857845	SLBE	African American
9	Gardensmith	813-352-3008		gardensmith@me.com	4113 Henderson Blvd	tampa	FL	33629	Sod	273649269	SLBE	Caucasian
9	Grass & Landscaping Hunters LLC	813-770-6795		grasslandscapinghunters@hotmail.com	914 Burlwood St	Brandon	FL	33511	Sod	821161283	SLBE	African American
9	GREEN EXPECTATIONS LANDSCAPING LLC	813-782-6263	813-315-6461	INFO@GXFL.COM	37609 Eiland Blvd.	Zephyrhills	FL	33542	Sod	262054130	SLBE	Hispanic American
9	Green Seeds Inc	813-858-7765		dborion@ourgreenseed.com	3387 Antigua lane, UNIT 303	tampa	FL	33614	Sod	111867821	SLBE	Hispanic American
9	Johnson's Excavation & Services, Inc.	813-752-7097	813-719-9052	sales@jawscontracting.com	1706 East Trapnell Road	Plant City	FL	33566	Sod	593031174	SLBE	Caucasian
9	JTCM Inc	813-935-7724		office@jawnsculptures.net	817 S MacDill Ave	Tampa	FL	33609	Sod	562418914	SLBE	Caucasian
9	Morelli Landscaping, Inc	727-535-6263	727-536-6855	vjmorelli@tampabay.rr.com	6370 146th Avenue North	Clearwater	FL	33760	Sod	591877993	SLBE	Caucasian
9	Moses & Wourman Maintenance Inc.	813-244-7134	813-920-1430	ctmoses11@msn.com	13014 N Dale Mabry Ste 136	Tampa	FL	33618	Sod	501052210	SLBE	African American
9	Promise Construction and Repair Solutions LL	813-988-8633	813-988-1555	promisecarellc@outlook.com	10711 North 53rd Street	TAMPA	FL	33617	Sod	464723775	SLBE	African American
9	Sunbelt Sod & Grading Company	813-641-9855	813-645-7263	sunbeltsod@verizon.net	819 - 9th St. N.E.	Ruskin	FL	33570	Sod	234250933	SLBE	Caucasian
9	WC Boxes, Inc.	813-478-1102	813-864-4386	wcindustries2003@gmail.com	17620 Lake Key Drive	Odessa	FL	33556	Sod	272682190	SLBE	African American
9	Williams Landscape Management Co., Inc.	813-628-8048	813-628-8041	tonywilliams@wlmslandscape.com	5710 N 50th St	Tampa	FL	33610	Sod	593516370	SLBE	African American

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.

**AWTP Methanol Storage Tank StartUp
Contract 19-C-00051**

Item No.	Description	Unit	Approx. Quantity	Unit Price	Unit Price in Words	Total Computed Price
100	The work includes the furnishing all labor, materials and equipment to remove and dispose (1) 100,000 gallons methanol storage tank, (1) adjacent fiberglass brewery waste storage tank, and (9) fiberglass liquid alum storage tanks; and install (2) 50,000 gallons methanol storage tanks, modify the existing methanol storage containment area to accommodate the new tanks as specified in construction plans; and electrical/instrumentation work required for a complete project in accordance with the Contract Documents.	LS	1	\$	\$	
200	Guardrail and Handrail Post Deteriorated Concrete Restoration (see S-03 Detail D)	CF	25	\$	\$	
300	Containment Walls Deteriorated Concrete Restoration (see Details on S-04)	CF	50	\$	\$	
400	Concrete Protective Coating System	SF	5,500	\$	\$	
500	Contingency	LS	1	\$ 100,000.00	\$	
				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.



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.



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 (GFECP) 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-00051; Howard F. Curren AWTP Methanol Storage Tank Replacement

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-00051, Howard F. Curren AWTP Methanol Storage Tank Replacement.

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-00051 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-00051; Howard F. Curren AWTP Methanol Storage Tank Replacement, shall include, but not be limited to, furnishing all labor, materials and equipment to remove (1) 100,000 gallon methanol storage tank and install (2) 50,000 gallon methanol storage tanks, modify the existing methanol storage containment area to accommodate the new tanks, demolition and disposal of the existing tanks, adjacent fiberglass brewery waste storage tank, and (9) fiberglass liquid alum storage tanks as specified in construction plans, 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 condition(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 items 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 or (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.

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

TEMPORARY STRUCTURES

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

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.

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.

SECTION 13 CLEANING

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.

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SPECIFIC PROVISIONS

SP-1.G Scope

The work included under these Contract Documents is described in the Proposal.

The Contractor shall furnish all labor, materials and equipment for the accomplishment of all work as described in the Specifications, as shown on the Plans and as directed by the Engineer in accordance with the obvious or expressed intent of the Contract.

SP-2.TP Permits

The Contractor shall have in his possession the proper license to perform the work before submittal of his bid and shall obtain and pay for all other licenses and authorizations required for the prosecution of the work, including the cost of all work performed in compliance with the terms and conditions of such permits, licenses and authorizations, whether by himself or others.

The City building permits shall be submitted and paid by the City.

The Contractor shall require all subcontractors to be currently licensed by the City to perform the proposed work in their respective fields and to obtain permits for the execution of said work. All work shall be performed in accordance with the licenses, permits and the requirements of the current Building and Construction Regulations Chapter of the City of Tampa Code.

The Contractor is responsible to schedule and coordinate with the City Inspectional Services Division of the Department of Housing and Development Coordination all required inspections and tests for all phases of work to obtain final approval thereof.

The Contractor is encouraged to contact the City's Permitting Department and Building Inspections Bureau prior to commencement of work to ascertain their respective requirements.

SP-5 Working Drawings

Prior to performing any work requiring working drawings, as specified on the Plans and in the Workmanship and Materials Sections, the Contractor shall submit the working drawings in accordance with the General Provisions section headed "Working Drawings."

SP-6 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. The fact that the permits are issued to the City does not relieve the Contractor in any way of his environmental obligations and responsibilities.

SP-9 Coordination and Cooperation

In performing work under this Contract, the Contractor shall coordinate his 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-12 Releasing Facilities for Use

It is the intent of these Specifications that all newly constructed sewers and appurtenant facilities be placed in service as rapidly as an integrated portion of the facilities can be constructed, inspected and accepted by the Engineer. Acceptance or use by the City of any portion of the facilities prior to final acceptance shall not relieve the Contractor of any responsibilities, regarding such facilities, included in the Contract.

SP-13 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 manufacturers.

SP-14 Contractor Emergency Response Time

The Contractor must be available to service emergency calls seven (7) days a week, twenty-four (24) hours a day. The response time for emergency calls shall be within one (1) hour. A contact person and telephone number shall be provided to the Engineer for such purposes.

SP-15 Contractor's Field Office

The Contractor or an authorized agent shall be present 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 the job site.

SP-16.TP Salvage

All salvageable materials, as determined by the Engineer, shall be removed by the Contractor and shall remain the property of the City unless otherwise noted.

All such salvaged items shall be removed by the Contractor, delivered, and unloaded at a location within the treatment plant's site, as directed by the Engineer. The Contractor shall include all necessary labor and equipment to unload the materials at a location designated by the City. The cost of removing, disposing, delivering, and unloading as salvage items of pipe and appurtenances shall be included in the various Contract Unit Prices or the Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-17 Sequence of Operations

The Contractor shall develop with the Engineer a complete schedule of operations which, in the opinion of the Engineer, will permit use of the facility at the earliest possible date.

Taking over of parts of the work for operation before completion of the entire project shall not relieve the Contractor of any responsibility for proper integrated operations of all parts of the work, nor shall it act to relieve him of any responsibilities under Article A-6.04 of the Agreement, for guaranty of all parts of the work, for one year after the date of acceptance of all the work on the project.

SP-23 Project Cleanup

Cleanup is extremely important and the Contractor will be responsible for keeping the construction site neat and clean with debris to be removed regularly as the work progresses.

SP-26 Surface Restoration

Where construction activities are conducted in existing grassed areas, the grassed areas shall be restored as specified or directed by sodding or grassing. Such restoration of grassed areas shall conform to the requirements of the Specifications.

The Contractor shall replace or repair all ground surfaces damaged during construction. Any bushes, flowers, gardens, patios, or other landscaping and irrigation systems disturbed by the construction project shall be repaired or replaced by the Contractor. The cost of such ground surface repair shall be included in the various classified unit price Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Existing corrugated metal and concrete pipe culverts removed during the construction work shall be stored and maintained in sound, useful condition and replaced upon completion of the work. Culverts damaged by the Contractor shall be replaced with new culverts meeting the applicable requirements of the Standard Specifications for Road and Bridge Construction published by the Florida Department of Transportation. No separate payment will be made for replacement of damaged culverts.

SP-40 Concrete Requirements

Division 3 – CONCRETE shall apply to all concrete work.

SP-60 Contingency

The Contractor shall include a One Hundred Thousand Dollar (\$100,000) contingency sum, to be included as part of the total bid amount for this contract. The contingency is for the purpose of compensating the Contractor for any incidental work that may arise as construction operations proceed and was not addressed as part of the original work portrayed in the Plans and Specifications.

The One Hundred Thousand Dollar (\$100,000) contingency sum if an upset limit. Any amount of the contingency shall be paid only after negotiation.

SP-68 Water, Light and Power

The City currently provides water and electrical power facilities to the sites. The Contractor may use the electrical and water sources as presently configured. If necessary to modify, extend, or relocate either the electrical or water facilities to facilitate construction, all costs shall be the responsibility of the Contractor.

SP-71 Electrical Requirements

Electrical Work

Where definite requirements are not set forth in the Specifications, all electrical equipment, materials, and work under this Division shall comply with the requirements of the Occupational Safety and Health Act (OSHA) and shall be in accordance with applicable ANSI, IEEE, IPCEA, and NEMA standards. The work shall be performed in compliance with the 2011 edition of the National Electrical Code (NEC), all applicable state and municipal regulations and codes, and the service rules of the Tampa Electric Company, unless otherwise specified or directed. All equipment and materials shall be listed and labeled by a nationally recognized testing laboratory (NRTL) as required by the 2014 Florida Building Code, 5th edition. All custom control panels shall be assembled by a UL 508A certified panel shop and a UL label shall be applied to the finished product.

Electrician Qualifications

The Electrician performing the electrical work shall be licensed / certified in the State of Florida. The Electrician shall be thoroughly experienced with, and regularly engaged in, the demolition, installation, and trouble-shooting of industrial power systems with nominal system voltages of 240 through 13,200 volts. The Electrician shall provide the City with evidence demonstrating at least three (3) years of successful industrial power system installations. The provided industrial power system installations shall be of similar complexity, content and scope of the contract bid project. Electrician shall supply the City with references of industrial clients that will attest to the Electrician's work experience and power system installations.

SP-72 Operation and Maintenance Manual, Submittals / Request for Information / Shop Drawings, and Asset Tracking Form

Operation and Maintenance Manuals

The Contractor shall prepare and submit to the Engineer four (4) hardcopies and one (1) high resolution color, bookmarked, and unsecured electronic portable document format (PDF) of an Operation and Maintenance Manual for all equipment and associated control systems furnished and installed under this Contract. Black and white copies will not be accepted. When the work reaches 75 to 80 percent completion, the Contractor shall submit to the Engineer for approval one (1) hardcopy and one (1) PDF electronic copy of the manual with all specified material that is available at that time. The submittal shall accompany the Contractor's partial payment request for the specified completion. Within 30 days after approval of the Engineer of the PDF submittal, the Contractor shall furnish to the Engineer four (4) hardcopies of the manual. Appropriate space shall be left in the manual for material not available at the time of submittal. All missing material for the manual shall be submitted prior to the request for final payment.

Also along with the missing material submitted with the request for final payment, one electronic copy (in pdf format) complete with all the missing material to be included in the earlier submitted hard copies shall be submitted. The manual shall be prepared and arranged as follows:

1. Space shall be provided in the manual for a reduced set of record Contract Drawings, size approximately 11 by 17 inches and folded to 8-1/2 by 11 inches. Drawings will be

furnished by the Engineer.

2. One copy of all approved shop drawings and diagrams for all equipment furnished. The shop drawings and diagrams shall be reduced to either 8-1/2 by 11 inches or to 11 inches in the vertical dimension and as near as practicable to 17 inches in the horizontal dimension. Such sheets shall be folded to 8-1/2 by 11 inches.
3. One copy of manufacturer's operating, lubrication and maintenance instructions for all equipment and controls furnished. All equipment operating, lubrication and maintenance instruction and procedures shall be furnished on 8-1/2 by 11 inch commercially printed or typed forms. Such forms shall include equipment name, serial number and other identifying references.
4. One copy of manufacturer's spare parts list for all equipment furnished and prepared as specified in No. 3 above.
5. One valve schedule, giving the valve number, location, fluid and fluid destination for each valve installed and prepared as specified in No. 3 above. All valves in the same piping system shall be grouped together in the schedule. A sample of the valve numbering system to be used will be furnished by the Engineer. Valve numbers may include three or four numerals and a letter.
6. List of electrical relay settings and control and alarm contact settings.

Each copy of the manual shall be assembled in one or more binders, each with title page, typed table of contents, and heavy section dividers with copper reinforced holes and numbered plastic index tabs. Each manual shall be divided into sections headed by the equipment specification section included in "Workmanship and Materials." Binders shall be 3-ring hard-back. All data shall be punched for binding and composition and printing shall be arranged so that punching does not obliterate any data. The cover and binding edge of each manual shall have the project title, Division designation and manual title printed thereon, all as furnished and approved by the Engineer.

Where more than one binder is required, they shall be labeled Vol. 1, Vol. 2, and so on. The table of contents for the entire set, identified by volume number, shall appear in each binder.

The four (4) hardcopies of the manuals and data included therein shall be provided in conformance with the subsection headed "Working Drawings" and, in addition, to the requirements of the General Provisions. The costs of the Operation and Maintenance Manual shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

Submittals / Request for Information / Shop Drawings

Contractor shall prepare and submit one (1) bookmarked, unsecured electronic portable document format (PDF) file for all Submittals, RFI, and Shop Drawings. The City will review the submittals and return one (1) PDF file of the marked up submittal to the contractor. The contractor shall have approved hard copies of all submittals at the job site. Each electronic submission must be in a high resolution color format and shall be original electronic documents from the manufacturer. Scanned printouts or poor quality resolution PDF files will not be

accepted.

Asset Tracking Form

The Asset Tracking Form (ATF) is a form that is intended to begin tracking assets and their respective preventative maintenance at an early stage in the project. The Contractor will be required to submit an electronic Asset Tracking Form for each piece of equipment. The information to be included on the form will include general information and specifications on the equipment such as, but not limited to, model, voltage, amperage, horsepower, material, manufacturer, serial number, recommended spare parts and preventative maintenance tasks.

During the preconstruction meeting of the project, the City will furnish the contractor with a blank electronic copy of the ATF in Microsoft Office 2010 and a preliminary list of equipment that will require an ATF. The City may provide the contractor a list of additional equipment requiring an ATF as the project progresses.

The Contractor shall submit all ATF(s) after the project is substantially complete. The City prefers one submission of all ATF(s).

SP-73 Work Directive Change

A Work Directive Change is a written directive to the Contractor, issued on or after the date of the execution of the Agreement, and signed by the Engineer on behalf of the City, ordering an addition, deletion or revision in the work, or responding to an emergency. A Work Directive Change will not change the contract price or the time for completion, but is evidence that the parties expect that the change directed or documented by an Authorization to Proceed with Extra Work letter will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the contract price or the time for completion.

Without invalidating the Agreement, additions, deletions or revisions in the work may, at any time or from time to time, be authorized by a Change Order or a Work Directive Change. Upon receipt of any such document, the Contractor shall promptly proceed with the work involved.

SP-81 Services of Manufacturers' Representatives

The services of manufacturers' representatives shall be provided on the site as required for the supervision of installation, the adjustment and placing in satisfactory trouble-free operation of such equipment, and instructing City personnel in the operation and maintenance of such equipment for which such specialized services are specified, directed, or required.

Such manufacturers' services shall be of sufficient time and include a minimum period of one 8-hour day for instruction of City personnel. Additional time shall be provided if necessary.

The cost of all services of manufacturers' representatives shall be included in the various Contract Unit Price Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-82 Access

GENERAL

Access to the site of the work shall be from Guy Verger Boulevard. The Contractor shall construct, as required for his purposes or as necessary, such temporary access roads between the public roads and the site as may be required for movement of heavy construction equipment and material delivery vehicles at locations approved by the Engineer.

Access facilities shall be adequate for equipment movement and shall provide for surface drainage. Areas used for temporary access, haul roads and access from public or plant roads shall be graded and restored to proposed site grade conditions, all to the satisfaction of the Engineer.

Access to existing plant roads by the Contractor will be restricted to those roads so designated. The Contractor will not be permitted to use any existing plant roads not designated for such use. All existing plant roads which are designated for use by the Contractor shall be maintained in serviceable condition by the Contractor during construction. Any damage to such roads caused by construction operations shall be promptly repaired to keep the road in serviceable condition. Any accumulations of soil, gravel or any other debris deposited on such plant roads as a result of construction operations shall be promptly removed by the Contractor to his own place of disposal.

Additionally, all existing plant roads which are designated for use by the Contractor shall be open at all times for unrestricted use by plant operations, maintenance and inspection service.

In NO case will the Contractor be permitted to use the monitored plant entrances for the passage of heavy construction equipment, concrete trucks or any other large vehicles.

PARKING

All employees of the Contractor shall park personal vehicles within the Contractor's storage and field office site. Contractor employees will not be permitted to drive personal vehicle onto the construction site. The Contractor shall provide transportation for all employees between the Contractor's storage and field office site and the work areas on the construction site.

IDENTIFICATION

The Contractor shall provide a Photo I.D. card for each employee. Each photo I.D. card shall be encapsulated in plastic and be provided with a clip for fastening to each employee's apparel. Each photo I.D. card shall be approximately 2 inches by 3 inches in size and shall include the following:

1. Employee photograph mounted on the left half of the card.
2. Name of employee and name of Contractor located on the right half of the card. Each employee shall display the photo I.D. card on outer apparel at all times when on the plant site.

Any person found on the site without the required photo I.D. card will be directed to leave

the site immediately.

The cost of construction, modification, maintenance, removal and restoration of all access facilities, and existing plant roads including excavation, backfilling, select fill material, paving material, grading, drainage and other such work, and all costs associated with limited access to the site, employee parking and transportation and photo I.D. cards, except as specified otherwise shall be included in the lump sum Contract Item for Structures and Equipment and no separate payment will be made therefor.

SP-84 Piping and Equipment Identification

All piping and equipment shall be identified as follows:

1. All painted piping and equipment shall be color coded. Such coding on pipelines shall include painted or plastic tape banding at 10-foot intervals. The Engineer will select the colors. Underground pipelines with plastic tape wrapping shall be wrapped with colored tape and include additional colored bands as directed. Polyethylene or hot bituminous wrapped underground pipelines shall have plastic tape bands. Polyethylene wrapping for ductile iron sewage or force main piping shall be green. Tape bands shall be placed at 10-foot intervals and all colors shall be selected by the Engineer.
2. All equipment and slide gates shall have an identification nameplate. The nameplates shall be of Type 304 stainless steel, No. 6 finish, not less than No. 16 gauge with indented stamped lettering. Nameplates shall be attached to equipment bases in accessible locations. Nameplates shall be fastened, in a permanent manner arranged not to damage equipment, with not less than four stainless steel fasteners. All nameplates shall be of the same size (approximately 3- by 8-inch) and shall conform to the following standard sample:

Sewage Pump	(Name of item)
SC-P-1	(General type of designation, final list furnished by Engineer)
(12 digit number)	(Furnished by Engineer)

Lettering shall be block style in size and spacing to suit the nameplate. A sample nameplate including fastenings shall be submitted to the Engineer for approval prior to manufacture of any of the nameplates. Stainless steel identification nameplates shall not be painted.

3. Piping shall be identified with a designation and directional flow arrow. The designation will be furnished by the Engineer. The designation will comprise a maximum of 20 letters. The designations and flow arrows shall be painted on after completion of color coding using suitable stencils and colors. Designations and flow arrows shall be arranged to be clearly in view from the normal operating or access space all as directed and approved by the Engineer. Designations and flow arrows shall be located along straight runs at intervals of not more than 50 feet, near valves, branches and junction points, and where pipes pass through walls or ceilings. Underground piping wrapped with polyethylene shall be provided with colored material selected by the Engineer.

The cost of piping and equipment identification shall be included in the various Contract Items, or in the total Lump Sum Price, as applicable, and no separate payment will be made therefor.

SP-87.TP Use of Site for Storage and Field Office

Space, on the site, for storage and field office for the Contractor shall be as directed by the Engineer. Any structures or facilities needed for storage or field office shall be constructed by the Contractor at his own expense and no separate payment will be made therefor. All security requirements for such facilities shall be provided and maintained by the Contractor.

Upon completion of the work, and as directed, the Contractor shall clean up the areas, remove any temporary facilities and finish grade as necessary, all as approved.

SP-98 Valves

Valves shall be handled with care to avoid damage. All valves shall be loaded and unloaded by lifting, and under no circumstances shall valves be dropped, skidded, or rolled. Valves shall not be placed, under any circumstances; against pipe or other fittings in such a manner that damage could result. Slings, hooks or tongs used for lifting shall be padded in such a manner as to prevent damage. If any part of the valves' coating and lining is damaged by the Contractor, the repair and replacement shall be made by the Contractor at his expense in manner satisfactory to the Engineer before installing. Valves shall also be stored at all times in a safe manner to prevent damage and kept free of dirt, mud or other foreign matter. All valve gaskets shall be stored and placed in a cool location out of direct sunlight and out of contact with petroleum products. All gaskets shall be used on a first-in, first-out basis.

Gate valves and butterfly valves shall be set and joined to new pipe in a manner heretofore specified for cleaning, laying and joining pipe. Valves shall be installed such that the operating nut is plumb.

Cast iron valve boxes shall be firmly supported and maintained centered and plumb over the operating nut of the valve by the Contractor with box cover flush with the surface of the finished pavement or at such other levels as may be directed. Valve boxes shall have 6-inch thick wire mesh reinforced concrete pads poured around the top section of the valve box when in pavement or when directed by the Department. The pad shall be 24 inches square and shall be centered on the valve box. All Department valve covers shall be painted safety blue as prescribed by the American Public Works Association (APWA) uniform color code for utility systems.

The valve and valve box shall be installed so Department personnel can insert a valve key through the valve box and completely open and close the valve. This test will be accomplished before final acceptance of the valve and box into the water system.

The work shall include all labor, materials, equipment, tools and any incidentals required for the completion of the work.

Payment for valves shall be included in the price of the work to which the valves are incidental.

SP-129.TP As-Built Plans

During manufacture and construction, installation and testing, records shall be kept of any changes or adjustments made in the work. All such changes shall be incorporated in the "As-Built" plans, shown in red.

The Contractor shall provide the City of Tampa with AutoCAD drawings, one (1) hardcopy, and (1) electronic high resolution unsecured color PDF copy of "As-Built" plans. Plan sheets shall have all deviations from original design annotated in red to clearly show as-built conditions. Relocation of existing facilities and utilities must be clearly noted.

All as-built plans shall be submitted within seven (7) calendar days of the final inspection. The final payment will not be issued until the as-built plans have been submitted to, and accepted by the City. Upon request by the Contractor, the City will provide AutoCAD drawings when available.

SP-130 SAFETY:

A. Responsibility: Employees shall immediately report any unsafe work practice or unsafe condition to their supervisor(s). The Contractor is solely responsible for the safety of their workers, and shall comply with all applicable requirements [i.e.: 29 CFR 1910 -Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction, etc] and industry safety standards while at the work site. The fact that City personnel may bring unsafe conditions to the attention of any member of the Contractors work force does not relieve the Contractor of this responsibility.

Suggest, all Contractors employees and sub-contractors be given a copy of SP-130.

The Contractor shall have a designated Safety Officer within his organization. At the Pre-Construction meeting, the Contractor shall provide the name and contact information of the Safety Officer to the Engineer.

At the Pre-Construction meeting, the Contractor will be given pertinent safety related information, necessary forms and instructions (i.e.: AWTP Lockout/Tagout Procedures, AWTP Hot Work Permits, etc) that pertain to any work that might be utilized during the contract. The Contractor shall be responsible to disseminate that information to their employees and sub-contractors. Special care shall be taken by the Contractor to ensure that any new employee or sub-contractor to the work site shall be briefed on these safety instructions.

If warranted by the project and directed by the Engineer, the Contractor shall develop and implement a comprehensive health and safety plan for their employees that will cover all aspects of onsite construction operations and activities associated with the contract. This plan must comply with all applicable health and safety regulations and any project specific requirements that the contract has specified.

B. Incident Reporting: All accidents that result in personal injury, illness or property damage shall be immediately reported and investigated, regardless of the extent of injury, illness or property damage. Employees must report accidents within one hour (or as soon as practical) from the time of occurrence to their immediate supervisor who in turn will report it to the City's inspector. The City inspector will record the incident in their daily report and report it to the Risk Management Division (274-5708).

C. Air-Borne Debris: All personnel in close proximity to drilling, sawing, sanding, scraping, spraying, power-washing or other work being done, either in enclosed spaces or in the open, that creates dust or air-borne debris shall wear eye protection

[29 CFR 1910.133] and a respirator [29 CFR 1910.134].

D. Hot Work: All welding, soldering, brazing, acetylene cutting or any other work at the AWTP or any pump station; that produces high temperatures shall require a AWTP "Hot Work Permit" and may require one or more fire watches. The number and location of fire watches (if any) shall be a condition of the Hot Work Permit. A current, portable, fully charged fire extinguisher shall be located with each person performing hot work and each fire watch. The Hot Work Permit shall be signed off by the appropriate personnel and maintained in the project file.

E. Confined Spaces: OSHA defines a confined space as having limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Confined spaces include, but are not limited to: vaults, tanks, manholes, wet-wells, pipelines, utility tunnels, etc.

The Contractor shall take measures [29 CFR 1910.146 (c)(5)] to ensure that atmospheric conditions in confined spaces are not hazardous to occupants. This can be accomplished by forcing a sufficient amount of clean air through the confined space and testing the atmosphere by using a portable certified, calibrated, atmosphere monitor that meets OSHA requirements [29 CFR 1910.146(c)(5)(ii)(C)]. The atmosphere monitor should record oxygen content, flammable gases and vapors and toxic air contaminants, such as the Industrial Scientific TMX-412.

F. Air-Borne Gases: The AWTP is located in an industrial area and as such there are several different substances, either on or off site, that can escape and become dangerous fumes such as: chlorine, methanol, anhydrous ammonia, etc. The AWTP currently has nine (9) Shelter In Place (SIP) locations that are designated as safe havens in the event of release of hazardous gases. These SIP's are stocked with necessary instructions and supplies to protect City and any Contractor's personnel.

The first day on site, City personnel will show all the Contractor's personnel present where the several closest SIP's are located, explain the alarm signals and provide the current alarm testing schedule. It shall be the Contractor's responsibility to show any future employee and/or sub-contractor that comes on site the location of the SIP's and explain the alarm signals.

In the event of an alarm, the Contractor's personnel shall immediately and hastily proceed to the nearest SIP along with the City personnel and remain there until further notice, taking guidance from and following the instruction of the senior City employee present.

G. Lockout / Tagout Policy: The AWTP Lockout / Tagout program is designed to set standards to help safeguard all employees from hazardous electrical or mechanical energy while they are performing service or maintenance on machines and equipment at the AWTP or any pump station. This program will also identify the practices and procedures to shut down and Lockout or Tagout machines and equipment. The Contractor shall be given a copy of the AWTP "LOCKOUT / TAGOUT POLICY AND PROCEDURES" instruction and shall make all of his employees and sub-contractors aware of this program.

No padlock (lockout) shall be removed except by the individual that installed it or if not available, by a City of Tampa AWTP team leader.

No tag (tagout) shall be removed except by the individual that installed it or if not available, by a

City of Tampa AWTP team leader, except in an Emergency and the tag states "Do Not Use Unless in an Emergency". In that event, the Contractor shall notify the City of Tampa AWTP team leader, who will prepare the necessary follow up report.

H. Trench Safety: Any excavation deeper than four (4) feet shall adhere to the requirements contained in 29 CFR 1926.650 thru 652 and the Florida Trench Safety Act [Florida Statutes, ss 553.60 - 553.64].

I. Open Flames: No fires shall be allowed. No open flames necessary for any construction activity shall ever be left un-attended. A current, portable, fully charged fire extinguisher shall be located with each activity requiring an open flame.

J. Sparks: Any activity lasting more than 10 continuous minutes, that creates sparks, such as grinding or chipping shall have a dedicated fire watch in attendance. A current, portable, fully charged fire extinguisher shall be located with each activity creating sparks, regardless if a fire watch is required or not.

K. First Aid: The Contractor shall furnish appropriate First Aid Kits [29 CFR 1910.151] and shall be responsible to ensure his employees are properly trained to render first aid. If injurious corrosive materials are to be utilized, eye wash and body wash facilities must be provided in the immediate area.

L. Related Costs: All costs associated with these or any safety measures shall be included in the total lump sum contract price or the various contract item unit prices, as applicable, and no separate payment shall be made thereof.

SP-133 Tampa Port Authority Access and Treatment Plant Access

The Tampa Port Authority has restricted access in accordance with Florida Statute 311.12. Refer to the Tampa Port Authority's website for procedures on gaining access to the port. All personnel assigned to provide this service or required to deliver goods to the Port of Tampa, if applicable in this award, shall obtain a Port Pass. To obtain this port pass will require each employee to have a valid photo ID. It is the responsibility of the Awardee to obtain Port Passes before work begins or prior to delivery. Each employee shall display the identification card on outer apparel at all times when on the AWT Plant site. Any person found on the site without the required identification card will be directed to leave the site immediately. The time and cost associated with acquiring this ID shall be the Awardee's responsibility.

Documentation, pricing and other information related to the access requirements for the Port of Tampa can be found at: <https://www.porttb.com/security>. All costs to comply with these procedures shall be included in the total Price for this project, and no separate payment shall be made therefore.

Wastewater Emergency Response Plan (ERP). The City has developed procedures to help protect the lives and health of all personnel working at the Wastewater facility in the event of an emergency. Everbridge is the software product and primary communication tool that is part of the Department's ERP. This product will be used to register daily visitors and contractors to Wastewater Departmental Facilities here at the Port and to send emergency notifications (via text or cell phone) in the event of an emergency.

Awardee will be required to provide a list of all employees who will be assigned to perform the services detailed in this bid document, including each employee's cell phone number, at least 24 hours prior to arrival to the City Inspector overseeing the services. The employee list must be maintained throughout the award and updated as needed.

Awardee must agree to attend various levels of safety awareness training as determined by the AWTP Safety Specialist.

AWTP Access. Upon entering and departing the AWT Plant, the lead on-site representative of the Awardee shall physically check in at the AWTP Administration Building, AWTP Maintenance Building or AWTP Operations Building. The lead on-site representative of the Awardee must inform the AWTP representatives which Awardee employees are on-site, including start and stop times. These hours must match the hours reflected on the invoices submitted by the Awardee for acceptance.

WW-Collection Access. Upon entering and departing the Wastewater Collection area (WWC), the lead on-site representative of the Awardee shall physically check in with the WWC main dispatch area. The lead on-site representative of the Awardee must inform the WWC representatives which Awardee employees are on-site, including start and stop times. These hours must match the hours reflected on the invoices submitted by the Awardee for acceptance.

* * *



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 may 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.

0 1 2 3 4 5 6 7 8

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.

Improvement Project



Jane Castor, Mayor

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

For information call:
(813) 635-3400



Sign Information

Building a Better Tampa

David L. Tiplin Water Treatment Facility
Caustic Soda Piping Improvements

Project provides for Improvements at the David L. Tiplin 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

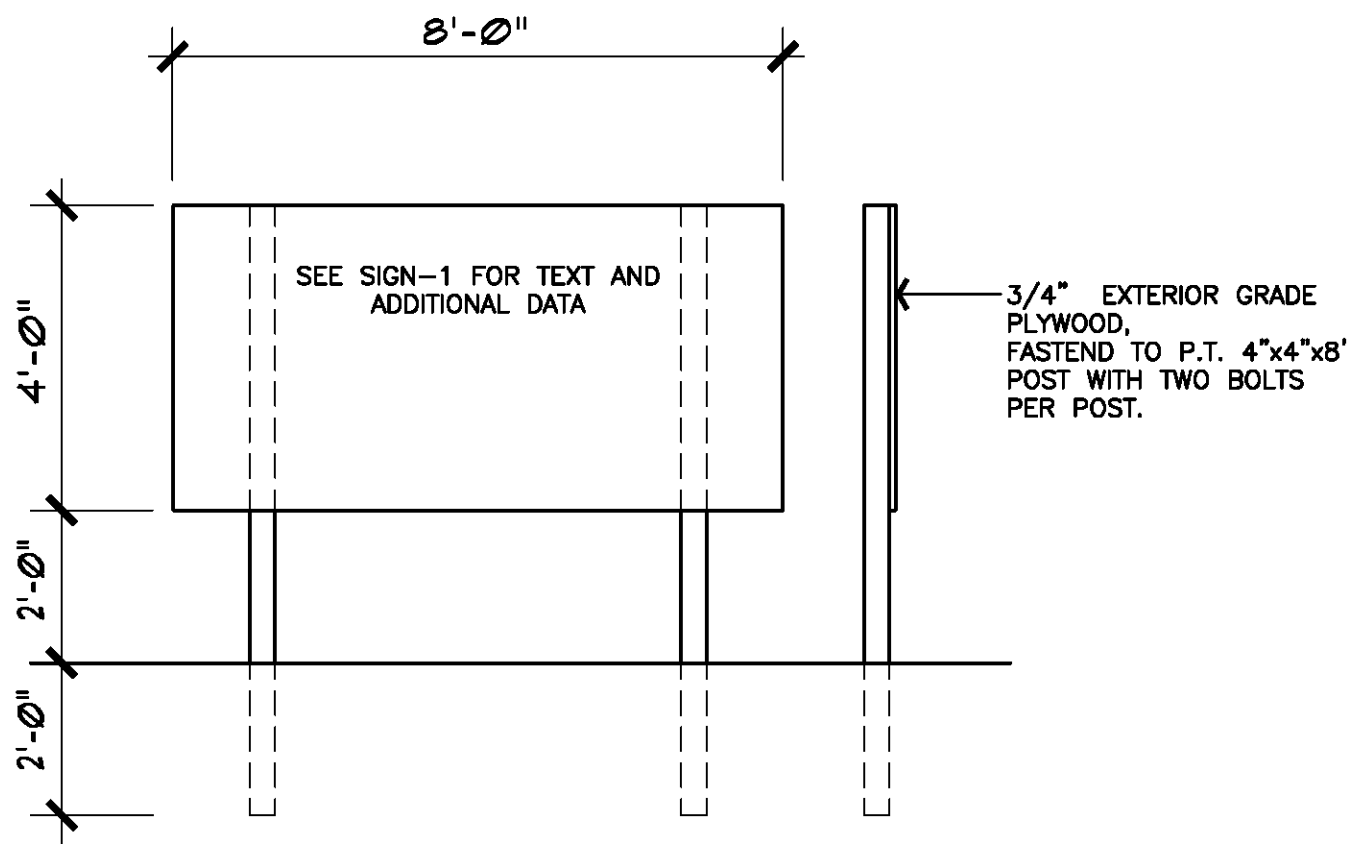
Blue: Sherwin Williams Naval SW6244
Green: Sherwin Williams Center Stage SW 6920
White: Sherwin Williams Pure White SW7005

Font

Franklin Gothic

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

not to scale



Section 01610

GENERAL EQUIPMENT STIPULATIONS

1. SCOPE. When an equipment specification section in this Contract references this section, the equipment shall conform to the general stipulations set forth in this section, except as otherwise specified in other sections.

2. COORDINATION. Contractor shall coordinate all details of the equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Drawings or Specifications.

Contractor shall also follow the City of Tampa, Wastewater Department, Technical Standards Guideline for Construction of Wastewater Facilities (latest edition) for additional requirements. Where these specifications differ from the City's Standards, the City's Standards shall take precedence.

3. MANUFACTURER'S EXPERIENCE. Unless specifically named in the Specifications, a manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past 5 years.

4. WORKMANSHIP AND MATERIALS. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch [6.3 mm] thick. When dissimilar metal components are used, consideration shall be given to prevention of galvanic corrosion.

5. STRUCTURAL DESIGN REQUIREMENTS. All equipment, including non-structural components and non-building structures as defined in ASCE 7, and their anchorage, shall be designed and detailed in accordance with the Meteorological and Seismic Design Criteria section.

6. LUBRICATION. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

Lubricants of the types recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Lubricants for equipment where the lubricants may come in contact with water before or during a potable water treatment process or with potable water, shall be food grade lubricants. This includes lubricants for equipment not normally in contact with water, but where accidental leakage of the lubricants may contaminate the water.

Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient

collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

7. ELEVATION. The elevation of the site shall be as indicated in the Meteorological and Seismic Design Criteria section. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at the specified elevation.

8. ELECTRIC MOTORS. Unless otherwise specified, motors furnished with equipment shall meet the requirements specified in Common Motor Requirements for Process Equipment section or specified in specific equipment sections.

9. DRIVE UNITS. The nominal input horsepower [kW] rating of each gear or speed reducer shall be at least equal to the nameplate horsepower [kW] of the drive motor. Drive units shall be designed for 24 hour continuous service.

9.01. Gearmotors. The use of gearmotors sharing an integral housing or cutgears into the motor output shaft, or that require removal of lubricant from the gear reducer to change out the motor will not be acceptable.

9.02. Gear Reducers. Each gear reducer shall be a totally enclosed unit with oil or grease lubricated, rolling element, antifriction bearings throughout.

Unless superseded by individual specification requirements each helical, spiral bevel, combination bevel-helical, and worm gear reducers shall have a service factor of at least 1.50 based on the nameplate horsepower [kilowatts] of the drive motor. Cycloidal gear reducers shall have a service factor of at least 2.0 based on the nameplate horsepower [kW] of the drive motor. Shaft-mounted and flange-mounted gear reducers shall be rated AGMA Class III. Helical gear reducers shall have a gear strength rating to catalog rating of 1.5. Each gear reducer shall be designed and manufactured in compliance with applicable most current AGMA standards, except the L₁₀ bearing life shall be 200, 000 hours.

The thermal horsepower [kW] rating of each unit shall equal or exceed the nameplate horsepower [kW] of the drive motor. During continuous operation, the maximum sump oil temperature shall not rise more than 100°F [38°C] above the ambient air temperature in the vicinity of the unit and shall not exceed 200°F [93°C].

Each grease lubricated bearing shall be installed in a bearing housing designed to facilitate periodic regreasing of the bearing by means of a manually operated grease gun. Each bearing housing shall be designed to evenly distribute new grease, to properly dispose of old grease, and to prevent overgreasing of the bearing. The use of permanently sealed, grease lubricated bearings will not be acceptable in large sized reducers. In small reducers, similar to basin equipment, permanently sealed grease lubricated bearings rated L₁₀ 200,000 hour life may be provided at the manufacturer's option. An internal or external oil pump and appurtenances shall be provided if required to properly lubricate oil lubricated bearings. A dipstick or a sight glass arranged to permit visual inspection of lubricant level shall be provided on each unit.

Gear reducers which require the removal of parts or the periodic disassembly of the unit for cleaning and manual regreasing of bearings will not be acceptable.

Certification shall be furnished by the gear reducer manufacturer indicating that the intended application of each unit has been reviewed in detail by the manufacturer and that the unit provided is fully compatible with the conditions of installation and service.

9.03. Adjustable Speed Drives. Each mechanical adjustable speed drive shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower [kilowatts] of the drive motor. A spare belt shall be provided with each adjustable speed drive unit employing a belt for speed change. Unless specifically permitted by the detailed equipment specifications, bracket type mounting will not be acceptable for variable speed drives.

9.04. V-Belt Drives. Each V-belt drive shall include a sliding base or other suitable tension adjustment. V-belt drives shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower [kilowatts] of the drive motor.

10. SAFETY GUARDS. All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gage [1.52 mm] thick or thicker galvanized, aluminum-clad sheet steel, or stainless sheet steel or from 1/2 inch [12.7 mm] mesh galvanized expanded metal, or pultrusion molded UV resistant materials. Each safety guard shall be reinforced or shaped to provide suitable strength to prevent vibration and deflection and shall comply with OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

11. ANCHOR BOLTS. Equipment suppliers shall design and detail suitable anchor bolts for each item of equipment. Anchor bolts shall be designed for all operating conditions of the equipment, including wind and seismic loadings when applicable. Wind and seismic loads shall be as indicated in the Meteorological and Seismic Design Criteria section.

Requirements for anchor bolt type, material, and minimum diameter shall be as indicated in the Anchorage in Concrete and Masonry section.

Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete or masonry grout is placed.

Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches [38 mm] of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

12. EQUIPMENT BASES. Unless otherwise indicated or specified, all equipment shall be installed on concrete bases at least 6 inches [150 mm] high. Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components, and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in the Grouting section.

13. SPECIAL TOOLS AND ACCESSORIES. Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

14. SHOP PAINTING. All iron and steel surfaces of the equipment shall be protected with suitable protective coatings applied in the shop. Surfaces of the equipment that will be inaccessible after assembly shall be protected for the life of the equipment. Coatings shall be suitable for the environment where the equipment is installed. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with an epoxy or polyurethane enamel or universal type primer suitable for top coating in the field with a universal primer and aliphatic polyurethane system.

Surfaces to be coated after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of a universal primer.

Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound as recommended by the equipment manufacturer.

15. PREPARATION FOR SHIPMENT. Equipment shall be prepared for shipment as specified in the Product Delivery Requirements section.

16. STORAGE. Handling and storage of equipment shall be as specified in the Product Storage and Handling Requirements section.

17. INSTALLATION AND OPERATION. Installation and operation shall be as specified in respective equipment sections and the Startup Requirements section.

18. OBSERVATION OF PERFORMANCE TESTS. Where the Specifications require the presence of Engineer, initial tests shall be observed or witnessed by Engineer. Owner shall be reimbursed by Contractor for all costs of subsequent visits by Engineer to witness or observe incomplete tests, retesting, or subsequent tests.

19. PROGRAMMING SOFTWARE. Programming software shall be provided for any equipment which includes a programmable logic controller (PLC) or other digital controller that is user-programmable. The software shall be suitable for loading and running on a laptop personal computer operating with a Windows-based operating system. A copy of the manufacturer's original operating logic program shall be provided for use in maintaining and troubleshooting the equipment. Where multiple pieces of equipment, from the same or different vendors, use the same programming software, only one copy of the software need be provided.

End of Section

Section 01611

METEOROLOGICAL AND SEISMIC DESIGN CRITERIA

1. **SCOPE.** Buildings, non-structural components and non-building structures shall be designed in accordance with this section. In the event of conflict with requirements in other sections, the more stringent criteria shall be followed.

2. **DESIGN CRITERIA.** Buildings, non-structural components, non-building structures including anchorage of such items, shall be designed in accordance with the following criteria.

General Design Data:

Building code and references

IBC 2015, ASCE 7-10
 "Minimum Design Loads for
 Buildings and Other
 Structures", AISC 360
 "Specification for Structural
 Steel Buildings", AISC 341
 "Seismic Provisions for
 Structural Steel Buildings"

Design flood elevation, DFE (ft)

10.00'

Wind Design Data:

Ultimate design wind speed, V_{ult}
(mph)

150

Nominal design wind speed, V_{asd}
(mph)

90

Exposure category

C

Risk Category

IV

Snow Design Data:

Ground snow load, P_g (psf)

Zero

Seismic Design Data

Mapped MCE short period spectral response
acceleration, S_s

0.061

Mapped MCE one second period spectral
response acceleration, S_1

0.032

Design short period spectral response
acceleration, S_{DS}

0.065

Design one second period spectral response
acceleration, S_{D1}

0.051

Risk Category

IV

Non-Structural Components Importance factors,
 I_P

As indicated in the Non-Structural
 Component Schedule

Non-Structural Components Seismic Design Category	A
Non-Building Structures Importance factors, I	As indicated in the Non-Building Structure Schedule or in the applicable reference documents, whichever is greater.

3. **WIND ANCHORAGE**. Equipment that is to be located outdoors shall have anchor bolts designed for the effects of wind forces, as determined in accordance with ASCE 7, Chapters 26-31. Design of anchorage into concrete shall be in accordance with ACI 318 Appendix D, shall consider concrete to be cracked, and shall not include the strengthening effects of supplementary reinforcement or anchor reinforcement unless approved by Engineer. Design of anchorage into masonry shall be in accordance with ACI 530. Post-installed anchors into concrete or masonry may be used only when approved by Engineer, and shall be designed in accordance with the anchor manufacturer's research report. Shop drawings shall include full anchor bolt details, and shall be sealed by a professional engineer licensed in the state of the project. Calculations shall be furnished when requested by Engineer.

4. **SEISMIC DESIGN**.

4-1. **General**. Structural systems shall provide continuous load paths, with adequate strength and stiffness to transfer all seismic forces from the point of application to the point of final resistance.

4-2. **Pre-Engineered Buildings**. Not used.

4-3. **Non-Structural Components**. Non-structural components are architectural, mechanical, and electrical items that are permanently attached to and supported by a structure but are not part of the structural system, as indicated in Chapter 13 of ASCE 7. The Non-Structural Components Schedule identifies the components that require seismic design. The requirements of this paragraph are applicable only to the items listed in the Non-Structural Components Schedule.

4-3.01. **General**. Design of non-structural components shall be in accordance with all applicable provisions of ASCE 7, Chapter 13. "W_p" shall include the total operating weight of the component or system, including, but not limited to, any insulation, fluids, and concentrated loads such as valves, condensate traps, and similar components.

4-3.02. **Anchorage Design**. Every component in the Non-Structural Components Schedule shall have its anchorage to the supporting structure designed in accordance with ASCE 7, Chapter 13. Design of anchorage into concrete shall be in accordance with ACI 318 Chapter 17, shall consider concrete to be cracked, and shall not include the strengthening effects of supplementary reinforcement or anchor reinforcement unless approved by Engineer. Design of anchorage to concrete shall also include the overstrength factors indicated in ASCE 7, Tables 13.5-1 and 13.6-1. Design of anchorage into masonry shall be in accordance with ACI 530. Post-installed anchors into concrete or masonry may be used only when approved by Engineer, and shall be designed in accordance with the anchor manufacturer's research report.

Components shall be attached so that seismic forces are transferred to the structural system. Curbs that support roof-mounted equipment shall be designed to transfer forces from the equipment into the main structural roof members. All structural attachments shall be bolted, welded, or otherwise positively fastened. Frictional resistance due to gravity shall not be considered in evaluating the required resistance to seismic forces.

4-3.03. Component Design. Components indicated in the Non-Structural Components Schedule to require design of the component itself, as opposed to an anchorage design alone, shall be designed in accordance with ASCE 7, Chapter 13.

Components shall have sufficient strength and ductility to resist the specified seismic effects, and shall meet all of the design, proportioning, detailing, inspection, and quality assurance provisions of the specified building code and other referenced codes. Components shall be designed to be operable during and following a design level seismic event without collapsing, breaking away from supports, creating an ignition hazard, or releasing any contents.

Seismic effects that shall be analyzed in the design of piping systems include the dynamic effects of the piping system, contents, and supports. The interaction between piping systems and the supporting structures, including other mechanical and electrical equipment, shall also be considered. Where pipe supports are to be designed by Contractor, as required by the Pipe Supports section, both the piping and support systems shall be designed to meet the applicable requirements of ASCE 7, Chapter 13.

4-3.04. Submerged Components. Components that are to be submerged in water shall be designed to withstand loads from the effects of water sloshing during the seismic event. The calculation of the sloshing effects shall be in accordance with the latest edition of ACI 350.3.

4-3.05. Seismic Certification. Design of components and their anchorage shall be certified by one of the following methods.

1. Analysis and design by a design professional registered in the state of the project.
2. Shake table testing based upon a nationally recognized testing standard procedure, such as ICC-ES AC 156, acceptable to the authority having jurisdiction.
3. Experience data, based upon nationally recognized procedures acceptable to the authority having jurisdiction.

Components indicated in the Non-Structural Components Schedule to require special seismic certification shall be certified only by methods 2 or 3 above, except that certification for containment of hazardous materials may be by any of the three methods.

4-3.06. Construction Documents. Construction documents (fabrication or shop drawings) of non-structural components shall be sealed by a design professional that is registered in the state of the project. Documents shall be sealed whether the basis for certification is analysis and design, shake table testing, or experience data. The sealing method shall clearly indicate that the anchorage system, and the component itself when applicable, have been designed for the code required seismic forces.

4-3.07. Submittals. The construction documents, structural design calculations, shake table certification, and experience data certification, as applicable, shall be submitted in accordance with the Submittal Procedures section.

4-4. Non-Building Structures. Non-building structures are the items described as such in Chapter 15 of ASCE 7. The Non-Building Structures Schedule identifies the items that require seismic design. The requirements of this paragraph are applicable only to the items listed in the Non-Building Structures Schedule.

4-4.01. General. Design of non-building structures shall be in accordance with all applicable provisions of ASCE 7, Chapter 15. Design of anchorage into concrete shall be in accordance with

ACI 318 Chapter 17, shall consider concrete to be cracked, and shall not include the strengthening effects of supplementary reinforcement or anchor reinforcement unless approved by Engineer. Post-installed anchors into concrete may be used only when approved by Engineer, and shall be designed in accordance with the anchor manufacturer's research report.

"W" shall include the total dead load and shall also include all normal operating contents of tanks, vessels, bins, and piping.

Non-building structures shall provide sufficient strength and ductility to resist the specified seismic effects, and shall meet all of the design, proportioning, detailing, inspection, and quality assurance provisions of the specified building code and other referenced codes.

The seismic design of non-building structures shall provide sufficient stiffness, strength and ductility to resist the effects of seismic ground motions during the design level earthquake.

Non-building structures shall be designed to be operable during and following a design level seismic event, without collapsing, breaking away from supports, creating an ignition hazard, or releasing any contents.

4-4.02. Construction Documents. Construction documents (fabrication or shop drawings) depicting all seismic force resisting elements of non-building structures shall be sealed by a design professional that is registered in the state of the project.

4-4.03. Submittals. The construction documents shall be submitted in accordance with the Submittal Procedures section.

Component	Applicable Specification Section	Importance Factor (I _p)	Component Design Required	Special Seismic Certification Required
Piping Systems and Related Pipe Supports				
Methanol	15140	1.5	x	
Lighting Fixtures	16050	1.0		
Lighting Panels	16050	1.0		
Power Panels	16050	1.0		
Lighting and Auxiliary Power Transformers	16050	1.0		
Power Centers	16050	1.0		
Power Factor Correction Capacitors	16050	1.0		
Lighting Contactors	16050	1.0		
Photoelectric Controls	16050	1.0		
Relay Enclosures	16050	1.0		
Bypass Isolation Automatic Transfer Switch	16491	1.0		
Lightning Protection Systems	16670	1.0		

Note: Some specification sections listed in the Non-Structural Components Schedule cover multiple items. Within those sections, some components may be exempt from seismic design based on their weight and/or their height above the floor. Reference ASCE 7, Paragraph 13.1.4 for specific conditions of the exemptions. Some ductwork and piping systems may also be exempt from seismic design based on criteria in their respective paragraphs in ASCE 7, Chapter 13.

Non-Building Structures Schedule		
Structure	Applicable Specification Section	Importance Factor (I)
Methanol Storage Tanks	13215	1.5

End of Section

Section 02050

DEMOLITION

PART 1 - GENERAL

1-1. SCOPE. This section covers the demolition of existing structures, piping, equipment, and sitework and the salvage of existing materials and equipment as indicated on the Drawings or as specified herein.

1-2. GENERAL. Contractor shall be responsible for all work under this section. Contractor shall provide 30 days written notice prior to beginning demolition activities.

All structures and facilities of the existing Howard F. Curren AWTP which are not to be removed must remain in continuous operation during the work. Demolition and salvage work shall create minimum interference with Owner's operations and minimum inconvenience to Owner. Contractor shall provide protection and safety of all roadways, railways, sidewalks, and all accessible areas during demolition activities.

Blasting or crushing of materials will not be permitted on site. Cutting of materials near the existing or new Methanol Storage Tank(s) shall not be permitted due to potential sparking.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3-1. DEMOLITION. Removal of equipment or facilities shall include removal of all accessories, piping, wiring, supports, associated electrical starters and devices, baseplates and frames, and all other appurtenances, unless otherwise directed. Existing materials and equipment removed, and not indicated to be reused as a part of the Work, shall become Contractor's property unless otherwise specified, and shall be removed from the Site and properly disposed of or recycled in accordance with state laws.

Contractor shall conduct demolition activities in a manner that prevents damage to existing facilities which are indicated to remain and shall provide all necessary protection for existing facilities. Any remaining facilities damaged during demolition shall be repaired by Contractor to a condition equal to or better than the original condition.

When demolition is complete, all debris shall be removed from the Site and the Site graded to the lines and grades indicated on the Drawings.

3-1.01. Structure Demolition.

The following structures shall be demolished, and the debris shall be removed from the jobsite.

Methanol Tank

Brewery Waste Storage Tank

Nine (9) Alum Storage Tanks

3-1.02. Piping and Equipment Demolition.

The following piping and equipment shall be removed and shall become the property of Contractor. All such items shall be promptly removed from the jobsite.

Methanol Tank piping and valves

Brewery Waste Storage Tank piping and valves

Alum Storage Tank piping

Plant air piping

Effluent water piping

3-1.03. Sitework Demolition. Sitework demolition shall include the following:

Removal of sections of reinforced concrete containment walls and existing tank pads as indicated on the Drawings.

Removal of existing yard piping within the limits indicated on the Drawings. All yard piping indicated to be abandoned shall be plugged with concrete.

3-2. SALVAGE.

3-2.01. Items To Be Salvaged by Owner. Not used.

3-2.02. Items To Be Salvaged by Contractor. Removed and salvaged equipment or facilities shall include removal and salvage of all accessories, piping, wiring, supports, associated electrical starters and devices, baseplates and frames, and all other appurtenances, unless otherwise directed. Refer to the contract drawings for specific the electrical components to be salvaged from the existing methanol tank and reused on the new tank.

Existing materials and equipment removed, and not reused as a part of the work, shall become Contractor's property unless otherwise specified, and shall be removed from the jobsite.

Contractor shall carefully remove, in a manner to prevent damage, all materials and equipment specified herein or indicated to be salvaged and to remain the property of Owner. Contractor shall store and protect salvaged items specified or indicated to be reused in the work. Any items damaged in removal, storage, or handling through carelessness or improper procedures shall be replaced by Contractor in kind or with new items.

Contractor may, at his option, furnish and install new items instead of those specified or indicated to be salvaged and reused, in which case such removed items will become Contractor's property.

End of Section

Section 02930

SEEDING AND SODDING

PART 1 - GENERAL

1-1. SCOPE. This section covers seeding and sodding to be performed after backfilling and final grading are complete. All areas disturbed by construction operations shall be treated as specified herein.

All lawn, ditch, and street shoulder areas within street right-of-way and temporary construction easements that are damaged during the Work shall be restored, after completion of construction, to the complete satisfaction of Owner. All areas disturbed by Contractor outside the temporary construction easements shall be restored, at Contractor's expense, to the satisfaction of the property owner, except that if the temporary construction easement through the ownership is sodded all disturbed areas outside the construction easement shall also be sodded. Occupying areas outside temporary construction easements, street right-of-way, and utility easements for any purpose shall be done only with the written approval of the property owner.

1-2. GENERAL.

1-2.01. Governing Standard. The governing standard for the seeding and sodding Work shall be FDOT Specifications Sections 570, 575 and 981.

1-2.03. Completion. At Owner's option, a portion of the final payment not to exceed one (1) percent of the contract price may be retained until an acceptable stand for all grass/ground cover is established. Seeding requirements are as follows:

Locations to be seeded. Contractor laydown areas or any area disturbed during demolition and construction activities.

Sodding requirements are as follows:

Locations to be sodded. Contractor laydown areas or any area disturbed during demolition and construction activities.

1-3. SUBMITTALS.

1-3.02. Invoices and Analysis Labels. A copy of supplier's invoices for all seed, mulch, and fertilizer which shows the quantity by weight purchased for the project and representative labels bearing the manufacturer's or vendor's guaranteed statement of analysis shall be submitted to Engineer for review and approval to assure compliance with specified requirements for quality and application rates.

1-4. GUARANTEE.

1-4.01. Seeding. Contractor shall guarantee a uniform stand of seeding, free of weeds to the extent practical, and acceptable to Owner.

1-4.02. Sodding. Contractor shall guarantee the sodding Work to the extent that all transplanted sod shall be uniform in color, leaf texture, shoot density, and reasonably free of visible imperfections at acceptance.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

Prior to use, all products shall be kept dry and in a weatherproof location so that their effectiveness will not be impaired.

PART 2 - PRODUCTS

2-1. MATERIALS. All materials shall conform to the requirements of the Governing Standard, except where otherwise specified.

2-1.02. Seed. The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

2-1.03. Sod. Sod shall have been planted on cultivated agricultural land and grown specifically for sod purposes and shall conform to the quality standards of Nursery Grown Sod as defined by the Turfgrass Producers International. Sod shall be free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than five such plants are found per 100 square feet of area.

2-1.04. pH Adjustment. Not used.

2-1.05. Topsoil. Topsoil shall be fertile, natural soil, typical of the locality, free from stones, roots, sticks, clay, peat, weeds, and sod, and obtained from naturally well drained areas. It shall not be excessively acidic or alkaline nor contain toxic material harmful to plant growth. Stockpiled topsoil may be used but the Contractor shall furnish additional topsoil at his own expense if required.

2-1.05. Mulch. Not used.

PART 3 - EXECUTION

3-1. GENERAL. Execution of seeding and sodding Work shall conform to the Governing Standard, or shall be as specified herein, whichever is the most stringent.

3-1.01. Clearing Prior to finish grading, areas to be seeded or sodded shall be cleared to remove stumps, stones larger than 3 inches, roots, cable, wire, debris or other materials that might hinder seeding and/or sodding and future turf maintenance.

3-1.02. Finish Grading. Seeding and/or sodding shall not be started until all work has been substantially completed. Topsoil shall be allowed to be spread and finish grading completed before the Work is started.

3-1.03. Final Preparation The areas to be seeded and/or sodded shall be tilled to a true depth of 6 inches by disking, harrowing, or other accepted methods to thoroughly incorporate the additives and fertilizer, destroy vegetation, and pulverize the soil. After tilling, the bed shall be smoothed by dragging or floating. The surface shall be cleared of all stones, stumps or other objects larger than 1 1/2 inches [38 mm] in thickness or diameter; roots, wire, grade stakes, and other objects that might hinder future turf maintenance operations.

When results are not satisfactory because of drought, excessive moisture or other causes, the Work shall be stopped until such conditions have improved or have been corrected.

When possible, operations shall be performed parallel to the contour lines and operations uphill and downhill shall be avoided.

3-2. SEEDING.

3-2.01 Seed Application. Seed shall be applied within 72 hours after preparation of the seedbed. Seed shall be applied with equipment designed to give uniform application. Any method or combination of methods which uniformly distributes the seed directly in contact with the soil, covers the seed, and firms the bed, may be selected. Seed shall be placed approximately 1/4 inch below the surface.

3-2.02. Mulching. All seeded areas shall be mulched within 24 hours following seed application. The mulching operation shall be in accordance with the Governing Standard.

3-3. HYDROSEEDING. Not used.

3-4. SODDING.

3-4.01. Application of Sod. Sod shall be placed within 72 hours after preparation of the sod bed. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. When the soil is too dry, the sod shall be cut only after Contractor has watered the sod sufficiently to moisten the soil to the depth at which the sod is to be cut.

Care shall be exercised at all times to retain the native soil on the roots of the

sod during the process of stripping, transporting, and planting. Dumping from vehicles will not be permitted.

The sod shall be transplanted within 24 hours from the time of stripping, unless stored in a satisfactory manner. During delivery and while in stacks, the sod shall be kept moist and shall be protected from exposure to the air and sun.

Sod shall be laid smoothly, edge-to-edge, and with staggered joints. The sod shall be immediately pressed firmly into contact with the sod bed by tamping or rolling with acceptable equipment so as to eliminate all air pockets, provide a true and even surface, and assure knitting.

Staking is not required, except in ditch flow lines; however, Contractor will be responsible for replacing all sod that is displaced by erosion during the maintenance period. Only wooden (lath) stakes shall be used.

3-5. WATERING.

3-5.01. Seeded Areas.

Watering for seeded areas will not be required.

3-5.02. Sodded Areas. Contractor shall provide all water, labor, and equipment for watering sodded areas. Sodded areas representing one day's planting shall be watered sufficiently to wet the sod pads and at least 2 inches of the sod bed. Thereafter, in the absence of adequate rainfall, watering shall be performed daily and as often as necessary to keep the sod pads moist at all times. Watering of sod shall continue as needed until final acceptance.

3-6. REPLANTING.

3-6.01. Seeded Areas. Unacceptably seeded areas shall be overseeded or completely reseeded as instructed by Engineer. Unless otherwise permitted by Engineer, reseeding shall be performed during the next planting season.

3-6.02. Sodded Areas. Prior to acceptance, sodded areas that show signs of substantial desiccation as evident by a loss of color and a distinct yellowing shall be resodded and shall continue to be resodded until an acceptable sod cover is obtained. Replanting operations shall be as specified except that fertilizer and lime shall be deleted from the operation.

3-7. MAINTENANCE. All areas shall be maintained until final acceptance of the project.

3-7.01. Seeded Areas. Maintenance shall include any necessary reseeding, repair of erosion damage, and replacement of displaced mulch until covered with seedlings. In the event erosion occurs from either watering operations or rainfall, such damage shall be repaired.

3-7.02. Sodded Areas. Original grades of the sodded areas shall be maintained after commencement of planting operations and until acceptance. Any damage to the finished surface shall be repaired. In the event erosion occurs from either watering operations or rainfall, such damage shall be repaired. Ruts, ridges, tracks, and other surface irregularities shall be corrected and areas resodded.

During the maintenance period prior to acceptance, all sodded areas shall be mowed to height of 3 inches as soon as, and each time that, the grass reaches an average height of 5 inches. Clippings shall be collected and removed from the Site.

End of Section

Section 03301

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1-1. **SCOPE.** This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work.
Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

1-2. **GENERAL.** All cast-in-place concrete shall be accurately formed and properly placed and finished as indicated on the drawings and as specified herein.

1-3. **SUBMITTALS.** All submittals of drawings and data shall be in accordance with the Submittals Procedures section.

The following items shall be submitted for review:

Aggregate reports (ASTM C33)	
	Source and type
	Gradation
	Deleterious materials
	Alkali-aggregate reactivity
Cement mill report	
Fly ash or slag cement test report	
Admixture data sheets	
Proposed mixture proportions	
Concrete compressive strength at 28 days	
NSF 61 compliance evaluation	

1-4. **STORAGE AND HANDLING.** Cement shall be stored in suitable moistureproof enclosures. Cement which has become caked or lumpy shall not be used.

Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches [150 mm] of aggregate piles in contact with the ground shall not be used.

Reinforcing steel shall be carefully handled and shall be stored on supports that will prevent the steel from touching the ground.

PART 2 - PRODUCTS

2-1. **LIMITING REQUIREMENTS.** Unless otherwise specified, concrete shall be controlled within the following limiting requirements.

2-1.01. **Cement Content.** The quantity of Portland cement, plus any substituted fly ash or slag cement, in the concrete shall be not less than that indicated in the following table:

Quantity of Cement (lb/yd ³)			
Coarse Aggregate Size from No. 4 Sieve to			
3/8 in.	1/2 in.	3/4 in.	1 in.
600	580	560	535

2-1.02. Maximum Water-Cementitious Ratio. The maximum water-cementitious ratio shall be 0.42 on a weight basis. If fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.

2-1.03. Fly Ash and Slag Cement Content. At the option of Contractor, fly ash or slag cement may be substituted for portland cement, on the basis of 1.0 lb added for each 1.0 lb of cement reduction. Fly ash replacement shall be within a range of 15 to 25 percent. Slag cement replacement shall be within a range of 25 to 50 percent.

2-1.04. Coarse Aggregate. The maximum nominal coarse aggregate size shall be 1 inch [25 mm].

2-1.05. Slump. Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by Engineer, slump of concrete without a superplasticizer shall not exceed 4 inches [100 mm]. Slump of concrete with a high-range water reducer (superplasticizer), or a midrange water reducer, shall not exceed 8 inches [200 mm].

2-1.06. Total Air Content. The total volumetric air content of concrete after placement shall be 6 percent \pm 1.5 percent. Air-entraining admixture shall be omitted from concrete for interior slabs which are to be trowel finished.

2-1.07. Admixtures. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations and acceptable to Engineer. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. A midrange water reducer or a high-range water reducer (superplasticizer) may be used at Contractor's option. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.

2-1.08. Strength. The minimum acceptable compressive strengths, as determined by ASTM C39, shall be:

Age	Minimum Compressive Strength
7 days	3,375 psi [23.5 MPa]
28 days	4,500 psi [31.5 MPa]

Cylinders shall be 6 inches [150 mm] diameter by 12 inches [300 mm] high for concrete mixes using a maximum nominal aggregate size of 1 inch [25 mm] or larger. Cylinders may be either 6 inches [150 mm] diameter by 12 inches [300 mm] high, or 4 inches [100 mm] diameter by 8 inches [200 mm] high for concrete mixes using a maximum nominal aggregate size of less than 1 inch [25 mm]. The average compressive strength shall be determined from the results of at least

three cylinders when using 4 inch [100 mm] diameter cylinders, and at least two cylinders when using 6 inch [150 mm] diameter cylinders. All tests shall be performed using the same sized cylinders for the duration of the work.

2-2. MATERIALS.

Cement	ASTM C150, Type II or I/II , low alkali .
Fly Ash	ASTM C618, Class F, except loss on ignition shall not exceed 4 percent.
Slag Cement	ASTM C989, Grade 100 or Grade 120.
Fine Aggregate	Non-reactive, clean natural sand, ASTM C33. Artificial or manufactured sand will not be acceptable.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, class 4S, except that clay and shale particles shall not exceed 1 percent.
Water	Potable. Water from concrete production operations shall not be used.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.
Air-Entraining	ASTM C260.
Superplasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Mechanical Connectors	Splicing system meeting Type 2 tensile requirements of ACI 318. Products shall have a current evaluation report verifying testing per ICC-ES AC 133. Use only where indicated on the drawings.
Metal Waterstops	Uncoated carbon steel, 12 gage minimum thickness, size as indicated on the drawings.
PVC Waterstops	Extruded, virgin, elastomeric, polyvinyl chloride (PVC), white (no pigment), ribbed, 3/8 inch [9.5 mm] thick. Reclaimed material will not be acceptable. Provide hog rings or grommets spaced at 12 inches [300 mm] on center entire length.

At construction joints in concrete sections less than 12 inches [300 mm] in thickness	6 inches [150 mm] wide; Greenstreak "679" or Vinylux "R638".
At construction joints in concrete sections 12 inches [300 mm] or more in thickness	9 inches [225 mm] wide; Greenstreak "646" or Vinylux "R938".
Expandable Waterstops, permitted only at locations indicated on Drawings	
For concrete sections that are at least 10 inches [300 mm] thick and 6 feet [1.8 m] high, and with at least two layers of reinforcement	Hydrophilic; bentonite free, chemically modified rubber. Adeka "Ultra Seal MC-2010MN" or Greenstreak "Hydrotite CJ-1020-2K". Adhesive and sealant as recommended by the manufacturer.
For other concrete sections	Hydrophilic; chemically modified rubber. Adeka "KBA-1510FP" or Greenstreak "Swellstop". Adhesive and sealant as recommended by the manufacturer.
Forms	
Plywood Product	Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Form Coating	Nonstaining and nontoxic after 30 days. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Evaporation Reducer	Dayton Superior "AquaFilm Concentrate J74", Euclid "Eucbar", L&M Chemical "E-Con", BASF "MasterKure ER50", or Sika "SikaFilm".
Polyethylene Film	Product Standard PS17 or ASTM D4397, 6 mils [150 µm] or thicker.
Vapor retarder and seam tape	Polyolefin membrane, 15 mil [0.38 mm] min, ASTM E1745, Class A, with maximum water vapor permeance of 0.02 perms. Stego Industries "Stego Wrap 15 Mil", Raven Industries "Vaporblock 15", Reef Industries "Griffolyn 15 Mil Green", W.R. Meadows "Perminator 15", Insulation Solutions "Viper VaporCheck II". Manufacturer recommended seam tape and pipe boots.
Membrane Curing Compound and Floor Sealer	ASTM C1315, Type I, Class A, minimum 25 percent solids, acrylic, non-yellowing, unit moisture loss 0.40 kg/m ² maximum in 72 hours. Product shall not exceed VOC limits established

by the federal, state, or local regulatory agency having jurisdiction over the project site.

Concrete Surface Coloring/Hardener	Mineral aggregate dry-shake colored hardener for concrete flatwork. ChemSystems, Inc. "CSI Heavy-Duty Color Hardener", Euclid "Surflex", or Dayton Superior "Quartz Tuff".
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Epoxy Bonding Agent	ASTM C881, Type V, moisture insensitive, 100 percent solids; Dayton Superior "Sure Bond J58", Euclid "Euco #452", or Prime Resins "Prime Bond 3000".
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2-3. MIXTURE DESIGN AND TESTING. All reports and tests required for Engineer acceptance of materials and concrete mixtures shall be made at the expense of Contractor. Mixtures shall be adjusted in the field as necessary, within the limits specified, to meet the requirements of these specifications. If the source of any concrete materials is changed during the contract, concrete work shall pause until the new materials and the new mixture design are acceptable to Engineer.

2-3.01. Review of Materials. The source and quality of concrete materials shall be submitted to Engineer for review before concrete is placed.

2-3.02. Proposed Mixture Proportions. Proposed proportions of concrete shall meet the limiting requirements indicated herein.

2-3.03. Mixture Testing. Test results shall be submitted for review and shall be acceptable to Engineer before concrete work is started.

2-3.03.01. Field Test Record Data. Concrete mixtures may be qualified based on field test record performance data. Field test data records shall be from the production facility being used on the current Project and shall have been performed in the past 12 months. Field test records shall represent a single group of at least 10 consecutive strength tests for one mixture, using the same materials, under the same conditions, and encompassing a period of not less than 45 days.

2-3.03.02. Laboratory Trial Mixture Testing. If field test record data is not available, or does not meet the specified criteria, laboratory trial mixtures shall be performed to confirm concrete strength requirements. Laboratory trial mixtures shall meet a minimum compressive strength of $f'_c + 1200$ psi.

2-4. FORMS. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

Forms for pavement, curbs, or gutters shall be made of steel and shall be supported on thoroughly compacted earth. The top face of pavement forms shall not vary from a true plane more than 1/4 inch in 10 feet [2 mm/m].

Forms shall be thoroughly cleaned and coated before concrete is placed.

Form-facing materials shall be selected in accordance with ACI 347.3R, based upon the applicable formed concrete surface category. Formed concrete surface categories vary by structure and application, and shall be as indicated in the Finishing Formed Surfaces paragraph.

2-4.01. Form Ties. Form ties shall be of the removable end, permanently embedded body type, and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Form ties for liquid-containing walls shall be provided with waterstop washers located on the permanently embedded portions of the ties at the approximate center of the wall. Through-wall tapered removable ties will not be acceptable for liquid-containing walls.

2-4.02. Edges and Corners. Chamfer strips shall be placed in forms to bevel all salient edges and corners, except the top edges of walls and slabs which are to be tooled and edges which are to be buried. Unless otherwise noted, bevels shall be 3/4 inch [19 mm] wide.

2-4.03. Form Removal. Forms shall not be removed or disturbed until the concrete has attained sufficient strength to safely support all dead, live, and construction loads. Care shall be taken in form removal to avoid surface gouging, corner or edge breakage, and other damage to the concrete.

2-5. REINFORCEMENT. Reinforcement shall be accurately formed and positioned and shall be maintained in proper position while the concrete is being placed and compacted. Unless otherwise indicated on the drawings, the details of fabrication shall conform to ACI 315 and 318. In case of conflict, ACI 318 shall govern. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connections shall be used only as indicated on the drawings.

PART 3 - EXECUTION

3-1. BATCHING, MIXING, AND DELIVERY. Concrete shall be furnished by an acceptable ready-mixed concrete supplier, and shall conform to ASTM C94 except as indicated otherwise in this specification.

3-1.01. Delivery Tickets. A delivery ticket shall be prepared for each load of ready-mixed concrete and a copy of the ticket shall be handed to Engineer by the truck operator at the time of delivery. Tickets shall indicate the name and location of Contractor, the project name, the mixture identification, the quantity of concrete delivered, the quantity of each material in the batch, the outdoor temperature in the shade, the time at which the cementitious materials were added, and the numerical sequence of the delivery.

3-1.02. Mixing Water. Mixing water shall not be added in transit. Any amount of water withheld from the truck mixer shall be clearly indicated on the delivery ticket. Water added at the site shall not exceed the amount withheld, and shall not be added without oversight by Owner's on site inspector.

3-1.03. Consistency. The consistency of concrete shall be suitable for the placement conditions. Aggregates shall flow uniformly throughout the mass, and the concrete shall flow sluggishly when vibrated or spaded. The slump shall be kept uniform.

3-2. PLACEMENT. Contractor shall inform Engineer at least 24 hours in advance of the times and places at which he intends to place concrete.

Methods of conveying concrete to the point of final deposit and of placing shall prevent segregation or loss of ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Concrete shall be compacted by immersion-type vibrators, vibrating screeds, or other suitable mechanical compaction equipment. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

3-2.01. Polyethylene Film. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 [4.75 mm] sieve, such surfaces shall be covered with polyethylene film. Joints in the film shall be lapped at least 6 inches [150 mm] and taped.

3-2.02. Vapor Retarder. Vapor retarder shall be installed at the locations indicated on the Drawings. Installation shall be in accordance with ASTM E1643 and the manufacturer's recommendations. Joints in the retarder shall be sealed with waterproof sealing tape. Care shall be exercised to avoid tearing or puncturing the retarder. Any damage shall be promptly repaired, and the retarder shall be inspected for damage immediately before the concrete is placed.

3-2.03. Cold Weather Concreting. Except as modified herein, cold weather concreting shall comply with ACI 306.1.

When placed, heated concrete shall not be warmer than 80°F [26°C].

3-2.04. Hot Weather Concreting. Except as modified herein, hot weather concreting shall comply with ACI 305.1.

At air temperatures of 90°F [32°C] or above, concrete shall be kept as cool as practicable during placement. The temperature of the concrete when placed in the work shall not exceed 90°F [32°C].

Plastic shrinkage cracking due to rapid evaporation of moisture shall be prevented. Concrete shall not be placed when the evaporation rate (actual or anticipated) equals or exceeds 0.2 lb per square foot per hour [1 kg/m²/h], as determined using the nomograph in Appendix A of ACI 305.1.

3-3. WATERSTOPS. Each waterstop shall be continuous throughout the length of the joint in which it is installed. Waterstops shall be clean, free from coatings, and shall be maintained in proper position until surrounding concrete has been deposited and compacted.

Junctions between adjacent sections of metal waterstops shall be lapped 5 inches [130 mm] and securely bolted, screwed, or spot welded together.

Junctions between adjacent sections of elastomeric (PVC) waterstops shall be spliced in strict conformity with the recommendations of the manufacturer. Directional changes and intersections shall be factory fabricated by the waterstop manufacturer prior to delivery to the site of the work. Field splices will be acceptable only in straight sections.

3-4. FINISHING.

3-4.01. Finishing Formed Surfaces. Formed concrete surfaces shall meet all criteria of the relevant formed concrete surface category (CSC), as defined in ACI 347.3R, except as indicated otherwise herein. Surfaces shall be assigned to CSC's as indicated.

Formed Concrete Surface Category	Applicable Surfaces	Mockup Required
CSC1	Formed concrete surfaces that will be in permanent contact with earth backfill.	No
CSC2	All other formed concrete surfaces not designated otherwise.	No
CSC3	None.	Yes
CSC4	None.	Yes

3-4.01.01. Tie Holes. All tie holes in formed surfaces, regardless of the relevant CSC, shall be cleaned, wetted, and filled with patching mortar. The patches shall be finished flush and cured and shall match the texture and color of the adjacent concrete.

3-4.01.02. Mockups. Not used.

3-4.02. Finishing Unformed Surfaces. Unless otherwise specified, unformed surfaces shall be screeded and given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface.

Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color and the completed finish for unformed surfaces unless indicated otherwise.

3-4.03. Troweling. Interior floor surfaces which will be exposed after construction is completed; exposed top surfaces of equipment bases and interior curbs; and other surfaces designated on the drawings shall be steel trowel finished. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.

3-4.04. Application of Evaporation Reducer. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight shall be protected with an evaporation reducer. The evaporation reducer shall form a continuous film on the surface of fresh, plastic concrete to reduce evaporation.

Immediately following screeding, evaporation reducer shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon [4 m²/L], in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray the product at approximately 40 psi [275 kPa] with a suitable nozzle as recommended by the manufacturer.

The sprayable solution shall be prepared as recommended by the manufacturer.

Under severe drying conditions, additional applications of evaporation reducer may be required following each floating or troweling, except the last finishing operation.

3-5. CURING. Concrete shall be protected from loss of moisture for at least 7 days after placement unless indicated otherwise. Curing of concrete shall be done by methods which will keep the concrete surfaces adequately wet for the specified curing period.

3-5.01. Water Curing. Water curing shall be performed for concrete in liquid-containing structures and for all concrete containing slag cement. Other forms of curing will not be acceptable in these applications. Water curing shall be in accordance with ACI 308.1 except as modified herein.

Water saturation of concrete surfaces shall begin as soon as possible after initial set. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff.

Water curing shall continue for 14 days for concrete containing slag cement, and for 7 days for other types of concrete. However, when concrete is being protected from low temperatures, the

duration of water curing may be shortened to 1 day less than the duration of cold weather protection.

When forms are removed before the specified curing duration is completed, measures shall be taken to immediately continue water curing and to provide adequate thermal protection for the concrete.

3-5.02. Membrane Curing. Unless otherwise specified, membrane curing compound may be used instead of water curing on concrete in non-liquid-containing structures which will not be stained or etched, covered with chemical resistant linings, covered with additional concrete, or indicated in the Architectural drawings to be covered with a finish flooring material.

Membrane curing compound shall be evenly sprayed at a coverage rate of not more than 300 square feet per gallon [7.3 m²/L]. The spray equipment shall have sufficient capacity to continuously spray curing compound at approximately 40 psi [275 kPa] with a suitable nozzle as recommended by the manufacturer. Unformed surfaces shall be covered with the first coat of curing compound within 30 minutes after final finishing. A second coat of curing compound shall be applied when the first coat has become tacky to the touch and shall be applied at right angles to the first coat.

Curing compound shall be suitably protected against abrasion during the curing period.

3-5.03. Film Curing. Unless otherwise specified, film curing with white polyethylene sheeting may be used instead of water curing on concrete in nonliquid-containing structures which will be covered later with mortar or additional concrete, or which will otherwise not be exposed to view.

Film curing shall begin as soon as possible after initial set of the concrete. The concrete surfaces shall be completely covered with polyethylene sheeting. Sheeting shall overlap the edges of the concrete for proper sealing and anchorage, and joints between sheets shall be sealed. All tears, holes, and other damage shall be promptly repaired. Covering shall be anchored continuously at edges and as necessary to prevent billowing on the surface.

3-6. REPAIRING DEFECTIVE CONCRETE. Defective concrete shall be defined as any surface with undesirable visible effects in excess of that permitted by the relevant formed concrete surface category (CSC), except as indicated otherwise herein.

Defects in formed concrete surfaces shall be repaired to the satisfaction of Engineer within 24 hours of form removal. Surface repair work shall conform to Article 5.3.7 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of the surrounding concrete. Surface repair material shall be adequately cured.

Defects in concrete that are more than 3 inches [75 mm] deep shall be brought to the attention of Engineer prior to any repair work. Contractor shall submit a proposed repair material and procedure for review by Engineer. The repair material and procedure required by Engineer may be more extensive than the process described in Article 5.3.7 of ACI 301.

3-7. OWNER'S FIELD CONTROL TESTING. Field control tests shall be performed by Engineer or Owner's testing laboratory personnel, at the expense of Owner. Contractor shall provide access to all facilities and the services of one or more employees as necessary to assist with the field control testing.

3-7.01. Air Content. An air content test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Air content shall be determined in accordance with ASTM C231.

3-7.02. Slump. A slump test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.

3-7.03. Test Cylinders. Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39. Compressive strength tests will be evaluated in accordance with ACI 318 and as specified herein.

One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of four or six cylinders depending on the cylinder size selected. Half of the cylinders shall be tested at 7 days, and the remaining half shall be tested at 28 days. All concrete required for testing shall be furnished by, and at the expense of, Contractor.

End of Section

Section 03600

GROUTING

PART 1 - GENERAL

1-1. SCOPE. This section covers procurement and installation of grout. Unless otherwise specified, only nonshrink grout shall be furnished.

Epoxy grouting and adhesive anchoring of anchor bolts, threaded rod anchors, and reinforcing bars is covered in the Anchorage in Concrete and Masonry section. Grouting of masonry is covered in the Masonry section.

1-2. SUBMITTALS. A letter of certification indicating the types of grout to be supplied and the intended use of each type shall be submitted in accordance with the Submittals Procedures section.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent damage of any kind. Materials shall be protected from moisture.

PART 2 - PRODUCTS

2-1. MATERIALS.

Nonshrink Grout	Precision cementitious grout with demonstrated non-shrinking properties, minimum 28 day compressive strength of 9000 psi; L&M "Crystex", BASF "Masterflow 928", Sika "SikaGrout 328", or Dayton Superior "Sure-Grip High Performance Grout".
Water	Clean and free from deleterious substances.

2-2. CEMENTITIOUS GROUT. Cementitious grout shall be furnished factory premixed so that only water is added at the jobsite.

2-3. EPOXY GROUT. Epoxy grout shall be used in lieu of cementitious grout when required by the equipment manufacturer for performance or warranty requirements. Epoxy grout shall be a three component system consisting of a Part A (resin), Part B (hardener) and Part C (aggregate). All three components shall be products of the same manufacturer and be compatible. Epoxy grout products and installation procedures shall be submitted to Engineer for approval.

PART 3 - EXECUTION

3-1. CEMENTITIOUS GROUT INSTALLATION.

3-1.01. Preparation. The concrete foundation to receive cementitious grout shall be saturated with water for at least 12 hours preceding grouting unless additional time is required by the grout manufacturer.

3-1.02. Mixing. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout, nor shall water content exceed the amount recommended by the manufacturer.

3-1.03. Temperature Restrictions. Grout shall be placed in accordance with the manufacturer's published temperature restrictions. Ambient temperature and grout temperature shall be a minimum of 40 degrees F and rising at time of placement. Grout shall not be placed on frost covered surfaces. Grout shall be protected from freezing until it has reached a minimum strength of 4,000 psi. Grout shall not be placed when the ambient or grout temperature exceeds 90 degrees F.

3-1.04. Placement. Unless otherwise specified or indicated on the Drawings, grout under baseplates shall be 1-1/2 inches [38 mm] thick. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities below the baseplates are completely filled without voids. Forms shall be provided where structural components of baseplates will not confine the grout.

3-1.05. Edge Finishing. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush at the baseplate.

3-1.06. Curing. Grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 3 days and then an acceptable membrane curing compound shall be applied.

3-2. EPOXY GROUT INSTALLATION. Epoxy grout shall be installed in accordance with ACI 351.5.

End of Section

Section 03 01 26.76 [03920]

CONCRETE SURFACE REPAIR

PART 1 - GENERAL

1-1. SCOPE. This section covers the repair of existing concrete surfaces as indicated on the drawings, as specified, or as required to complete the Work. This specification covers the furnishing of all labor, equipment and materials required to repair, rehabilitate or reconstruct spalled, deteriorated, or structurally damaged concrete surfaces. Depth of repairs shall be adequate to restore concrete members to original dimensions and surface profiles.

The Work covered by this section includes, but is not limited to, the following locations:

**Methanol Storage Tank 01 Containment Area
Methanol Storage Tank 02 Containment Area (previously Brewery
Waste Storage Tank Containment Area)**

1-2. SUBMITTALS. Specifications and data covering physical properties, the mixtures, application procedures, and curing procedures of the materials proposed shall be submitted in accordance with the Submittals Procedures section. Submittals shall include the approvals required from the material manufacturer.

1-3. QUALITY ASSURANCE.

1-3.01. Manufacturer's Field Services. The material manufacturer shall provide engineering field services to review the project and the selected material application prior to any preparation; to approve the applicator, the material used, and the procedure to be used; to observe and approve surface preparation; and to observe application and curing procedures. The field representative of the material manufacturer shall submit, in writing through Contractor, approvals of proposed materials, surface preparation, applicator, and application procedures. The field representative shall instruct the applicator, as needed, to assure that handling, mixing, placing, finishing, and curing of materials are in accordance with specifications and manufacturer's requirements. The field representative shall be an employee of the material manufacturer.

1-3.02. Applicator. The repair contractor shall have experience and proficiency specific to the repair type and shall be acceptable to Engineer and the material supplier. The applicator shall submit, through Contractor, a satisfactory experience record including references for previous application of the specified materials to concrete structures of similar design and complexity.

1-3.03. Pre-construction Meeting. At least 30 days prior to planned performance of the Work, Contractor shall conduct a meeting to review the detailed requirements for the Work. Site conditions, surface preparation, proposed

equipment, procedures, material mixing, placing and finishing procedures, and curing methods shall be discussed and approved by Engineer and by the manufacturer's field representative. Contractor shall require the attendance of all involved parties, including but not limited to Contractor's superintendent, repair contractor if applicable, manufacturer's field representative and proposed equipment supplier representative. Minutes of the meeting shall be recorded, typed and printed by Contractor and distributed to all parties, including Engineer, within 5 days after the meeting.

1-3.04. Site Conditions. Job conditions shall be maintained at standards that allow material placement within temperature and cleanliness requirements. Unusual conditions or unexpected additional deterioration uncovered during the course of Work by Contractor shall be brought to Engineer's attention for analysis and disposition. These conditions include but are not limited to poor quality base concrete, severely corroded reinforcing steel, random cracks, deep oil penetration and any other condition which would prevent completion of the Work in accordance with manufacturer's recommendations and this specification.

1-4. PRE-BID INSPECTION. Contractor shall visit the site prior to bid submittal to witness and verify the extent of the required repairs. Final bid shall include a lump sum for the Work with a unit price adjustment for each repair type. Unit prices shall be utilized to adjust the final project cost upon completion and acceptance of the Work based on actual quantities more than or less than the bid form estimated quantities.

PART 2 - PRODUCTS

2-1. ACCEPTABLE PRODUCTS. Concrete repair products shall be manufactured by the Euclid Chemical Company, BASF Corporation, Sika Corporation, or equal as specified herein. Equivalent products of other manufacturers regularly producing high quality concrete repair materials, providing engineering field services, and meeting the specified quality assurance requirements may be furnished subject to acceptance by Engineer.

2-2. MATERIALS. Unless otherwise specified or authorized, materials shall conform to the requirements specified herein. Types of materials or concrete repair not specified herein shall be as specified in other sections, as indicated on the drawings or, in the absence of any definite requirement, as recommended by the manufacturer's field representative and acceptable to Engineer.

Products shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.

2-2.01. Leveling Mortar or Surface Filler. Applied thickness less than one fourth inch. One-component or two-component, polymer-modified, cementitious product. Material shall have the following properties:

1. Minimum 6,000 psi compressive strength at 28 days per ASTM C109 using 2 inch (50 mm) cubes.
2. Bonding agent shall be a repair mortar scrub coat utilizing mixed

product per manufacturer's printed installation instructions.

MasterEmaco N 300CI	BASF
Thin-Top Supreme	Euclid
SikaTop 121 Plus	Sika

2-2.02. Horizontal Repairs and Overlays.

2-2.02.01. Overlay thickness less than one inch. One-component or two-component, polymer-modified, cementitious product. Material shall have the following properties:

1. Minimum 7,000 psi compressive strength at 28 days per ASTM C109 using 2 inch (50 mm) cubes.
2. Minimum 1,200 psi flexural strength at 28 days per ASTM C348.
3. Minimum 2,100 psi bond strength at 28 days per ASTM C882 modified.
4. Bonding agent shall be a repair mortar scrub coat utilizing mixed product per manufacturer's printed installation instructions.

MasterEmaco T 310CI	BASF
Dural Top Flowable Mortar	Euclid
SikaTop 122 Plus	Sika

2-2.02.02. Overlay thickness equal to or greater than one inch. One-component, polymer-modified, silica-fume enhanced, cementitious product, containing integral corrosion inhibitor. Material shall have the following properties:

1. Minimum 6,500 psi compressive strength at 28 days per ASTM C109 using 2 inch (50 mm) cubes.
2. Minimum 1,000 psi flexural strength at 28 days per ASTM C348.
3. Minimum bond strength per ASTM C882 modified.
 - a. 500 psi at 1 day
 - b. 2,400 psi at 28 days
4. Maximum 1,000 coulombs rapid chloride permeability at 28 days per ASTM C1202.
5. Bonding agent shall be a repair mortar scrub coat utilizing mixed product per manufacturer's printed installation instructions.

MasterEmaco N 425	BASF
Concrete Top Supreme	Euclid
Sika Top 122 Plus	Sika

2-2.03. Vertical or Overhead (Non-sag) Repairs. One-component or two-component, polymer modified, cementitious mortar containing a migratory corrosion inhibiting admixture and suitable for interior or exterior use. Material shall have the following properties:

1. Minimum compressive strength per ASTM C109 using 2 inch (50 mm) cubes.
 - a. 2,000 psi at 1 day
 - b. 3,500 psi at 7 days
 - c. 5,500 psi at 28 days
2. Minimum flexural strength per ASTM C348.
 - a. 650 psi at 7 days
 - b. 1,000 psi at 28 days
3. Minimum 2,500 psi at 28 days shear bond strength per ASTM C882.
4. Bonding agent shall be a repair mortar scrub coat utilizing mixed product per manufacturer's printed installation instructions. The bonding agent shall be used for all trowel applied mortars.

MasterEmaco N 400	BASF
Verticoat Supreme	Euclid
Speed Crete PM	Euclid
SikaTop 123 Plus	Sika

2-2.04. Form and Pour. Thickness 6 inches or less. One-component, silica-fume enhanced, cementitious product, shrinkage compensated or polymer modified, containing migratory corrosion inhibiting admixture and suitable for interior or exterior use. Material shall have the following properties:

1. Minimum 6,500 psi compressive strength at 28 days per ASTM C109 using 2 inch (50 mm) cubes.
2. Minimum 770 psi flexural strength at 28 days per ASTM C348.
3. Minimum bond strength per ASTM C882 modified.
 - a. 1,200 psi at 1 day
 - b. 2,500 psi at 28 days
4. Maximum 1,000 coulombs rapid chloride permeability at 28 days per ASTM C1202.
5. Bonding agent shall be extended open time epoxy emulsion cement modified bonding agent, and shall be utilized in areas where form and pour repair products are being placed in a manner that exceeds the working life of the scrub coat, such as when enclosed forms are used.

MasterEmaco S 466CI	BASF
Eucocrete Supreme	Euclid
Sikacrete 211 SCC Plus	Sika

2-2.05. Penetrating Sealer. Silane-based sealer with minimum 40 percent active ingredient. Minimum water repellency 85 percent by ASTM C642. No scaling exhibited at 100 cycles by ASTM C672.

MasterProtect H 400	BASF
Baracade Silane 40	Euclid
Sikagard 740 W	Sika

2-2.06. Water. Clean and free from deleterious substances.

2-2.07. Accessory Products.

2-2.07.01 Repair Mortar Scrub Coat Bonding Agent. For proprietary prepackaged repair mortars, utilize the material itself mixed to a scrub coat or slurry consistency per manufacturer's printed installation instructions.

2-2.07.02. Latex Modified Mortar Scrub Coat Bonding Agent. For repairs to be performed with ready-mixed concrete, mortar scrub coat shall consist of one part Portland cement complying with ASTM C150, Type I or Type I/II and one part fine aggregate complying with ASTM C144, except 100 percent passing a No. 16 sieve, mixed with water to form a thick slurry. Mixing liquid shall consist of specified latex admixture bonding agent diluted with clean potable water at manufacturer's recommended dilution ratio.

Latex Admixture Bonding Agent:

- a. Non-redispersable, liquid bonding admixture used to produce polymer-modified concrete and mortar. Product shall conform to ASTM C1059 Type II.

Flex-Con
SikaLatex R

Euclid
Sika

2-2.07.03. Extended Open Time Epoxy Emulsion Cement Modified Bonding Agent. Protective coating for reinforcing steel and to bond repair material to reinforcing steel. Three-component, pre-proportioned, water based epoxy modified portland cement bonding agent containing migratory corrosion inhibitor. Product shall not form a vapor barrier and shall also serve as a anti-corrosion coating for reinforcing steel. Material shall have a minimum 2,000 psi bond strength at 7 days per ASTM C882.

MasterEmaco P 124
Duralprep A.C.
Armatec 110 EpoCem

BASF
Euclid
Sika

2-2.08. Coarse Aggregate Extension of Cementitious Mortar. In areas where depth of repair exceeds manufacturer's recommended limits for neat repair mortar, repair mortar may be extended with washed, graded, rounded, high-density, low-absorption coarse aggregate meeting ASTM C33. Aggregate shall be in size and volumes recommended by the product manufacturer. Aggregate extension shall not be permitted unless approved by Engineer.

PART 3 – EXECUTION

3-1. GENERAL. Unless otherwise specified, Contractor shall prepare and apply all materials in strict accordance with the manufacturer's printed installation instructions which are hereby made part of this specification.

3-2. INSPECTION. Prior to the placement of repair material, the surface to be

repaired shall be inspected by the material manufacturer's field representative to assure the surface conditions are correct for the type of repair and product/material is being used as specified.

3-3. PREPARATION.

3-3.01. Cleaning. The surface of existing concrete shall be clean and the pores free of any dirt or material that will be detrimental to the bond of the repair material. All oil, dirt, debris, paint, and unsound concrete shall be removed. Cleaning shall include complete removal of all dust, dirt, and residue by high pressure washing.

3-3.02. Surface Preparation. All prepared surfaces shall conform to the requirements of the material manufacturer. All edges shall be square cut to avoid feather edges. As required, surfaces shall be prepared mechanically using a scabber, bushhammer, chipping hammer, shotblast, scarifier or hydrodemolition equipment which will give the specified surface profile. Means and methods selected by Contractor, subject to acceptance by Engineer, shall minimize surface micro-cracking (i.e. "bruising") and impact on areas surrounding the Work area.

Remove all loose and unsound concrete per International Concrete Repair Institute (ICRI) Guideline 310.1R "Guide for Surface Preparation." Unsound concrete surfaces shall have perimeter boundaries saw cut to minimum depth of one-half inch, or less if such depth will cause saw to come in contact with embedded reinforcing steel. Saw cuts shall be made perpendicular to the concrete surface and all concrete removal boundaries shall be straight and aligned parallel to opposite boundary edges resulting in repair areas that are rectangular in shape.

Contractor shall provide a surface profile which is suitable for bonding, as defined in repair manufacturer's printed installation instructions. In the absence of other instructions, the surface shall be roughened to 1/4 inch amplitude. If delamination, cracking, or unsound material exists beyond minimum removal depth, then removal shall continue until all unsound, delaminated, or cracked concrete has been removed from the repair area.

3-3.03. Cracks. Cracks shall be located and repaired, if required, in accordance with the Concrete Crack Repair specification. All cracks located within or adjacent to Work covered under this specification shall be repaired prior to performance of the Work covered under this specification.

3-3.04. Inspection and Replacement of Reinforcing Steel. Any exposed reinforcing steel shall be exposed to the extent that a minimum of three-quarter inch of clear space is provided all around the steel to allow proper placement of repair material.

Contractor shall clean all exposed reinforcing steel to a bright finish prior to installation of repair materials.

Replace any reinforcing steel that has lost more than 20 percent of the original cross-sectional area within the surface repair area. Existing reinforcing steel which has been cut or otherwise damaged shall be replaced if the damage exceeds 20 percent of the original cross-sectional area. New reinforcing steel shall be either lapped or spliced with existing steel on both sides of the damaged or corroded portion of reinforcing steel. Either Class B laps or ACI 318 Type 2 mechanical connectors shall be used. Repaired reinforcing steel shall be inspected by Engineer or Owner's representative prior to placement of concrete repair materials.

3-4. APPLICATION. Concrete repair work shall be performed in accordance with the following requirements.

3-4.01. Bonding and Priming. Bonding agent shall be applied per manufacturer's recommendations. The manufacturer's coverage rate shall be followed. For rough surfaces, scrub bonding agent into the surface with a stiff broom.

Apply all prepackaged bonding agent materials within recommended ambient and substrate temperatures published in the manufacturer's printed installation instructions. Do not apply materials over frozen or liquid filled surfaces.

Upon completion of all concrete and reinforcing steel demolition, surface preparation, and cleaning operations, apply specified bonding agent to substrate. Provide complete and thorough coverage of surface assuring that bonding agent has been fully worked into profile of surface.

In areas where bonding agents classified as a mortar scrub coat are to be applied directly to concrete surface, such surfaces shall be saturated with water one hour prior to placement of the scrub coat to provide a saturated substrate. Just prior to application of the scrub coat, water shall be removed by compressed air blasting. Compressed air shall be maintained free of oil and contaminants by filtration as needed.

In areas where bonding agents classified as an extended open time epoxy emulsion cement modified bonding agent are to be applied and all exposed reinforcing steel and other metal embedments, mix bonding agent and apply two uniform coats at manufacturer's published recommended coverage rates to properly prepared surfaces. Allow adequate time between coats per manufacturer's recommendations.

Special attention shall be given to timing of placement of bonding agents, so that the repair mortar is able to be placed within the allowable open time of the bonding agent or while any mortar scrub coats are wet and have not yet stiffened.

3-4.02. Treatment of Reinforcing Steel and Other Metal Embedments. All existing and new reinforcing steel shall be secured and properly positioned by tying to other secured bars or supplemental anchoring pins as needed. New reinforcing steel, which is not replacing existing reinforcing steel, shall be

provided per the Drawings as applicable.

All exposed reinforcing steel and other metal embedments within the repair area shall be treated with two coats of anti-corrosion bonding agent.

3-4.03. Forming. Where forms are required, water-tight forms shall be constructed with sufficient rigidity to withstand head pressure and prevent excessive deflection during material placement. For pumped applications without open top forms, provide a port connection or birdmouth of sufficient size to allow pumping into the form. After forms are removed, all birdmouths and other protrusions resulting from the placement method shall be carefully removed and the surface smoothed.

Tolerances for formed work shall be as stipulated in ACI 117 for cast-in-place concrete, unless otherwise indicated. Formed surfaces shall meet a Class C for both abrupt and gradual irregularities.

3-4.04. Shoring and Support. When removal and repair of deteriorated concrete may cause temporary weakness, excessive deflections, structural instability, or other unacceptable damage, shoring or other suitable supports shall be provided until completion of the repair and adequate curing of repair material.

3-5. FINISHING. All unformed surfaces shall receive a light broom finish unless directed otherwise.

3-6. CURING. Immediately following placement and finishing procedures, cure cementitious repair mortars for a minimum of seven days. Curing procedures shall be in accordance with ACI 308.1 and the manufacturer's printed installation instructions. The more stringent requirements shall control.

During cold weather conditions, as defined by ACI 306.1, cold weather concreting procedures shall be followed including thermal protection of repair materials and removal of wet curing 24 hours prior to exposure to freezing temperatures.

Unless specified otherwise, one or more of the following methods shall be used:

3-6.01. Water Curing. Keep concrete surfaces continuously wet with water during the curing period. The method used shall limit water runoff and any runoff shall be directed and controlled. The difference in temperature between the water used for curing and the concrete surface shall not exceed 20 degrees F except when deemed a significant safety hazard and acceptable to Engineer.

3-6.02. Wet Coverings Curing. Cover the surfaces with moisture retaining curing blankets, burlap, cotton mats, or other suitable moisture retaining materials. The coverings shall not stain or otherwise discolor the repair material or the surrounding surfaces, and shall keep the repair products fully saturated during the curing period. Lap all coverings at least 8 inches at joints.

3-6.03. Membrane Curing. Membrane curing compounds shall not be used as a

method for curing repair materials except when water curing or wet coverings curing are not acceptable to the repair material manufacturer and the manufacturer's printed installation instructions requires membrane curing compounds to be used.

3-7. SEALING. Provide a penetrating sealer over the concrete repair product when recommended by the repair product manufacturer, or when no other sealer is specified on the drawings or other specifications. The penetrating sealer shall be applied in accordance with the manufacturer's instructions.

3-8. FIELD QUALITY CONTROL.

3-8.01. Material Storage and Handling. The material shall be delivered in original, unopened containers. Containers shall be labeled with the manufacturer's name, product name, and lot number. Materials shall be stored at the job site under dry conditions and at temperatures between 50 deg F and 90 deg F unless more stringent limitations are required by the manufacturer.

3-8.02. Environmental Conditions. Repair materials shall not be applied without protection in temperatures below 45 deg F, nor when the temperature is expected to fall below 45 deg F during the curing period, unless otherwise specified by the material manufacturer and cold weather concreting procedures are followed in accordance with ACI 306.1.

When ambient temperatures below 45 deg F are expected during the curing period, the repair material shall be maintained at 50 deg F for the full curing period. Sudden cooling shall not be permitted. Gradual temperature drop shall be maintained at not more than 20 deg F in any 24 hour period. Carbon dioxide or exhaust gases from combustion heaters shall not be allowed within enclosures or allowed to contact the repair material.

3-8.03. Protection. Repair areas shall be protected from other trades and weather for a minimum of 10 days after material is placed.

3-8.04. Cleaning. Work areas are to be cleaned each day in accordance with the Project Requirements section. Upon completion of the final cleanup, Contractor shall restore all areas affected by repair procedures to their original condition, leaving no trace of material piles or other wasted materials.

End of Section

Section 03930

CONCRETE CRACK REPAIR

PART 1 - GENERAL

1-1. SCOPE. This section covers the repair of concrete and shotcrete cracks and joints.

Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

1-1.01. General Crack Repair. General crack repair is applicable only to new construction, and shall include the following:

- a. Sealing of all cracks and crack networks that are wider than 10 mils (0.01 inch) [250 μ m] as measured at the exposed surface.
- b. All necessary repairs to structures that have failed a tightness test, including sealing of construction joints.

All costs for general crack repair shall be included in the Contract Price. General crack repair work is expected to be necessary due to cracks that commonly develop during concrete construction.

1-1.02. Engineer-Directed Crack Repair. Engineer-directed crack repair is applicable only to new construction, and shall only be performed when instructed by Engineer. The work shall include, but is not limited to, the following:

- a. Sealing of construction joints that are not otherwise required to be sealed as the result of a failure of a leakage test.
- b. Sealing of cracks and crack networks with a width of 10 mils (0.01 inch) [250 μ m] or less as measured at the exposed surface.

Contractor shall include 150 linear feet [50 linear meters] of Engineer-directed crack repair in the Contract Price. The Engineer-directed crack repair may be either epoxy resin or foam resin, as determined by Engineer.

1-1.03. Pre-Defined Crack Repair. Pre-defined crack repair is applicable only to existing structures, and the extent of this type of repair is indicated on the Drawings.

Prior to beginning the repair work Contractor shall field verify and provide clear bright colored marking to the cracks to be repaired. Crack repair work shall not begin until marking is complete and has been approved by Engineer.

1-2. SUBMITTALS. Specifications and data covering physical properties, mixtures, application procedures, and curing procedures of the materials

proposed shall be submitted in accordance with the Submittals Procedures section. Submittals shall include the approvals from the material manufacturer.

1-3. QUALITY ASSURANCE.

1-3.01. Manufacturer's Field Services. The material manufacturer shall provide engineering field services to review the Work and the material application prior to any preparation; to approve the applicator, the material used, and the procedure to be used; to observe surface preparation; to approve surface preparation; and to observe application. The field representative of the material manufacturer shall submit, in writing through Contractor, approvals of proposed material, application procedures, applicator, and surface preparation. The field representative shall be an employee of the material manufacturer.

1-3.02. Applicator. The applicator shall submit through Contractor a satisfactory experience record including references from previous application of the specified materials to structures of similar design and complexity.

1-3.03. Pre-Construction Meeting. At least 30 days prior to concrete crack repairs, Contractor shall conduct a meeting to review the detailed requirements for rehabilitation work. Site conditions, surface preparation, proposed equipment, procedures, material mixing, placing procedures, and curing methods shall be discussed and approved by Engineer and by the manufacturer's field representative. Contractor shall require the attendance of all involved parties, including but not limited to Contractor's superintendent, repair contractor, manufacturer's field representative and proposed equipment supplier representative. Minutes of the meeting shall be recorded, typed and printed by Contractor and distributed to all parties within 5 days after the meeting.

1-3.04. Quality Assurance Certification. Material manufacturers shall be ISO 9001/9002 registered or shall provide proof of documented quality assurance. The documented quality assurance system shall be obtained through an independent auditing registrar.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

PART 2 - PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS. Unless otherwise specified or authorized, repairs shall conform to the requirements specified herein. Types of repairs not specified herein shall be as specified in other sections, as indicated on the Drawings, or, in the absence of any definite requirement, as recommended by the manufacturer's representative and subject to acceptance by Engineer. The following types of repairs shall be performed as required.

2-1.01. Pressure-Injected Epoxy Resin. Unless indicated otherwise on the drawings, pressure-injected epoxy resin shall be used to seal joints and cracks that are not intended to permit movement.

2-1.02. Pressure-Injected Foam Resin. Unless indicated otherwise on the drawings, pressure-injected foam resin shall be used to seal joints that are intended to permit movement.

2-1.03. Crack Sealant. Crack sealant shall be used to seal cracks in structures prior to pressure injection of resin.

2-2. ACCEPTABLE PRODUCTS. Repair products/materials shall be as specified herein. Equivalent products of other manufacturers regularly producing high quality concrete crack repair products/materials, providing engineering field services, and meeting the specified quality assurance requirements may be furnished subject to review and acceptance by Engineer.

2-3. MATERIALS. Materials shall be approved by the manufacturer for the type of application, including temperature and moisture conditions encountered.

Pressure-Injected Epoxy Resin	ASTM C881, Type I or Type IV, moisture tolerant or moisture insensitive.
Crack Sealant	As recommended by the manufacturer of the pressure-injected epoxy resin product.
Pressure-Injected Foam Resin	Hydrophilic polyurethane foam; Prime Resins "Prime-Flex 900 XLV", DeNeef "Sealfoam PUR", or Avanti "AV-333 Injectaflex".
Foam Resin Accelerator	As recommended by foam resin manufacturer.
Water	Clean and free from deleterious substances.

PART 3 - EXECUTION

3-1. INSPECTION. Prior to the placement of the repair materials, the crack to be repaired shall be inspected by the material manufacturer to assure that preparation and conditions are correct for the type of repair and the product/material being used as specified herein.

3-2. PREPARATION. All cracks and surfaces around the cracks shall be free of objectionable substances and shall conform to the requirements of the material manufacturer. Concrete and shotcrete to be repaired shall be cleaned by methods acceptable to the material manufacturer so that the cracks are free of dirt, oil, grease, laitance, and other foreign matter. All loose and deteriorated existing concrete and shotcrete shall be removed down to sound materials. All concrete and shotcrete surfaces shall be checked for delamination to ensure that all surfaces are sound. All edges shall be square cut to avoid feather edges.

Any other preparation recommended by the material manufacturer shall be brought to Engineer's attention and may be incorporated into the work if acceptable to Engineer.

Concrete and shotcrete surfaces in the area of a crack to be repaired shall be cleaned by wire brushing, blasting, or other acceptable methods.

Wall surfaces shall be sandblasted clean to expose crack networks and construction joints. If there is active water seepage in the repair area, the seepage shall be stopped as recommended by the injection material manufacturer and as acceptable to Engineer. Injection ports shall be installed, when recommended by the injection material manufacturer.

3-2.01. Injected Epoxy Resin. Preparation for injected epoxy resin shall include sealing the surface at the crack, on both sides when possible, with crack sealant as recommended by the material manufacturer and as acceptable to Engineer for the pressure injection work. Injection ports for epoxy resin shall penetrate through the crack sealant into the cracks at spacings recommended by the material manufacturer.

3-2.02. Injected Foam Resin. Preparation for injected foam resin shall include drilling offset injection holes at an angle that will intersect the crack, joint, or crack network at approximately one-half the thickness of the concrete or shotcrete up to a thickness of 36 inches [900 mm]. Spacing of injection ports shall be determined as recommended by the injection material manufacturer and as acceptable to Engineer. When the injection material manufacturer certifies, in writing, that spacing of injection ports and installation procedures are acceptable, the injection ports may be installed directly into the crack, subject to review by Engineer.

3-3. APPLICATION. Concrete and shotcrete repair work shall be performed in accordance with the following requirements.

3-3.01. Crack Sealant. Crack sealant shall be trowel-applied to a minimum dried thickness of 1/8 inch [3 mm], or thicker if directed by manufacturer's literature. The concrete surface where the sealant is applied shall be smooth, uniform, and free from irregularities. Crack sealant shall be removed after the injection of resin is completed, except for portions of wall faces that will be at least 12 inches below the finished grade.

3-3.02. Pressure-Injected Resin. The injected areas shall be prepared as specified and as recommended by the manufacturer. Pressure-injected resin shall be suitable for penetration of joints, cracks, and crack networks 2 mils (0.002 inch) [50 µm] wide and larger.

After the joints and cracks are prepared and before the injection of the resin, the joints shall be flushed with water. The water flush shall be terminated when the turbidity of the expelled water is equal to that of the flush water. Unless otherwise acceptable to resin manufacturer and Engineer, cracks shall be dry prior to injecting resin.

The pumping equipment used for the pressure injection of resin shall have pressure metering. Written procedures for use and quality control of the injection equipment shall be furnished to Engineer for review and acceptance. The pump shall be electric. The material and process used for the pressure injection of the resin shall have been in use a minimum of 5 years.

The joints and crack networks shall have a minimum of 90 percent penetration of resin into the joint or crack network. Core samples may be taken at Engineer's discretion.

3-3.02.01. Epoxy Resin. Epoxy resin shall be injected into the structure in accordance with the material manufacturer's recommendations and as acceptable to Engineer. Epoxy resin shall be injected until the resin appears at the next injection port.

3-3.02.02. Foam Resin. Foam resin shall be premixed and injected into the structure in accordance with the material manufacturer's recommendations and as acceptable to Engineer. Foam resin shall be injected into the structure until the resin appears at the next injection port.

Surfaces of cracks and joints may need to be sealed with crack sealant.

3-3.03. Cold Weather. When ambient temperatures below 40°F [4°C] are expected during the curing period, the repair materials shall be maintained at a temperature of at least 50°F [10°C] for 14 days or 75°F [24°C] for 7 days after placement. Sudden cooling of the repair materials shall not be permitted.

3-4. PROTECTION. Post-placement curing and protection shall be as specified herein and in accordance with the manufacturer's recommendations.

3-5. CLEANING. Work areas shall be cleaned each day in accordance with the Project Requirements section. Upon completion of the final cleanup, Contractor shall restore all areas affected by the grouting procedures to their original condition, leaving no trace of material piles or other wasted materials.

End of Section

Section 05550

ANCHORAGE IN CONCRETE AND MASONRY

PART 1 - GENERAL

1-1. **SCOPE**. This section covers the design and installation of anchors in concrete and masonry. It includes cast-in-place anchor bolts and anchor rods, adhesive anchors for both threaded rods and reinforcing bars, expansion anchors, and undercut anchors.

1-2. **GENERAL**.

1-2.01. **Anchors Designed by Engineer**. Cast-in-place and post-installed anchors that are fully detailed on the Drawings have been designed by Engineer, and may not be changed to a different type without written approval of Engineer.

1-2.02. **Anchors Designed by Contractor's Suppliers**. Contractor's material suppliers shall be responsible for design of anchors for railings, ladders, equipment, pre-engineered structures, and other manufactured items, as indicated in the Drawings and Specifications. Anchors shall be designed for all operating conditions, including wind and seismic loadings when indicated in the Meteorological and Seismic Design Criteria section. Cast-in-place anchors shall be used unless post-installed types are indicated on the Drawings or accepted by Engineer. Adhesive anchors used in vibrating applications, such as for pumps, shall only be used if the manufacturer submits documentation indicating that the product is suitable for the service conditions.

1-2.03. **Materials**. Unless otherwise indicated, anchors of structural steel members connected to concrete shall have a diameter of at least 3/4 inch, and structural members connected to masonry shall have a diameter of at least 5/8 inch. Anchors for ladders and equipment shall have a diameter of at least 1/2 inch. Anchors for pedestrian railing systems shall have a diameter of at least 3/8 inch.

Unless otherwise indicated on the Drawings, anchors used in the following locations and applications shall be of the indicated materials.

Cast-In-Place Anchor Bolts and Anchor Rods

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.
Buried locations	Stainless steel.
Anchorage of structural steel columns	Galvanized steel.
Other exterior locations	Galvanized steel.
Other interior locations	Carbon steel.

Adhesive, Expansion, and Undercut Anchors

Submerged locations	Stainless steel.
Locations subject to splashing	Stainless steel.

Buried locations	Stainless steel.
Anchorage of structural steel columns	Stainless steel.
Other exterior locations	Stainless steel.
Other interior locations	Carbon steel.

Adhesive, expansion, and undercut anchors may be used instead of cast-in-place anchors only where specifically indicated or permitted on the Drawings or with the specific acceptance by Engineer.

1-3. **SUBMITTALS.** Data, catalog cuts, and manufacturer's research reports (from independent organizations such as ICC-ES or IAPMO UES) indicating the manufacturer and types of adhesive anchors, expansion anchors, and undercut anchors to be supplied shall be submitted in accordance with the Submittals Procedures section.

If Contractor requests use of products other than those indicated herein, calculations may be required as part of the submittal package. Calculations shall be prepared by a professional engineer licensed in the state of the project, using methods and procedures required by the building code. Contractor shall demonstrate that the proposed substitute anchors are equivalent in all necessary criteria, including strength, spacing and edge distance limitations, embedment depth limitations, temperature limitations, and any other criteria required by Engineer.

1-4. **DELIVERY, STORAGE, AND HANDLING.** Materials shall be handled, transported, and delivered in a manner which will prevent damage or corrosion. Damaged materials shall be promptly replaced. Materials shall be shipped and stored in original manufacturer's packaging.

PART 2 - PRODUCTS

2-1. **MATERIALS.** Unless otherwise indicated on the drawings, materials shall be as indicated below.

Cast-In-Place Anchor Bolts and Anchor Rods

Carbon steel	ASTM F1554, Grade 36 with compatible nuts.
Galvanized steel	ASTM F1554, Grade 36 with compatible nuts; hot-dip galvanized, ASTM F2329.
Stainless steel	Bolts, ASTM F593, Alloy Group 1 or 2 (minimum yield strength of 45 ksi); nuts, ASTM F594, Alloy Group 1 or 2.
Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.

Expansion Anchors in Concrete	Products shall be single component anchors tested in accordance with ICC AC193, and shall have a manufacturer's research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces. Hilti "Kwik-Bolt TZ" or Powers Fasteners "Power-Stud+SD2" (carbon steel), "Power-Stud+SD4" (304 stainless steel), and "Power-Stud+SD6" (316 stainless steel).
Expansion Anchors in Grouted Concrete Masonry Units	Products shall be single component anchors tested in accordance with ICC AC01, and shall have a manufacturer's research report in compliance with the applicable building code. Hilti "Kwik-Bolt TZ Masonry Anchors", Simpson "Wedge-All", or Powers Fasteners "Power-Stud+ SD1".
Undercut Anchors in Concrete	Products shall be tested in accordance with ICC AC193, and shall have a manufacturer's research report in compliance with the applicable building code. Hilti "HDA Undercut Anchor" (carbon steel) and "HDA-R Undercut Anchor" (stainless steel), or Powers Fasteners "Atomic+ Undercut Anchor" (A36 carbon steel).
Adhesive Anchors in Concrete	Products shall be tested in accordance with ICC AC308, and shall have a manufacturer's research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Threaded Rods and Nuts (Carbon Steel)	ASTM A307 or ASTM F1554 Grade 36.
Threaded Rods and Nuts (Carbon Steel)	ASTM F593, CW.
Reinforcing Bars	ASTM A615, Grade 60, deformed.
Reinforcing Bars, weldable	ASTM A706, Grade 60, deformed.
Adhesive	Hilti "HIT-HY 200", or Powers Fasteners "Pure 110+".
Adhesive Anchors in Grouted Concrete Masonry Units	Products shall be tested in accordance with ICC AC58, and shall have a manufacturer's research report in compliance with the applicable building code.
Threaded Rods and Nuts (Carbon Steel)	ASTM A307 or ASTM F1554 Grade 36.
Threaded Rods and Nuts (Stainless Steel)	ASTM F593 CW (Hilti or Powers systems), or ASTM A193 Grades B6, B8, or B8M (for Simpson system).

Adhesive	Hilti "HIT HY 70", Powers "AC100+ Gold", or Simpson "SET XP".
Adhesive Anchors in Hollow Concrete Masonry Units	Products shall be tested in accordance with ICC AC58, and shall have a manufacturer's research report in compliance with the applicable building code.
Threaded Rods and Nuts (Carbon Steel)	ASTM A307 or ASTM F1554 Grade 36.
Threaded Rods and Nuts (Stainless Steel)	ASTM F593 CW (Hilti or Powers systems), or ASTM A193 Grades B6, B8, or B8M (for Simpson system).
Adhesive	Hilti "HIT HY 70", Powers "AC100+ Gold", or Simpson "SET XP".
Screen Tubes	As recommended by the manufacturer.
Adhesive Anchors in Unreinforced Brick Masonry	Products shall be tested in accordance with ICC AC60, and shall have a manufacturer's research report in compliance with the applicable building code.
Threaded Rods and Nuts	ASTM A307.
Adhesive	Hilti "HIT HY 70", Simpson "SET".
Screen Tubes	As recommended by the manufacturer.

2-2. ANCHORS.

2-2.01. Cast-in-Place Anchor Bolts and Anchor Rods. Cast-in-place anchor bolts and anchor rods shall have forged heads or embedded nuts and washers. Anchors shall be delivered in time to permit setting prior to the placing of structural concrete or masonry grout. Anchor sleeves shall not be used unless acceptable to Engineer. Unless installed in sleeves, anchor bolts and anchor rods shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template. Two nuts, a jam nut, and a washer shall be furnished for cast-in-place anchor bolts and anchor rods indicated on the Drawings to have locknuts; two nuts and a washer shall be furnished for cast-in-place anchor bolts and anchor rods without locknuts.

2-2.02. Adhesive, Expansion, and Undercut Anchors. When adhesive, expansion, or undercut anchors are indicated on the Drawings, only acceptable systems shall be used. Acceptable systems shall include only those systems and products specified or specifically indicated by product name on the Drawings. Alternative anchoring systems may be used only when specifically accepted by Engineer.

Unless otherwise noted, single nuts and washers shall be provided with adhesive anchors, expansion anchors, and undercut anchors. Adhesive anchors shall be free of coatings that would weaken the bond with the adhesive.

Adhesive anchors in hollow CMU masonry and unreinforced brick masonry shall utilize screen tubes as recommended by the manufacturer.

PART 3 - EXECUTION

3-1. GENERAL. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchors immediately before tightening of the nuts.

3-1.01. Compliance With Manufacturer's Instructions. Post-installed anchors shall be installed in accordance with the manufacturer's printed installation instructions and all applicable requirements of the manufacturer's research report for the specific anchor system. If conflicts are found between the Drawings, the manufacturer's printed installation instructions, and the manufacturer's research report installation requirements, Contractor shall notify Engineer for resolution.

3-1.02. Special Inspection. Special inspection requirements for cast-in-place and post-installed anchors shall be as indicated in the Code-Required Special Inspections and Procedures section. Anchorage work shall be performed in a manner that allows the inspections to take place without adversely impacting the schedule.

3-2. CAST-IN-PLACE ANCHOR BOLTS AND ANCHOR RODS. Cast-in-place anchor bolts and anchor rods shall be carefully positioned with templates and secured in the forms prior to placing concrete, or in masonry bond beams prior to placing grout. Contractor shall verify that anchorage devices are positioned in accordance with the Drawings and with applicable equipment or structure submittal drawings.

Threads, bolts, and nuts spattered with concrete or masonry grout during placement shall be cleaned prior to final installation of the bolts and nuts.

Sleeves shall be filled with non-shrink grout.

3-3. ADHESIVE ANCHORS. Adhesive shall be statically mixed in the field during application. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

Anchors or bars shall be installed in holes hammer drilled into hardened concrete or masonry. Drill shall be set to rotation-only mode when drilling into hollow CMU or into brick. Diameter of holes shall be 1/16 inch larger than the outside diameter of the rod or bar unless recommended otherwise by the anchor system manufacturer. Holes shall be prepared by removing all dust and debris using procedures recommended by the adhesive manufacturer.

Adhesive anchors and holes shall be clean, dry, and free of grease and other foreign matter at the time of installation. The adhesive shall be placed and the rods or bars shall be set in accordance with the recommendations of the manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids.

3-3.01. Concrete Installation. Unless indicated otherwise on the Drawings, reinforcing bars shall be embedded to a depth of 15 bar diameters, and threaded rods shall be embedded to a depth that will develop the yield strength of the rod.

Adhesive anchors in concrete shall be installed under the following conditions.

Minimum Age of Concrete Prior to Anchor Installation	21 days.
Concrete Temperature Range	Maximum short-term temperature 162 F, maximum long-term temperature 110 F.

Moisture Condition	Dry concrete.
Type of Lightweight Concrete	N/A
Hole Drilling and Preparation	Hammer drill only.

Installation of adhesive anchors into concrete that are either horizontal or upwardly inclined shall be performed only by personnel certified by the ACI/CRSI Adhesive Anchor Installation Certification Program.

3-3.02. Masonry Installation. Anchors shall be installed to meet all criteria in the manufacturer's installation instructions and ICC-ES reports, including but not limited to minimum compressive strength at time of installation, minimum edge distances, minimum clearances from mortar joints, minimum anchor spacing, and use of screen tubes.

3-4. EXPANSION AND UNDERCUT ANCHORS. Expansion and undercut anchors shall be installed using all procedures and accessory devices recommended by the anchor manufacturer.

End of Section

Section 05990

STRUCTURAL METALS

PART 1 - GENERAL

1-1. SCOPE. This section covers the fabrication and erection of structural metal items.

Except as otherwise specified or indicated on the Drawings, all work shall conform to the applicable provisions of the AISC "Steel Construction Manual" (14th edition) with the exception of the "Code of Standard Practice for Steel Buildings and Bridges"; and the Aluminum Association "Specification for Aluminum Structures".

Special inspection during the fabrication and erection of structural steel, if required by the local building code, is addressed in the Code-Required Special Inspections and Procedures section.

Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

1-2. SUBMITTALS. Complete data, fabrication drawings, and setting or erection drawings covering all structural and miscellaneous metal items shall be submitted in accordance with the Submittals Procedures section.

All bolted connections and welds shall be properly identified on the shop drawings. Welding procedures, welding procedure qualification records and welder qualifications shall be submitted.

Submittals for high strength bolts, tension control bolts and load indicator washers shall include statements from the bolt and washer manufacturers certifying satisfactory compliance with the governing standards and the specified tests.

Submittals for items that are designed by the fabricator shall include drawings sealed by a professional engineer registered in the state of the project. Data shall include confirmation that the design meets all applicable code requirements. Calculations shall be submitted when requested by Engineer.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent bends, dents, significant coating damage, or corrosion. Damaged materials shall be promptly replaced. Structural and miscellaneous metal work shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads.

Bolting materials shall be stored indoors. Weld rod shall be stored in accordance with the supplier's instructions and AWS D1.1.

1-4. FABRICATOR QUALIFICATION. All fabricating plants providing structural steel shall be qualified fabricators who participate in the AISC Certification program and are designated an AISC Certified Plant, Category BU.

PART 2 - PRODUCTS

2-1. GENERAL. All materials needed for both shop and field assembly shall be furnished.

2-2. MATERIALS.

Steel

Shapes (W, WT)	ASTM A992.
Shapes (S, M, HP, C)	ASTM A36 or ASTM A572 Grade 50.
Other Shapes (angles)	ASTM A36.
Plates and Bars	ASTM A36.
Sheets	ASTM A1008 CS Type B or A1011 CS Type B.
Pipe	ASTM A53, Type E or S, Grade B ($F_y = 35$ ksi).
Round Structural Tubing	ASTM A500, Grade C ($F_y = 46$ ksi).
Square and Rectangular Structural Tubing	ASTM A500, Grade C ($F_y = 50$ ksi).
Bolts and Nuts	
Bolts, High Strength	ASTM F3125, Grade A325.
Bolts, Tension Control Type (Twist off)	ASTM F3125, Grade 1852.
Bolts, unfinished	ASTM A307.
Nuts, Heavy-Hex	ASTM A563, grade and finish compatible with bolts.
Nuts, Self-Locking	Prevailing torque type; IFI-100, Grade A.
Washers	
Flat, Hardened	ASTM F436, Type 1.
Lock	ANSI/ASME B18.21.1, helical spring type.
Beveled	ASTM F436.
Load Indicator	ASTM F959, compressible-washer-type direct tension indicator; type compatible with bolts tested in accordance with Article 10.2 of ASTM F959.
Threaded Rods (Including Hanger Rods for Pipe Supports)	ASTM A36. Threaded rods shall have sufficient threading to permit the maximum adjustment available. Continuously threaded rod is not acceptable for rods over 12 inches in length.
Forged Steel Sleeve Nuts	AISI C-1018, Grade 2.

Stainless Steel

Shapes	ASTM A1069 or A276, Type 316L.
Plates	ASTM A240, Type 316L.
Pipe	ASTM A312, Grade TP316L.
Tube	ASTM A269, Grade TP316L.
Checkered Plate	ASTM A793, Type 316L, raised pattern A.
Bolts	ASTM F593, Alloy Group 1 or 2, minimum yield strength of 45 ksi.
Nuts	ASTM F594, Alloy Group shall match that of the bolts. Nuts shall have a minimum proof stress equal to or greater than the minimum full-size tensile strength of the bolts.
Washers	
Flat	ANSI/ASME B18.22.1, Type 316.
Lock	ANSI/ASME B18.21.1, helical spring type, Type 316.
Threaded Rods (Including Hanger Rods for Pipe Supports)	ASTM A593, Alloy Group 1 or 2, minimum yield strength of 45 ksi.

Aluminum

Sheet and Plate	ASTM B209, Alloy 6061-T6.
Rolled Sections	ASTM B308, Alloy 6061-T6. All members shall be Aluminum Association standard shapes. Special shapes with sloping flange surfaces, or Army-Navy type members, shall not be used unless specifically indicated on the Drawings.
Rod and Bar (Rolled or Drawn)	ASTM B211, Alloy 6061-T6 or 2017-T4.
Extrusions	ASTM B221, Alloy 6063-T5 or T6.
Pipe	ASTM B429, Alloy 6061-T6.
Rivets	ASTM B316, Alloy 6061-T6.
Bolts, Aluminum	ASTM F468, Alloy 2024-T4.
Nuts, Aluminum	ASTM F467, Alloy 6061-T6.
Washers, Aluminum	

Flat	ANSI/ASME B18.22.1, Type 6061 T-6.
Lock	ANSI/ASME B18.21.1, helical spring type, Type 6061-T6.
Weld Metal (Steel Connections)	ANSI/AWS D1.1, Table 3.1, filler metal with minimum 70 ksi tensile strength unless otherwise required.
Rails	
Crane	ASTM A1.
Railroad	ASTM A1.
Shop Coatings	
Universal Primer	As indicated in the Protective Coatings section.
Bituminous Paint	Metal fabricator's standard product.
Galvanizing	ASTM A123, A153, A385, and F2329 as applicable.

2-3. STAIRS. Stairs shall be fabricated to the dimensions, arrangements and sizes indicated on the Drawings. Stairs shall be true to line and slope, shall be rigidly supported, and shall be braced and tightened to prevent movement. All treads shall be level and in perfect alignment and spacing.

After installation, stairs shall be rigid and shall not sway noticeably or deflect under foot traffic. If necessary to prevent noticeable movement, additional supports or bracing shall be provided.

2-3.01. Stair Design. Stairs shall be designed by the stair supplier in general accordance with details indicated on the Drawings. The design shall comply with all applicable provisions of the local building code, ANSI A117.1, and OSHA as applicable. The drawings shall be sealed by a professional engineer registered in the state of the project. If requested, calculations shall be submitted to Engineer.

The completed fabrications shall support a uniform live load of 100 lbs per square foot and a concentrated load of 300 lbs applied at the center of the span. Individual treads and platforms shall be designed to support a uniform live load of 100 lbs per square foot or a 300 lb concentrated live load applied on an area of 4 square inches. Vertical deflections under full live load shall be limited to span/240. Stairs and landings shall be braced or otherwise designed to avoid noticeable sidesway.

The stair design and details shall be coordinated with the handrailing and guardrailing supplied. Stair members shall be adequate to accept loads from the rail posts based upon the criteria in the Metal Railings section.

Connections between the stair members and the supporting structure shall be adequate to transfer all loadings, and shall be designed in accordance with all applicable provisions of the AISC manual and ACI 318 Appendix D. The number and type of connections shall comply, at a minimum, with the Drawings. All necessary brackets, bolts, and anchors shall be provided.

2-3.02. Nosings. All stair treads shall have non-skid nosings, either fabricated integrally with the tread or attached with stainless steel bolts and self-locking nuts.

2-3.03. Grating Stairs. Treads shall be fabricated from grating material in accordance with the Metal Gratings section.

2-3.04. Pan Type Stairs. Risers and subtreads shall be fabricated from 12 USS gage steel and subplatforms from 10 USS gage steel. Fill depth shall be 2 inches for treads and 3 inches for platforms. Each riser shall have an integral non-slip nosing and a formed sanitary cove, located so that the toe of the cove will be at the surface of the concrete fill or applied finish.

2-3.05. Cast Aluminum Stairs. Risers and subtreads shall be fabricated from cast aluminum as indicated on the details on the Drawings.

2-4. CRANE SYSTEMS. Not Used.

2-5. STRUCTURAL STEEL BOLTED CONNECTIONS. Bolt holes shall have a diameter nominally 1/16 inch larger than the nominal bolt diameter. Bolt holes for one ply of vertical diagonal bracing connections may be oversized to a diameter nominally 3/16 inch larger than the nominal bolt diameter.

2-6. SHOP COATING. All items shall be shop coated as specified herein. The requirements for field painting are covered in the Protective Coatings section.

Contact surfaces of structural steel slip critical bolted connections shall not be shop coated. Contact surfaces of structural steel bearing type bolted connections may be shop coated.

2-6.01. Cleaning. Surfaces shall be dry and of proper temperature when coated, and shall be free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux, slag, weld spatter, and other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by solvent, high-speed power wire brushing or by blasting to the extent recommended by the paint manufacturer and as required in the Protective Coatings section.

2-6.02. Edge Grinding. Sharp projections of cut or sheared edges of ferrous metals which will be submerged in operation, except for items specified to be hot-dip galvanized, shall be ground to a radius as needed to ensure satisfactory paint adherence and as required in the Protective Coatings section.

2-6.03. Prime Painted Steel. Unless otherwise specified or indicated on the Drawings, all ungalvanized structural and miscellaneous steel shall be given a universal prime coat in the shop after fabrication. The dry film thickness of the universal primer shall be at least 5 mils. Steel surfaces shall be prime-coated as soon as practicable after cleaning. Steel shall not be moved or handled until the shop coat is dry and hard.

2-6.04. Galvanizing. Steel materials required to be galvanized are indicated on the Drawings. All galvanizing shall be done by the hot-dip process after fabrication. An approved zinc-rich paint shall be used to touch up minor coating damage, in accordance with ASTM A780. Materials with significant coating damage shall be regalvanized or replaced.

Bolts, nuts, and washers shall be galvanized when connected materials are galvanized or where indicated on the Drawings. The use of zinc-plated bolts will not be acceptable.

2-6.05. Stainless Steel. Unless otherwise specified, all items fabricated from stainless steel shall be thoroughly cleaned and degreased after fabrication. Pickling or a light blast cleaning shall

produce a modest etch and remove all embedded iron and heat tint. Surfaces shall be subjected to a 24 hour water test or a ferroxyl test to detect the presence of residual embedded iron and shall be retreated as needed to remove all traces of iron contamination. Surfaces shall be adequately protected during shipping and handling to prevent contact with iron or steel objects or surfaces.

2-6.06. Aluminum. All surfaces of aluminum which will be in contact with concrete, mortar, or dissimilar metals shall be given a coat of bituminous paint.

PART 3 - EXECUTION

3-1. STRUCTURAL STEEL ERECTION. Structural steel shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevations of the top of floor and roof members shall be within 1/16 inch of the elevations indicated on the Drawings. The faces of girts and other supporting members for rigid wall panels shall be in vertical planes within a maximum variation of 1/8 inch.

All members and parts, as erected, shall be free of warps, local deformations, and unauthorized bends. All parts shall be assembled accurately as indicated on the Drawings. Light drifting will be permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills and only with the approval of Engineer. Enlarging holes by burning will not be permitted.

Baseplates shall be set level in exact position and grouted in place.

3-1.01. Inspection and Testing. Special inspection will be performed as indicated in the Code Required Special Inspections and Procedures section. The erector shall provide access as needed to facilitate all inspections and shall provide timely notification during erection when inspection milestones are approaching.

3-2. STRUCTURAL STEEL BOLTED CONNECTIONS. Unless otherwise indicated on the Drawings, bolted connections for structural steel, as defined in the AISC manual, shall be made with ASTM F3125 high strength bolts conforming to the "Specification for Structural Joints Using High-Strength Bolts" as approved by the Research Council on Structural Connections. The method of installation, pretensioning procedures, bolting equipment and tools shall likewise conform to the above referenced standard.

When assembled, all joint surfaces, including those adjacent to the bolt heads, nuts, or washers, shall be free of loose mill scale, dirt, burrs, oil, and other foreign material that would prevent solid seating of the parts.

Beveled washers shall be used when the bearing faces of bolted parts have a slope of 1:20 or greater with respect to a plane perpendicular to the bolt axis. Bolt length shall be increased as needed to accommodate the beveled washers.

If oversized holes are provided in an outer ply, a hardened flat washer shall be installed over each hole during bolting. Load indicator washers shall not be substituted for hardened flat washers required for oversized holes.

Tightening of each connection assembly shall progress systematically from the most rigid part of the joint toward the free edges until all have been sufficiently rotated or the load indicator washers on all bolts have been closed to the average gap stipulated by the load indicator washer manufacturer.

Except as otherwise indicated on the Drawings or specified herein, bolted connections shall be bearing type with threads excluded from the shear plane. Slip critical connections shall be used in

diagonal bracing connections, where oversized holes or slotted holes parallel to the direction of the load are used, and where indicated on the Drawings.

Bolts in all structural steel connections, both bearing and slip critical, shall be fully pretensioned in accordance with the AISC standards unless specifically noted otherwise on the Drawings. The calibrated wrench method of pretensioning bolts will not be acceptable. Acceptable pretensioning methods are as follows:

Connection Type	Acceptable Pretensioning Method
Bearing	Turn of the nut method and load-indicator washers are acceptable. Tension control (twist-off) type bolts may be used only if approved by Engineer.
Slip-Critical	Load indicator washers.

3-2.01. Turn of the Nut Method. The bolt, nut, and material shall be match marked. A wax lumber marker or paint shall be used to clearly mark the assembly.

3-2.02. Load-Indicator Washers. Load indicator washers shall be installed in accordance with the manufacturer's recommendations, as supplemented herein. To facilitate proper tightening of fastener assemblies with load indicator washers, a hardened flat washer shall be installed under the turned element (bolt head or nut) and between the turned element and the load indicator washer protrusions, in all cases. Whenever possible, the load indicator washer shall be installed on the head end of the bolt. If the bolt head will not be visible for inspection of the indicator washer after installation, or if the bolt head must be turned to tighten the assembly, the load indicator washer may be installed on the nut end of the bolt.

3-2.03. Tension Control (Twist-off) Bolts. Patented tension control bolts shall be of equivalent size and strength to the indicated high strength bolts, and shall be installed in strict accordance with the manufacturer's instructions. Load-indicator washers are not required on tension control bolts.

3-3. STRUCTURAL, STAINLESS, AND MISCELLANEOUS STEEL WELDING.

Welding and related operations shall conform to applicable provisions of AWS D1.1 for steel and AWS D1.6 for stainless steel. All welding shall be performed in accordance with written procedures, using only those joint details which have prequalified status. All welding shall be performed by welders qualified in accordance with the American Welding Society.

Welds not dimensioned on the Drawings shall be sized to develop the full strength of the least strength component of the connection.

Where structural or miscellaneous steel connections are welded, all butt and miter welds shall be continuous and, where exposed to view, shall be ground smooth. Intermittent welds shall have an effective length of at least 2 inches and shall be spaced not more than 6 inches apart.

Surfaces to be welded and surfaces within 2 inches of a weld shall be free from loose or thick scale, slag, rust, moisture, grease, paint and other foreign materials that would prevent proper welding or release objectionable fumes.

Only shielded metal arc, gas metal arc, flux cored arc, submerged arc, and gas tungsten arc welding are permitted. For flux cored arc welding, only E70xx one (1) or five (5) wire electrodes with supplemental gas shielding shall be permitted. Use of electroslag or electrogas welding processes or the short-circuiting transfer mode of the gas metal arc process will not be acceptable.

Field welded connections shall not be substituted for field bolted connections indicated on the Drawings.

3-4. STRUCTURAL AND MISCELLANEOUS ALUMINUM. Unless otherwise noted, all work shall conform to applicable provisions of the Aluminum Association "Specification for Aluminum Structures".

3-4.01. Connections. Connections not specifically detailed on the Drawings shall develop the full strength of the least strength member of the connections. Bolted connections shall be all-bolted bearing type, equipped with a helical spring lock washer under the stationary element (bolt head or nut) and a flat washer under the turned element. All bolts shall be fully tightened. Bolts and nuts for structural aluminum connections shall be stainless steel. A sufficient number of bolts shall be provided in each connection to develop the shear strength of the member.

Welded connections shall be made in accordance with the American Welding Society D1.2, Structural Welding Code - Aluminum. All welding shall be performed by welders qualified in accordance with American Welding Society. Welds shall be free of porosity, cracks, holes, and flux. Welded connections shall not be substituted for bolted connections without prior approval of Engineer.

3-4.02. Erection. Structural aluminum shall be erected so that individual pieces are plumb, level, and aligned within a tolerance of 1:500. The elevation of horizontal members shall be within 1/16 inch of the elevation indicated on the Drawings.

End of Section

Section 09940

PROTECTIVE COATINGS

PART 1 - GENERAL

1-1. **SCOPE**. This section covers field applied protective coatings, including surface preparation, protection of surfaces, inspection, and other appurtenant work for equipment and surfaces designated to be coated with heavy-duty maintenance coatings. Regardless of the number of coats previously applied, at least two field coats in addition to any shop coats or field prime coats shall be applied to all surfaces unless otherwise specified.

1-2. **GENERAL**. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the manufacturer's minimum recommendations. When equivalent products are acceptable to Engineer, Contractor shall comply with this Specification and the coating manufacturer's recommendations.

1-2.01. **Governing Standards**. All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of the following AWWA, ANSI, NACE, SSPC, NSF, and ASTM.

1-2.02. **Delivery and Storage**. All coating products shall be received and stored in accordance with the coating manufacturer's recommendations.

1-2.03. **Coatings, Painting, and Linings Covered in Other Sections**. Not used.

1-3. **SUBMITTALS**. Contractor shall submit color cards for all coatings proposed for use, together with complete descriptive specifications, manufacturer's product data sheet and the completed Coating System Data Sheets, to Engineer for review and color selection. Each product data sheet shall include application temperature limits including recoat time requirements for the ambient conditions at the site, including temperatures up to 130°F [54°C]. Requests for review submitted directly to Engineer by coating suppliers will not be considered.

When the proposed products will be in contact with treated or raw water in potable water treatment facilities, Contractor shall submit certifications that the proposed systems are in compliance with ANSI/NSF 61.

Contractor shall submit a Coating System Data Sheet for each separately identified surface in the Metal Surfaces Coating Schedule, Concrete and Masonry Surfaces Coating Schedule, and the Miscellaneous Surfaces Coating Schedule that will be used in the Project, using the appropriate Coating System Data Sheet forms (Figures 1-09940 and 2-09910) at the end of this section. Each field coating system shall be acceptable to the coating material manufacturer.

Coating System Data Sheets shall be assigned a unique number with a prefix letter based on the following:

Prefix	Surfaces	Fig.09940
A	Iron and steel (coated entirely in field)	1
A	Iron and steel (shop primed)	2
C	Concrete and concrete block	1

E	Equipment - submerged	1
E	Equipment – nonsubmerged	2
F	Nonferrous metal	1
G	Galvanized	1
H	High temperature	1
P	PVC and FRP	1

Each coating system that will be applied entirely in the field shall be assigned only a prefix letter and no suffix letter. Fig.1-09940 shall be submitted for each surface coated entirely in the field.

Each shop-applied coating system that includes one or more field applied coats shall be assigned both a prefix letter and suffix letter “F”. Fig.2-09940 shall be submitted for each surface having a shop applied coating and one or more field applied finish coats.

A separate Coating System Data Sheet shall be developed and submitted for each surface scheduled to be coated or variation or change in a coating system. The number identifying the surface and coating system shall be of the form A11 or A12-F. The subscript number shall be assigned by the Contractor so that each surface and coating system combination is uniquely identified. For example:

A1₁-F may be assigned to “Epoxy – one coat to metal curbs for skylights and power roof ventilators that have been shop primed.”

A2₁ may be assigned to “Epoxy – two coats to non-galvanized structural and miscellaneous steel exposed to view inside buildings.”

C2₁ may be assigned to “Epoxy – two coats to all concrete and concrete block in corrosive area (Except floors and surfaces scheduled to receive other coatings) which are exposed to view.”

C2₂ may be assigned to “Epoxy – two coats to walls, floors, and curbed areas, adjacent to corrosive chemical storage and feed equipment as indicated on the Drawings.”

1-4. QUALITY ASSURANCE.

1-4.01. Coating System Data Sheet Certifications. The coating applicator and coating manufacturer shall review and approve in writing the coating manufacturer's written recommendations for the coating system and the intended service. Any variations from the Specifications or the coating manufacturers published recommendations shall be submitted in writing and approved by the coating manufacturer.

1-4.02. Special Interior Coating Systems. Not used.

PART 2 - PRODUCTS

2-1. ACCEPTABLE MANUFACTURERS.

2-1.01. Alternative Manufacturers. In addition to the coatings listed herein, equivalent products of other manufacturers that distribute globally will also be acceptable.

2-1.02. Equivalent Coatings. Whenever a coating is specified by the name of a proprietary product or of a particular manufacturer or vendor, it shall be understood as establishing the desired type and quality of coating. Other manufacturers' coatings will be accepted, provided that sufficient information is submitted to enable Engineer to determine that the proposed coatings are equivalent to those named. Information on proposed coatings shall be submitted for review in accordance with the

Submittals Procedures section. Requests for review of equivalency will be accepted only from Contractor, and will be considered only after the contract has been awarded.

2-2. MATERIALS. All coatings shall be delivered to the job in original, unopened containers, with labels intact. Coatings shall be stored indoors and shall be protected against freezing. No adulterant, unauthorized thinner, or other material not included in the coating formulation shall be added to the coating for any purpose.

All coatings shall conform to the air quality regulations applicable at the location of use. Coating materials that cannot be guaranteed by the manufacturer to conform, whether or not specified by product designation, shall not be used.

With the exception of heat resistant coatings, the coatings specified have been selected on the basis of the manufacturer's statement that the VOC content of the product is 2.8 lbs per gallon [335 g/L] or less; however, it shall be the Contractor's responsibility to use only coating materials that are in compliance with the requirements of all regulatory agencies. Local regulations may require some coatings to have a lower VOC content than specified herein. The coatings specified may meet the VOC limits in the unthinned (as shipped) condition, but may exceed the limits if thinned according to the manufacturer's recommendations. In such case, the coatings shall not be thinned beyond the 2.8 lbs per gallon [335 g/L] limit, and if the product cannot be thinned to suit the application method or temperature limits, another manufacturer's coating shall be used, subject to acceptance by Engineer.

Contractor shall be responsible for ensuring the compatibility of field coatings with each other or with any previously applied coatings. Coatings used in successive field coats shall be produced by the same manufacturer. The first field coat over shop coated or previously coated surfaces shall cause no wrinkling, lifting, or other damage to underlying coats.

2-2.01 Primers.

Universal Primer (tie coat)	PPG Amercoat "Amercoat 385 Epoxy", Carboline "Rustbond", ICI Devoe "Devran 224HS", Tnemec "Series 27 F.C. Typoxy", or Sherwin-Williams "Dura Plate 235".
Zinc Primer	PPG Amercoat "Dimetate 9 Series", Carboline "Carbo Zinc II Series", ICI Devoe "Catha-Coat 304V", or Sherwin-Williams "Zinc Clad II Series".

2-2.02. Fillers and Surfacer.

Epoxy Concrete Block Filler	PPG Amercoat "Amerlock 400BF Epoxy Block Filler", Carboline "Sanitile 600", ICI Devoe "Truglaze 4015", Tnemec "Series 54-562", or Sherwin-Williams "Kem Cati-Coat HS".
Epoxy Concrete Filler and Surfacer	Tnemec "Series 218 MortarClad", PPG Amercoat "NuKlad 114A", Carboline "Carboguard 510", or Sherwin-Williams "Steel Seam FT910".

2-2.03. Intermediate and Finish Coatings.

Epoxy (NSF certified systems)

Ferrous Metal Surfaces and Concrete Surfaces in Contact with Treated or Raw Water in Potable Water Facilities	PPG Amercoat "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", ICI Devoe "Bar-Rust 233H" Tnemec "Series N140 Pota-Pox Plus", or Sherwin-Williams "Dura Plate 235 NSF"; immersion service.
Epoxy	
Concrete Floors	PPG Amercoat "Amerlock 400", Carboline "Carboguard 890", ICI Devoe "Devran 224HS", Tnemec "Series N69 Hi-Build Epoxoline II", or Sherwin-Williams "Armorseal 1000HS"; nonskid.
Ferrous Metal Surfaces and Masonry or Concrete Surfaces Other Than Floors	PPG Amercoat "Amercoat 385 Epoxy", Carboline "Carboguard 890", ICI Devoe Devran "224HS", Tnemec "Series N69 Hi-Build Epoxoline II", or Sherwin-Williams "Dura Plate 235".
Flake-Filled Epoxy	Carboline "Plasite 4500/4500S", Sherwin-Williams "Sher-Glass FF", or equal.
Aliphatic Polyurethane	PPG Amercoat "Amercoat 450H", Carboline "Carbothane 134HG", ICI Devoe "Devthane 379H" Tnemec "Series 1074 Endura-Shield II", or Sherwin-Williams "Acrolon 218HS".
Coal Tar Epoxy	High-build coal tar epoxy; PPG Amercoat "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Medium Consistency Coal Tar	Carboline "Bitumastic 50" or Tnemec "46-465 H.B. Tnemecol".
Vinyl Ester	Tnemec "Series 120 Vinester" Carboline "Plasite 4110" or Sherwin-Williams "Magnalux 304FF".
Heat-Resistant	Suitable for temperatures up to 400°F [207°C]; PPG Amercoat "Amerlock 400", Carboline "Thermaline 450", Tnemec "43-36 Chrome Aluminum", or Sherwin-Williams "Silver-Brite Aluminum".
High Heat-Resistant	Suitable for temperatures up to 1000°F [537°C]; PPG Amercoat "Amercoat 878", Carboline "Thermaline 4700 VOC", or Sherwin-Williams "Silver-Brite Hi-Heat Silicone Aluminum".

PART 3 - EXECUTION

3-1. SURFACE PREPARATION. All surfaces to be coated shall be clean and dry and shall meet the recommendations of the coating manufacturer for surface preparation. Freshly coated surfaces shall be protected from dust and other contaminants. Oil and grease shall be completely

removed by use of solvents or detergents before mechanical cleaning is started. The gloss on previously coated surfaces shall be dulled if necessary for proper adhesion of topcoats.

Surfaces shall be free of cracks, pits, projections, or other imperfections that would interfere with the formation of a smooth, unbroken coating film, except for concrete block construction where a rough surface is an inherent characteristic.

When applying touchup coating or repairing previously coated surfaces, the surfaces to be coated shall be cleaned as recommended by the coating manufacturer, and the edges of the repaired area shall be feathered by sanding or wire brushing to produce a smooth transition that will not be noticeable after the coating is applied. All coatings made brittle or otherwise damaged by heat of welding shall be completely removed.

3-1.01. Galvanized Surfaces. Galvanized surfaces shall be prepared for coating according to the instructions of the manufacturer of the epoxy. Any chemical treatment of galvanized surfaces shall be followed by thorough rinsing with clean water.

3-1.02. Ferrous Metal Surfaces. Ungalvanized ferrous metal surfaces shall be prepared for coating by using one or more of the following cleaning procedures specified here-in: solvents (SSPC-SP1); abrasive blasting (SSPC-SP5, -SP10, -SP6, or -SP7) power tools (SSPC-SP3 or -SP11); or hand tools (SSPC-SP2). Oil and grease shall be completely removed in accordance with SSPC-SP1 before beginning any other cleaning method. Surfaces of welds shall be scraped and ground as necessary to remove all slag and weld spatter. Tools which produce excessive roughness shall not be used.

All components of equipment that can be properly prepared and coated after installation shall be installed prior to surface preparation. Components that will be inaccessible after installation shall have the surfaces prepared and coated before installation. Motors, drive trains, and bearings shall be protected during surface preparation in accordance with the equipment manufacturer's recommendations.

All cut or sheared edges shall be ground smooth to a 1/8 inch [3 mm] minimum radius for all material 1/4 inch [6 mm] thickness and larger. For material thickness less than 1/4 inch [6 mm] all cut or sheared edges shall be ground smooth to a radius equal to 1/2 the material thickness. Grinding of rolled edges on standard shapes with a minimum radius of the 1/16 inch [1.5 mm] will not be required.

All ferrous metal surfaces shall have all welds ground smooth and free of all defects in accordance with NACE Standard SP0178, Appendix C, Designation C and sharp edges ground smooth, if not previously prepared in the shop. Instead of blending of the weld with the base metal as required by the NACE standard, it will be acceptable to furnish a welded joint that has a smooth transition of the weld to the base metal. All welds shall be ground smooth to ensure satisfactory adhesion of paint.

The cleaning methods and surface profiles specified herein are minimums, and if the requirements printed in the coating manufacturer's data sheets exceed the limits specified, the value printed on the data sheets shall become the minimum requirement.

3-1.02.01. Ferrous Metal Surfaces – Non-immersion Service. Ferrous metal surfaces, including fabricated equipment, in non-immersion service shall be cleaned to the degree recommended by the coating manufacturer for surfaces to be coated with coal tar epoxy, epoxy, and heat-resistant coatings, except galvanized surfaces. Surface preparation of ferrous metal surfaces in non-immersion service shall consist of abrasive blast cleaning to SSPC-SP6, and the first application of coating shall be performed on the same day. If more surface area is prepared than can be coated in one day, the uncoated area shall be blast cleaned again to the satisfaction of Engineer. Surface profile shall be as recommended by coating manufacturer, but not less than 2.0 mils [50 µm].

3-1.02.02. Ferrous Metal Surfaces - Immersion Service. Surface preparation of ferrous metal surfaces in immersion service shall consist of abrasive blast cleaning to at least SSPC-SP10

and the first application of coating shall be performed on the same day. If more surface area is prepared than can be coated in one day, the uncoated area shall be blast cleaned again to the satisfaction of Engineer. Surface profile shall be as recommended by coating manufacturer, but not less than 3.5 mils [88 µm].

3-1.03. Concrete Surfaces. All concrete surfaces shall be free of objectionable substances and shall meet the coating manufacturer's recommendations for surface preparation. Concrete surfaces shall be prepared in accordance with SSPC-SP13/NACE 6. Any other surface preparation recommended by the coating material manufacturer shall be brought to Engineer's attention and may be incorporated into the work if acceptable to Engineer.

All concrete surfaces shall be dry when coated and free from dirt, dust, sand, mud, oil, grease, and other objectionable substances. Oil and grease shall be completely removed by use of solvents or detergents before mechanical cleaning is started.

New concrete shall have cured for at least 4 weeks before coating is applied as recommended by the material manufacturer. Concrete surfaces shall be tested for capillary moisture in accordance with ASTM D4263. There shall be no capillary moisture when coatings are applied on concrete.

All surfaces to be coated shall be cleaned in accordance with ASTM D4258 and abraded in accordance with ASTM D4259. Surface profile shall be at least 25 percent of the dry film thickness specified for the coating system. Prior to application of the coating, the surfaces shall be thoroughly washed or cleaned by air blasting to remove all dust and residue. Spalled areas, voids, and cracks shall be repaired in accordance with the Concrete section and as acceptable to the Engineer. Fins and other surface projections shall be removed to provide a flush surface before application of coating.

Except where epoxy is applied as damp-proofing, the concrete surfaces, including those with bug holes less than 1 inch [25 mm] in any dimension, shall be prepared as recommended by the manufacturer, using an epoxy concrete filler and surfacer. Where coating with a vinyl ester the concrete filler and surfacer shall be as recommended by the manufacturer to be compatible with vinyl ester.

3-1.04. Concrete Block Surfaces. Voids and openings in concrete block surfaces shall be pointed. All exposed exterior surfaces and surfaces to be coated with epoxy, including the joints, shall be filled so that a continuous unbroken coating film is obtained.

3-1.05. Copper Tubing. All flux residue shall be removed from joints in copper tubing. Immediately before coating is started, tubing shall be wiped with a clean rag soaked in xylol.

3-1.06. Plastic Surfaces. All wax and oil shall be removed from plastic surfaces that are to be coated, including PVC and FRP, by wiping with a solvent compatible with the specified coating.

3-1.07. Hardware. Hardware items such as bolts, screws, washers, springs, and grease fittings need not be cleaned prior to coating if there is no evidence of dirt, corrosion, or foreign material.

3-1.08. Aluminum. When a coating system is required, remove all oil or deleterious substance with neutral detergent or emulsion cleaner or blast lightly with fine abrasive.

3-1.09. Stainless Steel. When a coating system is required, surface preparation shall conform to the coating manufacturer's recommendations.

3-2. MIXING AND THINNING. Coating shall be thoroughly mixed each time any is withdrawn from the container. Coating containers shall be kept tightly closed except while coating is being withdrawn.

Coating shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. In no case shall the wet film thickness of applied coating be reduced, by addition of coating thinner or otherwise, below the thickness recommended by the coating manufacturer. Thinning shall be done in compliance with all applicable air quality regulations.

3-3. APPLICATION. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be thoroughly dry and hard before the next coat is applied. Each coat shall be a different color, if available. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer.

Coating failures will not be accepted and shall be entirely removed down to the substrate and the surface recoated. Failures include but are not limited to sags, checking, cracking, teardrops, fat edges, fisheyes, or delamination.

3-3.01. Priming. Edges, corners, crevices, welds, and bolts shall be given a brush coat (stripe coat) of primer before application of the primer coat. The stripe coat shall be applied by a brush and worked in both directions. Special attention shall be given to filling all crevices with coating. When using zinc primers the stripe coat shall follow the initial prime coat.

Abraded and otherwise damaged portions of shop-applied coating shall be cleaned and recoated as recommended by the manufacturer of the finish coating. Welded seams and other uncoated surfaces, heads and nuts of field-installed bolts, and surfaces where coating has been damaged by heat shall be given a brush coat of the specified primer. Before the specified spot or touchup coating of metal surfaces, edges, corners, crevices, welds, and bolts in the area of the spot or touchup coating shall be given a brush coat of primer. This patch, spot, or touchup coating shall be completed, and the paint film shall be dry and hard, before additional coating is applied.

3-3.02. Epoxy. When used, epoxy shall be applied in accordance with the coating manufacturer's recommendations, including temperature limitations and protection from sunlight until top-coated.

When concrete is to be coated, coatings shall not be applied to concrete surfaces in direct sunlight or when the temperature of the concrete is rising. Preferably the coating shall be applied when the temperature of the concrete is dropping.

When applying high build epoxy coatings with a roller or brush and where a dry film thickness of at least 4-6 mils [100-150 μm] per coat is required, two or more coats shall be applied to achieve the recommended dry film thickness equal to a spray applied coating.

3-3.03. Coal Tar Epoxy. When used, the application of coal tar epoxy, including time limits for recoating, shall conform to the recommendations of the coating manufacturer.

When concrete is to be coated, coatings shall not be applied to concrete surfaces in direct sunlight or when the temperature of the concrete is rising. Preferably the coating shall be applied when the temperature of the concrete is dropping.

3-3.04. Vinyl Ester. When used, the application of vinyl ester coating system, including time limits for recoating and temperature requirements of the materials, shall conform to the recommendations of the coating manufacturer.

3-3.05. Film Thickness. The total coating film thickness including intermediate coats and finish coat, shall be not less than the following:

<u>Type of Coating</u>	<u>Minimum Dry Film Thickness</u>
Medium consistency coal tar	20 mils [500 μm].

<u>Type of Coating</u>	<u>Minimum Dry Film Thickness</u>
Coal tar epoxy (two coats)	20 mils [500 µm].
Epoxy	
Floors (two coats)	10 mils [250 µm].
Surfaces with first coat of epoxy and final coat of aliphatic polyurethane	7 mils [175 µm] (5 mils [125 µm] DFT for epoxy plus 2 mils [50 µm] DFT for aliphatic polyurethane).
Surfaces with first and second coat of epoxy and final coat of aliphatic polyurethane	12 mils [300 µm] (10 mils [250 µm] DFT for epoxy plus 2 mils [50 µm] DFT for aliphatic polyurethane).
Other surfaces (two coats)	10 mils [250 µm].
Immersion service (three coats)	15 mils [375 µm].
Flake-filled epoxy (two coats)	30 mils [750 µm].
Vinyl ester	30 mils [750 µm].
Zinc, epoxy, polyurethane	
Surfaces with first coat of zinc, intermediate coat of epoxy, and final coat of aliphatic polyurethane	10 mils [250 µm], 3 mils [75 µm] zinc, 5 mils [125 µm] epoxy, plus 2 mils [50 µm] for aliphatic polyurethane.
Heat-resistant (silicone)	3 mils [75 µm].
High heat-resistant (silicone)	3 mils [75 µm].
Other (one coat)	5 mils [125 µm].
Other (two coats)	10 mils [250 µm].

3-3.06. Weather Conditions. Coatings shall not be applied, except under shelter, during wet, damp, or foggy weather, or when windblown dust, dirt, debris, or insects will collect on freshly applied coating.

Coatings shall not be applied at temperatures lower than the minimum temperature recommended by the coating manufacturer, or to metal surfaces such as tanks or pipe containing cold water, regardless of the air temperature, when metal conditions are likely to cause condensation. When necessary for proper application, a temporary enclosure shall be erected and kept heated until the coating has fully cured.

Coatings shall not be applied at temperatures higher than the maximum temperature recommended by the coating manufacturer. Where coatings are applied during periods of elevated ambient temperatures, Contractor and the coatings manufacturer shall be jointly responsible to ensure that proper application is performed including adherence to all re-coat window requirements. Precautions shall be taken to reduce the temperature of the surface application, especially for metal, at elevated temperatures above 100°F [38°C] including shading application area from direct sunlight, applying coating in the evening or at night, and ventilating the area to reduce the humidity and temperature,

Vinyl ester coating materials, when required, shall be maintained during transportation, storage, mixing, and application at the temperature required by the coating manufacturer, 35°F [2°C] to 90°F [32°C].

3-4. REPAIRING FACTORY FINISHED SURFACES. Factory finished surfaces damaged prior to acceptance by Owner shall be spot primed and recoated with materials equivalent to the original coatings. If, in the opinion of Engineer, spot repair of the damaged area is not satisfactory, the entire surface or item shall be recoated.

3-5. PROTECTION OF SURFACES. Throughout the work Contractor shall use drop cloths, masking tape, and other suitable measures to protect adjacent surfaces. Contractor shall be responsible for correcting and repairing any damage resulting from its or its subcontractors' operations. Coatings spilled or spattered on adjacent surfaces which are not being coated at the time shall be immediately removed. Exposed concrete or masonry not specified to be coated which is

damaged by coatings shall be either removed and rebuilt or, where authorized by Owner, coated with two coats of masonry coating.

3-6. FIELD QUALITY CONTROL. The following inspection and testing shall be performed: surface profile, visual inspection, adhesion testing, and wet and dry film thickness testing. All inspection and testing shall be witnessed by Engineer.

3-6.01. Surface Profile Testing. The surface profile for ferrous metal surfaces shall be measured for compliance with the specified minimum profile. The surface profile for concrete shall comply with SSPC 13/NACE 6 Table 1 for severe service.

3-6.02. Visual Inspection. The surface of the protective coatings shall be visually inspected.

3.6.03. Film Thickness. Coating film thickness shall be verified by measuring the film thickness of each coat as it is applied and the dry film thickness of the entire system. Wet film thickness shall be measured with a gauge that will measure the wet film thickness within an accuracy of ± 0.5 mil [$12.5 \mu\text{m}$]. Dry film thickness shall be measured in accordance with SSPC-PA 2.

3-6.04. Spark Testing. Not required.

3-6.05. Adhesion Testing. An adhesion test shall be conducted on a properly prepared and coated steel or concrete surface that is acceptable to the coating material manufacturer and Engineer. The test area shall be at least 2 square feet [0.2 m^2] or larger to allow a minimum of three tests to be conducted. The test area shall be coated with the specified system and cured as recommended by the coating material manufacturer. Pull-off strength adhesion tests of the coating shall be conducted by the coating material manufacturer in accordance with ASTM D4541 for metal surfaces and ASTM D7234 for concrete surfaces. Elcometer or other tensile adhesion tester acceptable to the Engineer shall be used. At least three adhesion tests shall be conducted and the results averaged. Adhesion strength shall equal or exceed the minimum adhesion strength recommended by the coating material manufacturer and shall exceed the tensile strength of the concrete.

If the coating fails the adhesion test, the cause of the failure shall be determined and corrected before reconducting the test.

3-7. FIELD PRIMING SCHEDULE. In general, steel and cast iron surfaces of equipment are specified to be shop primed. Any such surfaces which have not been shop primed shall be field primed. Damaged or failed shop coatings which have been determined unsuitable by Engineer shall be removed and the surfaces shall be field coated, including prime coat (if any). Galvanized, aluminum, stainless steel, and insulated surfaces shall be field primed. Primers used for field priming, unless otherwise required for repair of shop primers, shall be:

<u>Surface To Be Primed</u>	<u>Material</u>
Equipment, surfaces to be coated with	
Aliphatic polyurethane	Universal primer.
Epoxy	Same as finish coats.
Coal tar coating	Same as finish coats.
Vinyl ester	Same as finish coats.
Steel and cast iron, surfaces to be coated with	
Epoxy	Same as finish coats or inorganic zinc.
Coal tar coating	Same as finish coats.
Aluminum	Epoxy.
Galvanized	Epoxy.
Copper	Epoxy.
Stainless steel	Epoxy.

Surface To Be Primed

Plastic surfaces, including PVC and FRP

Insulated piping

Concrete, surfaces to be coated with epoxy

For damp-proofing

For all other surfaces

Concrete block exposed in exterior locations

Concrete block to be coated with epoxy

Material

Same as finish coats.

As recommended by manufacturer of finish coats.

Epoxy.

Epoxy concrete filler and surfacer.

Epoxy concrete block filler.

Epoxy concrete block filler.

Unless otherwise recommended by the coating manufacturer or specified herein, priming will not be required on concrete, or concrete block, nor on metal surfaces specified to be coated with coal tar epoxy, and heat-resistant coatings. Concrete surfaces to be coated with epoxy shall be filled with epoxy concrete filler and surfacer so that a continuous film is obtained, except where concrete is damp-proofed with epoxy.

3-8. FINISH COATING SYSTEMS. The following schedule lists coatings systems and coating surface designations. See Article 1-3 for a definition of the surface designations.

No.	Finish Coating Systems	Coating Surface Designation						
		A	C	E	F	G	H	P
1.	Epoxy – One coat	x			x	x		
2.	Epoxy – Two coats	x	x	x	x	x		x
3.	Epoxy / NSF – Two coats		x	x				
4.	Epoxy – Three coats	x	x	x				
5.	Epoxy / NSF – Three coats	x	x	x				
6.	Epoxy – First coat Aliphatic polyurethane – Finish coat	x	x	x	x	x		x
7.	Epoxy – First and second coat Aliphatic polyurethane – Finish coat	x	x	x	x	x		
8.	Universal primer – First coat Aliphatic polyurethane – Finish coat	x		x				
9.	Medium consistency coal tar – Two coats	x	x	x				
10.	Coal tar epoxy – Two coats	x	x	x				
11.	Vinyl ester – Two coats	x	x	x				
12.	Heat resistant – Two coats						x	
13.	High heat resistant – Two coats						x	
14.	Zinc primer – First coat Epoxy – Intermediate coat Aliphatic polyurethane – Final coat	x		x				
15.	Flake-filled epoxy	x		x				

3-8.01. Surfaces Not To Be Coated. Unless otherwise specified, the following surfaces shall be left uncoated:

Exposed aluminum, except ductwork.
 Polished or finished stainless steel. Unfinished stainless steel, except flashings and counter flashings, shall be coated.
 Nickel or chromium.
 Galvanized surfaces, except piping, conduit, ductwork, and other items specifically noted.
 Rubber and plastics, except as specified.
 Exterior concrete.
 FRP wastewater troughs.
 Surfaces specified to be factory finished.

3-8.02. Shop Finishing. Items to be shop finished include the following. Shop finishing shall be in accordance with the coating manufacturer's recommendations.

- a. All slide gates.
- b. All conveyors.
- c. Other surfaces where blast cleaning cannot be or is not recommended to be performed in the field.
- d. Other items as otherwise specified.

3-8.03. Field Coating. Items to be field coated include the following. Field coating shall be in accordance with the field priming schedule, the coating schedule, and the manufacturer's recommendations.

- a. Exterior surface of the sludge hopper.
- b. Surfaces not indicated to be shop finished and surfaces where blast cleaning can be performed in the field.
- c. All interior ferrous metal surfaces except stainless steel on the digester cover.
- d. Other items as otherwise specified.

3-9. METAL SURFACES COATING SCHEDULE.

<u>Surface To Be Coated</u>	<u>Finish Coating System</u>
Non-galvanized structural and miscellaneous steel exposed to view or to the elements in exterior locations.	A6, A7 and A14
Steel handrails, steel floor plates	A8
Steel yard lighting poles exposed to view or to the elements.	A8
Cast Iron and steel piping above grade exposed to the elements and to view outdoors, including piping to be insulated, valves, fittings, flanges, bolts, supports, and accessories, and galvanized surfaces after proper priming.	A6, A7 and A14
All metal surfaces, unless otherwise specified, which will be submerged or buried, all or in part, including valves, and scum baffles, and cast iron slide gates, but excluding piping laid in the ground.	E4, A10, and E5
Exterior surfaces of carbon steel chemical tanks.	A6 and A7

<u>Surface To Be Coated</u>	<u>Finish Coating System</u>
Supports and miscellaneous metal for equipment handling corrosive chemicals.	A6 and A7
Aluminum in contact with concrete.	F1
Aluminum materials exposed to the elements outdoors.	F6 and F7

3-10. CONCRETE AND MASONRY SURFACES COATING SCHEDULE.

<u>Surface To Be Coated</u>	<u>Finish Coating System</u>
All concrete and concrete block in corrosive area (Except floors and surfaces scheduled to receive other coatings) which are exposed to view.	C7
Where indicated on the Drawings, walls, floors, and curbed areas, adjacent to corrosive chemical storage and feed equipment.	C2

3-11. MISCELLANEOUS SURFACES COATING SCHEDULE.

Plastic Surfaces, including PVC and FRP.	P6
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3-12. PIPING IDENTIFICATION SCHEDULE. Exposed piping and piping in accessible chases shall be identified with lettering or tags designating the service of each piping system, marked with flow directional arrows, and color coded.

Piping scheduled to be color coded shall be completely coated with the indicated colors, except surfaces specified to remain uncoated shall include sufficiently long segments of the specified color to accommodate the lettering and arrows. All other piping shall be coated to match adjacent surfaces, unless otherwise directed by Engineer.

3-12.01. Location. Lettering and flow direction arrows shall be provided on pipe near the equipment served, adjacent to valves, on both sides of wall and floor penetrations, at each branch or tee, and at least every 50 feet [15 m] in straight runs of pipe. If, in the opinion of the Engineer, this requirement will result in an excessive number of labels or arrows, the number required shall be reduced as directed.

3-12.02. Metal Tags. Where the outside diameter of pipe or pipe covering is 5/8 inch [15 mm] or smaller, aluminum or stainless steel tags shall be provided instead of lettering. Tags shall be stamped as specified and shall be fastened to the pipe with suitable chains. Pipe identified with tags shall be color coded as specified.

3-12.03. Lettering. Lettering shall be painted or stenciled on piping or shall be applied as snap-on markers. Snap-on markers shall be plastic sleeves, Brady "Bradysnap-On B-915", Seton "Setmark", or equal. Letter size shall be as follows:

<u>Outside Diameter of Pipe or Covering</u>	<u>Minimum Height of Letters</u>
5/8 inch [15 mm] and smaller	Metal tags -1/4 inch [6 mm]
3/4 to 4 inches [20 to 100 mm]	3/4 inch [20 mm]

Outside Diameter of Pipe or CoveringMinimum Height of Letters

5 inches [125 mm] and larger

2 inches [50 mm]

3-12.04. Color Coding and Lettering. All piping for the following services shall be color coded. Bands shall be 6 inches [150 mm] wide spaced along the pipe at 5 foot [1.5 m] intervals. For services not listed, the color coding and lettering shall be as directed by the Engineer.

Piping Identification		
Service	Color of Pipe	Color of Letters
Activated Silica (solution)	Light brown with blue bands	White
Alum (solution)	Orange	Black
Ammonia	White	Black
Ash	Dark gray with green bands	White
Backwash waste	Light brown	White
Carbon	Black	White
Carbon Dioxide (liquid or gas)	Yellow with gray bands	Black
Carbon Dioxide (solution)	Yellow with black bands	Black
Chilled Water (supply or return)	Dark blue with red bands	White
Chlorine (gas, liquid, or vent)	Yellow	Black
Chlorine (solution)	Yellow	Black
Chlorine Dioxide	Yellow with violet bands	Black
Combustion Air	Dark green yellow bands	White
Compressed Air	Dark green	Black
Condensate	Light gray with brown bands	Black
Condenser Water (supply or return)	Dark blue with white bands	White
Digester Gas	Red with black bands	Black
Distilled Water	Light Blue with white bands	Red
Drain	Dark gray	White
Electrolyte	Aluminum with red bands	Black
Emergency Gas Treatment System – Indoors	Yellow with black bands	Black
Emergency Gas Treatment System – Outdoors	White	Black
Ferric Chloride	Orange	Black
Filtrate	Dark gray with red bands	White
Fire Protection Water	Red	White
Fluoride	Light blue with red bands	Black
Fuel Oil	Black	White

Piping Identification		
Service	Color of Pipe	Color of Letters
Gasoline	Black with red bands	White
Grease	Black with yellow bands	White
Grey Water	Purple	Black ¹
Grit	Light grey with black bands	White
Heated Sludge	Light brown with yellow bands	White
Heating Water (supply or return)	Light gray with black bands	Black
Hydrofluosilicic Acid	Yellow with blue bands	Black
Instrument Air	Light green with dark green bands	Black
Laboratory Special Gases	Match adjacent surface	Black
Laboratory Vacuum	Dark green with light green bands	Red
Lime Sludge	Light brown with white bands	White
Lime Slurry	Light green	Black
Liquid Alum	Yellow with orange bands	Black
Low Pressure Air (aeration supply)	Light green with orange bands	Black
Natural Gas Or Propane Gas	Yellow with red bands	Black
Nonpotable Water (downstream of backflow preventer)	Purple	Black ²
Odor Control – Indoors	Dark green with light brown bands	White
Odor Control – Outdoors	White	Black
Oil – Hydraulic	Black with white bands	White
Other Hydrocarbons (identify)	Black	White
Ozone	Yellow with orange bands	Black
Plant Effluent Water	Purple	Black ³
Plumbing Vents	Dark gray	White
Polymer	Orange with green bands	Black
Polyphosphate	Light green with red bands	Black
Potable Water (hot or cold)	Dark blue	White ⁴
Potassium Permanganate	Violet	Black
Raw Water	Olive green	White
Refrigerant	Yellow with white bands	Black
Sample	Light gray with green bands	Black
Scum	Dark brown	White
Service Water	Dark blue with red bands	White
Settled Sewage	Light gray with brown bands	Black

Piping Identification		
Service	Color of Pipe	Color of Letters
Settled Sewage Service Water	Dark blue with orange bands	White
Settled Water	Aqua	Black
Sewage	Dark gray	Black
Sludge	Dark brown	White
Soda Ash (solution)	Light green with orange bands	Black
Sodium Chlorite	Orange with red bands	Black
Sodium Hydroxide (caustic)	Yellow with green bands	Black
Sodium Silica (solution)	Light brown with orange bands	White
Steam	Light gray with orange bands	Black
Steam Vent	Light gray with red bands	Black
Sulfur Dioxide	Light green with yellow bands	Black
Sulfur Dioxide (solution)	Orange with blue bands	Black
Sulfuric Acid	Yellow with red bands	Black
Vacuum Pump Discharge	Aluminum	Black
Methanol	Orange (match existing)	Black (match existing)

Notes:

1. Lettering shall read, "CAUTION: NONPOTABLE WATER, DO NOT DRINK."
2. Lettering shall be on a yellow background and shall read, "CAUTION: NONPOTABLE WATER, DO NOT DRINK.". Each outlet on the nonpotable water line shall be similarly labeled.
3. Lettering shall read, "CAUTION: RECLAIMED WATER, DO NOT DRINK".
4. Lettering shall be on a light green background.

Electrical conduit shall be coated to match adjacent ceiling or wall surfaces as directed by Engineer. Vent lines shall be coated to match surfaces they adjoin.

In addition, special coating of the following items will be required:

<u>Item</u>	<u>Color</u>
Valve handwheels and levers	Red
Hoist hooks and blocks	Yellow and black stripes

Numerals at least 2 inches [50 mm] high shall be painted on or adjacent to all accessible valves, pumps, flowmeters, and other items of equipment which are identified on the Drawings or in the Specifications by number.

End of Section

SURFACE DESCRIPTION	SYSTEM NO. -

SURFACE PREPARATION DESCRIPTION
<input type="checkbox"/> Solvent SSPC-SP1 <input type="checkbox"/> Ferrous Metal Nonimmersion SSPC-SP6 <input type="checkbox"/> Ferrous Metal Immersion <div style="margin-left: 20px;"> <input type="checkbox"/> SSPC-SP10 <input type="checkbox"/> SSPC-SP-5 </div> <input type="checkbox"/> Other

COATING	DFT mils [μm]	MANUFACTURER AND PRODUCT
First Coat (Primer)		
Second Coat		
Third Coat		
Total System		Not less than minimum thickness specified.

Notes: (Attached if needed.)

Project:		
Coatings Manufacturer:		Initials _____
Painting Applicator:		Initials _____
BLACK & VEATCH	COATING SYSTEM DATA SHEET	Fig 1-09940

SHOP PRIMED SURFACE DESCRIPTION	SYSTEM NO. -	-F

SURFACE PREPARATION DESCRIPTION
<input type="checkbox"/> Solvent SSPC-SP1 <input type="checkbox"/> Other:

COATING	DFT mils [μm]	MANUFACTURER AND PRODUCT
Shop (Primer)		(Identify Product/Type)
Touchup		
Intermediate Coat		
Finish Coat		
Total System		Not less than minimum thickness specified.

Notes: (Attached if needed.)

Project:		
Coatings Manufacturer:		Initials _____
Painting Applicator:		Initials _____
BLACK & VEATCH	COATING SYSTEM DATA SHEET	Fig 2-09940

Section 11060

EQUIPMENT INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers general installation requirements of new equipment units that have been purchased by Contractor as part of this Work. Equipment specific installation requirements are covered in the equipment sections.

1-2. GENERAL. Equipment installed under this section shall be erected and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

Any existing equipment which is removed and salvaged for reinstallation shall be handled as indicated in the Project Requirements section.

1-2.01. Coordination. When manufacturer's field services are provided by the equipment manufacturer, Contractor shall coordinate the services with the equipment manufacturer. Contractor shall give Engineer written notice at least 30 days prior to the need for manufacturer's field services furnished by others.

Flanged connections to equipment including the bolts, nuts, and gaskets are covered in the appropriate pipe specification section.

PART 2 - PRODUCTS

2-1. MATERIALS. Materials shall be as follows:

Grout	As specified in the Grouting section.
Anti-Seize thread lubricant for SS bolts	As specified in the Anchorage in Concrete and Masonry section.

PART 3 - EXECUTION

3-1. INSTALLATION. Equipment shall not be installed or operated except by, or with the guidance of, qualified personnel having the knowledge and experience necessary to obtain proper results as specified in the Startup Requirements section.

Each equipment unit shall be leveled, aligned, and shimmed into position. Installation procedures shall be as recommended by the equipment manufacturer and as required herein. Shimming between machined surfaces will not be permitted.

Anti-seize thread lubricant shall be liberally applied to the threaded portion of all stainless-steel bolts during assembly. For equipment installed in drinking water facilities, the anti-seize lubricant shall meet requirements of NSF-61.

When specified in the equipment sections, the equipment manufacturer will provide installation supervision and installation checks. For installation supervision, the manufacturer's field representative will observe, instruct, guide, and direct Contractor's erection or installation procedures as specified in the equipment specifications. For installation checks, the manufacturer's field representative will inspect the equipment installation immediately following installation by Contractor, and observe the tests indicated in the Startup Requirements section. The manufacturer's representatives will revisit the site as often as necessary to ensure installation satisfactory to Owner.

All equipment shall be protected after installation, prior to final acceptance by Owner. Protection provisions shall be as recommended by the manufacturer, and shall include provisions to prevent rust, mechanical damage, and foreign objects entering the equipment.

3-2. STARTUP AND TESTING. Startup requirements, and tests associated with startup shall be as indicated in the Startup Requirements section. Other field tests shall be as indicated in the specific equipment sections. Startup and tests required shall occur in the order listed in the following paragraphs. Tests shall not begin until any installation supervision and installation checks by the equipment manufacturer have been completed, except where noted below.

3-2.01. Preliminary Field Tests. Preliminary field tests shall be conducted on all equipment by Contractor as indicated in the Startup Requirements section. When an installation check is specified in the equipment sections, the equipment manufacturer's representative will participate in these tests to the extent described in the Startup Requirements section and in the equipment sections.

3-2.02. Field System Operation Tests. Field system operation tests shall be conducted on all equipment by Contractor as indicated in the Startup Requirements section. When an installation check is specified in the equipment sections, the equipment manufacturer's service personnel will participate in these tests to the extent described in the Startup Requirements section and in the equipment sections.

3-2.03. Field Demonstration Tests. Field demonstration tests will be conducted by the equipment manufacturer on equipment as indicated and as specified in the equipment sections.

3-2.04. Field Performance Tests & Distribution Tests. Field performance tests or distribution tests will be conducted by the equipment manufacturer on equipment as indicated and as specified in the equipment sections.

3-2.05. Field Baseline Performance Tests. Field baseline performance tests shall be conducted by Contractor on the equipment indicated in the equipment sections, and the tests shall be performed as indicated. When indicated in the equipment sections, the equipment manufacturer will participate in these tests. This test shall not be considered an acceptance test, but rather a test to determine initial performance curves and efficiency just prior to the equipment entering service.

End of Section

Section 13199

CHEMICAL STORAGE TANK INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers installation of tanks for aboveground bulk storage of methanol.

Tanks, piping, pipe supports, valves, and accessories which are not an integral part of the tanks are covered in other sections.

1-2. GENERAL.

1-2.01. Coordination. The tanks are to be installed in areas of limited access. The timing of installation for the tanks shall be coordinated with building construction and with construction under other contracts as needed.

1-3. DELIVERY, STORAGE, AND HANDLING. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3-1. INSPECTION. All equipment and accessories shall be inspected for damage and cleanliness before being installed. Any item damaged or contaminated in handling on the job shall not be used unless it has been repaired and re-cleaned to the original requirements by Contractor. Such items shall be segregated from clean or undamaged items and shall be inspected and approved by Owner or his representative before its use.

3-2. PREPARATION. The concrete base for each tank shall be constructed in accordance with the Cast-in-Place Concrete section and shall be level and smooth to the tolerances recommended by the tank manufacturer. A cut-out in the base shall be provided for the tank pump suction / drain flange.

3-3. INSTALLATION. The tank shall be installed in accordance with the manufacturer's recommendations and made ready for the installation of the floating roof, piping, and other appurtenances as indicated on the Drawings and specified under other sections.

When the tank containment area has a corrosion protection system specified, the protection system shall be applied and cured to the tank base before each tank is installed. Each tank shall be installed in accordance with the tank manufacturer's recommendations, the applicable governing standard, and to the satisfaction of Engineer. At any location where a containment corrosion protection system lining is penetrated including anchorage of a tank, a caulking material suitable for the specified service conditions and recommended by the protection system manufacturer shall use to seal around the penetration. The tank shall be suitably grounded in accordance with manufacturers recommendations for methanol service. Grouting under the tank, if recommended by the tank manufacturer, shall be accomplished with non-shrinking grout as specified in the Grouting section.

3-4. FIELD QUALITY CONTROL.

3-4.01. Lining Testing. Not used.

3-4.02. Leakage Testing. After completion of installation of the tanks and the floating roofs, each tank shall be vacuum-box tested in accordance with API 650. After vacuum-box testing, each tank shall be filled with water to the level required and allowed to stand for a period of not less than 48 hours. During testing, flanged connections may be plugged by installing temporary blind flanges on the outside of the tank but shall not be blocked or plugged on the inside. All leaks or indication of leaks shall be repaired by the tank manufacturer and the tank re-tested to the satisfaction of Engineer.

3-5. CLEANING. When installation and testing have been completed and all connections have been made, all tank surfaces, both interior and exterior, shall be thoroughly cleaned and dried as recommended by the tank manufacturer and to the satisfaction of Engineer. Abrasive cleaning agents shall not be used.

End of Section

Section 13211

METHANOL STORAGE TANK INTERNAL FLOATING ROOFS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of two internal floating roofs to be installed in a stainless-steel methanol storage tank. The storage tank and accessories not specified herein are covered in the Methanol Source Storage Tanks Section.

1-2. GENERAL. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by the Engineer.

Each item shall be furnished and installed complete with all mechanical and electrical equipment required for proper operation, all components indicated on the drawings or specified, and all additional materials or construction required by the design of the system.

1-2.01. Supplier's Qualifications and Responsibilities. All work in connection with fabrication and erection of the floating roof shall be performed by a competent and experienced supplier with a minimum of 10 years proven history of the design, fabrication, and erection of internal stainless-steel floating roofs. The supplier shall design, furnish all materials, fabricate and install the internal floating roof in accordance with the latest edition of API Standard 650, Appendix H. Supplier shall be HMT, Inc. or Ultraflote, without exception.

1-2.02. Coordination. The floating roof and accessories specified in this section shall be furnished by a single supplier who shall be responsible for the design, coordination, and function of the assembly. The supplier shall coordinate with the methanol storage tank supplier to ensure that each component is compatible with all other components of the assembly; that all pipe sizes and materials are appropriate; and that all devices necessary for a properly functioning assembly have been provided.

1-2.03. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section.

1-2.04. Metal Thicknesses. Metal thicknesses and gauges specified herein are the minimum required. Gauges refer to US Standard gauge.

1-2.05. Spare Parts. A list of recommended spare parts with pricing shall be furnished during the submittal phase.

1-3. SUBMITTALS. Submittals for the floating roof systems shall include complete fabrication, assembly, and installation drawings, together with detailed specification, test result and data covering materials used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted in accordance with the Submittals Section.

1-3.01. Operation and Maintenance Data and Manuals. Operation and maintenance manuals shall be supplied and shall be submitted in accordance with the submittals section. Equipment designations used shall correspond to those indicated on the drawings.

Operation and maintenance manuals shall include the following:

- a. Equipment function, normal operating characteristics, and limiting conditions.

- b. Assembly, installation, alignment, adjustment, and checking instructions.
- c. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
- d. Lubrication and maintenance instructions.
- e. Guide to troubleshooting.
- f. Parts lists and predicted life of parts subject to wear.
- g. Outline, cross-section, and assembly drawings; engineering data; and wiring diagrams.
- h. Test data and performance curves, where applicable.

The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

PART 2 - PRODUCTS

2-1. SERVICE AND INSTALLATION CONDITIONS. The internal floating roofs shall be installed in a vertical cylindrical tank designed for storing 99.5% methanol with a specific gravity of 0.792 at a maximum temperature of 120° F. The tank will have a conical roof and flat bottom, will be 17 feet in diameter, and approximately 30 feet tall. All parts of the roof must pass through the 24-inch side or top manways. Cut and rewelded door sheets will not be acceptable.

2-2. DESIGN REQUIREMENTS. Flotation shall be designed for 100 percent excess buoyancy at the lowest expected specific gravity. The design shall have proven capability of supporting 750 pounds over any 1 square foot area when afloat or at rest. Test results and analysis to support this claim shall be provided. Deck skin splices shall be a nominal 1-3/4-inch lap with clamp beams to develop a metal-to-metal vapor tight joint that will develop full tear out strength and positively seal vapors. The clamp beam shall be symmetrical in both axes for balance and bolted on not more than 12-inch centers. All clamp beam splices shall develop the full section of the joined beam.

The main pontoon to clamp beam connection shall be by a load distributing saddle, a minimum of 4 inches wide, with 100-degree contact and rigid construction to prevent localized buckling by the beam.

Flotation tubes shall be a minimum of 10 inches diameter, 0.064-inch wall, longitudinally welded tubing, 304 stainless steel. The tube ends shall be mechanically rolled inward prior to welding for reinforcement and to avoid shipping damage. End caps and ears shall be 1/8-inch thick, 304 stainless steel. Leak testing of all seams shall be by detecting solution with at least 20 psi air pressure. Closure plug shall be 3/16-inch diameter aluminum closed end blind rivet with Teflon O-ring.

The peripheral rim plate shall be a minimum of 0.080 inches thick and extend into the liquid a minimum of 4 inches. Its lower edge shall be equipped with a ramp edge to avoid catching on shell snags. All vertical roof penetrations (for columns, ladders, etc.) shall be surrounded by a well extending into the liquid a minimum of 4 inches and equipped with a vapor mount seal. Lower edge of well shall have a ramped edge.

The floating roof shall be designed with sufficient weight to overcome wall friction of the seals. The floating roof manufacturer shall provide sufficient seals to keep the vapor above the floating roof below the explosive limit for methanol. Seals shall be double wall type compatible with methanol. Where multiple seals are required, 12-inch diameter rim support pontoons shall be used to provide the additional flotation necessary to overcome seal friction that occurs during upward travel of the cover.

A stainless-steel bodied vacuum breaker sized for a max 10,000 BPH withdrawal rate shall be provided on the floating roof to prevent drawing a vacuum in the liquid space in

the event that the floating roof becomes fixed in position while the tank is draining. The floating roof manufacturer shall design the vacuum breaker to relief vacuum while minimizing the amount of vapor released when the floating roof is in a fixed position. The floating roof shall be designed such that it can travel across the side manway connection to the minimum possible distance from the tank bottom as determined by the floating roof manufacturer and approved by Engineer.

The floating roof manufacturer shall coordinate with the tank manufacturer the provision of a manway baffle or plug that will facilitate the travel of the floating roof across the manway. The baffle shall present a face nearly flush to the tank sides that will allow the wiper seals to freely pass over the manway opening without snagging or causing excessive wear. The baffle shall be constructed of 1/4-inch stainless steel plate and shall be welded to the interior of the manway cover. The floating roof manufacturer shall coordinate with the tank manufacturer to ensure the manway cover continues to provide a good seal and the manway cover can be easily opened without damaging the baffle. The tank manufacturer shall provide a davit or hinge to facilitate opening the manway cover.

The floating roof manufacturer shall coordinate with the tank manufacturer to maximize the useable capacity of the tank.

The floating roof shall be furnished by HMT Inc. or Ultraflote, without exception.

2-3. MATERIALS. All components of the floating roof and accessories shall be constructed of materials chemically resistant to methanol at a temperature of 120° F. All wetted components and support components shall be constructed of 304 stainless steel. Deck skin materials shall be 304 stainless steel or combination of stainless steel and aluminum with a minimum thickness of 0.023 inches. Deck skin shall be a minimum of 102 inches wide to minimize joints and shall be continuous without cross-joints. All structural bolting shall be Grade 5 high strength steel, cadmium plated to double thickness (0.3 mil). No screws, self-tapping screws, or rivets will be allowed.

2-4. CABLES. The floating roof shall be kept from contacting the bottom of the tank by a cable system supported from the storage tank roof. Winches shall be provided by the floating roof manufacturer to allow operator-adjustment of support cable length. Winch number, and placement, shall be as recommended by floating roof manufacturer for the application. Anti-rotation cables shall be provided as required to prevent the floating roof from rotating on the liquid surface. Cables shall be 1/4-inch stainless steel. Location of cable penetrations into the storage tank's roof shall be coordinated with the storage tank manufacturer.

PART 3 - EXECUTION

3-1. INSTALLATION. The floating roof manufacturer shall install the floating roof inside the methanol storage tank after tank installation is complete. The floating roof and manway baffle shall be installed in accordance with the manufacturer's recommendations and made ready for the installation of appurtenances as indicated on the Drawings and specified under other sections.

End of Section

Section 13215

METHANOL SOURCE STORAGE TANKS

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing and installation of two (2) fabricated steel tanks for outdoor storage of methanol sources as defined in herein. A floating roof, connecting piping, valves, and accessories for each tank not specified herein are covered in other sections.

1-2. GENERAL. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under the General Equipment Stipulations Section.

1-2.02. Supplier's Qualifications. All work in connection with fabrication and erection of the storage tanks shall be performed by a competent and experienced tank manufacturer.

Welding procedures, welders, and welding operators shall be qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

1-2.03. Coordination. All equipment for this section shall be furnished by a single supplier who shall be responsible for the design, coordination, and function of the assembly. The supplier shall coordinate with the floating roof supplier to ensure that each component is compatible with all other components of the assembly; that all pipe sizes and materials are appropriate; and that all devices necessary for a properly functioning assembly have been provided.

1-3. SUBMITTALS. Complete fabrication, assembly, and installation drawings, and schematics, together with detailed specifications and data covering materials used, parts, devices, and other accessories forming a part of the equipment furnished, shall be submitted in accordance with the Submittals Procedures section.

1-3.01. Operation and Maintenance Data and Manuals. Adequate operation and maintenance information shall be supplied as required in the Submittals section. Operation and maintenance manuals shall be submitted in accordance with the Submittals section. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

1-4. DELIVERY, STORAGE, AND HANDLING. The tank and components shall be adequately protected during transportation, storage at the jobsite, installation, and construction. Damaged units will be rejected and shall be replaced with undamaged units.

1-5. Welding Qualifications. All welding procedures and welding operators shall be qualified and certified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, latest addendum. All procedure and operator qualifications shall be in written form and subject to Engineer's review. Accurate records of operator and procedure qualifications shall be maintained by Contractor and made available to Engineer upon request.

PART 2 - PRODUCTS

2-1. SERVICE AND INSTALLATION CONDITIONS. The tanks shall be installed outdoors, in an area with limited access. The timing of installation of the tanks shall be coordinated with construction and for uninterrupted methanol feed under other sections as required.

The tanks shall be designed for storing 99.5% methanol with a specific gravity of 0.792 at a maximum temperature of 120° F and as defined herein.

2-2. DIMENSIONS AND DESIGN REQUIREMENTS. The tanks shall be of the vertical cylinder type with a cone roof and flat bottom, and shall be supported on a concrete base, as indicated on the Drawings. The conical roof shall be provided with horizontal support beams internal to the tanks to provide adequate support for the floating roof, tank appurtenances and personnel. The tanks shall have a floating roof, to be provided by others, installed after tank installation. The tolerance on the tank's roundness shall be in accordance with the requirements of the floating roof manufacturer. The tanks shall be vented and will normally be used to store the specified chemical at atmospheric pressure. In addition to the hydrostatic head of the liquid chemical, the tanks shall be designed to accommodate the weight of the floating roof. Anchor bolts shall be designed by the tank manufacturer for wind and seismic considerations.

The tank shall conform to the following requirements:

Number of tanks	2
Designation	Methanol Storage Tank 01 Methanol Storage Tank 02
Useable capacity measured between low and high position of floating roof, gallons	50,000
Diameter, feet	17
Approximate height to overflow, feet	30
Approximate straight side height, (additional floating roof height included) feet	33

2-3. MATERIALS. Materials shall be as follows:

Shell and Plate	316/316L Stainless Steel.
Nozzle and Piping	316/316L Stainless Steel.
Flanges	316/316L Stainless Steel.
Structural Shapes	316/316L Stainless Steel.
Bolts and Nuts	Stainless steel, ASTM F593, Alloy Group 1 or 2, ASTM F594, Alloy Group 1 or 2.
Gaskets	1/16-inch thick teflon.
Welding Electrodes	ASME approved, of the same composition as the base material.

2-4. CONSTRUCTION. The storage tanks shall be furnished and installed as indicated on the Drawings. The tank wall thickness shall be determined by the tank manufacturer and shall include a corrosion allowance as recommended by the tank and floating roof manufacturer. Minimum shell, roof and bottom plate thickness, including corrosion allowance, shall be not less than 3/8-inch in accordance with Appendix J of API 650.

The tanks shall be of all-welded construction in accordance with Appendix J of API 650. Nozzles and personnel manways shall be provided as indicated. The tank and appurtenances shall be fabricated from a minimum number of pieces. Longitudinal shell seams shall be staggered. Welding seams shall be located to clear all nozzle openings. All flange faces shall be true to the center line of the nozzles, and bolt holes shall straddle center lines unless noted otherwise. All welding shall be done by the electric arc process. Weld procedure specifications and procedure qualification records shall be submitted to Engineer for approval. All welding shall be full and continuous, of uniform size and free from slag, porosity, undercuts, and other defects. All welds shall be fully penetrated. The manway flange shall be machined smooth for a gasket surface after welding.

Tank roof shall be self-supporting, structurally reinforced to withstand a superimposed load of 250 pounds at any point and shall be additionally reinforced as necessary for the required accessories.

The entire tank interior shall present a smooth surface free of marked depressions, offsets, abrupt edges, or other protrusions. All welds shall be ground smooth.

Provisions shall be made for anchoring the tank to the concrete base. The tank shall be provided with anchor bolts and hold down lugs. Lifting lugs shall be provided for handling and installation.

2-5. ACCESSORIES. Accessories shall be provided on the tank as indicated on the Drawings and as specified herein.

2-5.01. Access Manways. Access manways with a nominal diameter of at least 24 inches shall be provided on the side and the top of the tank. The center line of the side manway shall be 3 feet above the bottom of the tank. Manway covers and flanges shall be constructed of plate material in accordance with API 650. Flange drilling and diameter shall conform to ANSI B16.5, Class 150. Each tank manway shall be flanged, fully gasketed, and furnished with a davit or hinge to facilitate opening of the manway.

The floating roof manufacturer shall provide a baffle or plug that shall be welded on to the interior of the tank's side manway by the floating roof manufacturer. The baffle shall be designed to provide a surface flush with the interior tank wall. The tank manufacturer is responsible for coordination with the floating roof manufacturer to ensure the baffle is constructed properly by providing detailed drawings to the floating roof manufacturer. The tank manufacturer is also responsible for providing a davit or hinge capable of facilitating the opening of the manway with the additional baffle welded on to the interior of the manway cover.

2-5.02. Floating Roof. A floating roof will be installed inside the storage tank after tank installation is complete. The floating roof will enter the tank through the 24-inch manways. The floating roof is specified in the Methanol Storage Tank Internal Floating Roof section and will be supplied by others. The tank manufacturer is responsible for coordinating with the floating roof manufacturer to ensure all necessary accessories and appurtenances required to support the floating roof are provided.

2-5.03. Flanged Nozzles. Nozzles for connecting piping shall be provided on each tank at the locations and of the sizes indicated on the Drawings or specified herein. Nozzle flanges shall be flat-faced, with flange diameter and drilling conforming to ANSI B16.5, 150 Class. Tank nozzles shall have a projection in accordance with API 650 and shall extend not less

than 6 inches from the outside of the tank. The invert of the tank pump suction/ drain nozzle shall be flush with the bottom of the tank.

Each tank shall be provided with the following flanged nozzles:

<u>Quantity</u>	<u>Connection</u>	<u>Nozzle Size inches</u>	<u>Location on Tank</u>
1	Fill	4	Side at bottom
1	Cover position indicator	As Required	Top
1	Overflow	6	Side at top
1	Pump suction/drain	4**	Side at bottom
1	Level sensor.	8*	Side at bottom
4	Air scoop vents	As Required	Top

* Nozzle size shall match the device furnished but shall not be smaller.

** The suction pipe connection invert shall be flush with the tank bottom, so the entire contents of the tank can be drained.

2-5.04. Tank Venting. Air scoop vents shall be designed and provided by the tank manufacturer in accordance with Appendix H of API 650 and shall be installed in each quadrant of the tank roof. Vent size and location shall be coordinated with the floating roof manufacturer to prevent pressurizing the tank and facilitate removal of vapors.

2-5.05. Overflow. A tank overflow shall be provided to prevent the floating roof from contacting the fixed roof. Overflow location shall be coordinated with the floating roof manufacturer.

2-5.06. Ladder and Handrail. The tank shall be provided with an exterior ladder. The tank is supported on an elevated concrete base as indicated on the Drawings, and the ladder shall extend down to within 6 inches of the finished floor. The ladder shall be supported on and anchored to the concrete base and bracketed to the tank as required. Roof-perimeter handrail and kick plate shall be provided. The handrail and kickplate shall be attached to the ladder siderails and anchored to the tank roof as required. As a minimum, ladder, handrail and kickplate shall be designed and constructed to conform to OSHA requirements. The ladder shall be fabricated of 316/316L stainless steel. The ladder shall have a clear width of at least 16 inches, shall have rungs at least 3/4-inch in diameter and spaced not more than 12 inches apart, and shall have a minimum clearance of at least 7 inches between the back of the ladder and the tank wall and concrete base. Ladder shall be located as not to interfere with the air scoops.

2-5.06.01 Ladder Fall Protection System. Each tank with a total height of 12 or more feet above the finished floor shall be provided with a fall protection system. The fall protection system shall be installed directly on the ladder and constructed of stainless steel or other corrosion resistant materials where available. The fall protection system shall be provided with the appropriate number of cable guides as recommended by the system manufacturer, and one full body safety harness rated for not less than 300 pounds. When fall protection for outdoor tanks is specified, the storage tank vent shall be discharged 180 degrees from the ladder. Fall protection system shall be Capital Safety "Lad-Safe" or approved equal

2-5.07. Cover Position Indicator. A gaugeboard-type cover position indicator designed for use with the internal floating roof shall be supplied by the tank manufacturer. The cover position indicator shall be actuated by a cable connected directly to the floating roof and shall

include a gaugeboard with large red pointer that displays cover position on an easy-to-read scale. A drive elbow within the gaugeboard housing shall exert a constant tension on the cable. As the floating roof raises and lowers, the drive elbow shall allow the pointer to travel in the same direction as the roof so that the pointer tracks roof position along the indicator scale. The pointer shall read "0" when the floating roof is set on the tank bottom.

The gaugeboard shall be mounted on the side of the methanol storage tank. Scale graduations shall be in gallons, with black numerals stenciled on a white background at every 250-gallon increment. The gaugeboard shall be designed for 30 feet maximum cover travel. Travel distance shall be confirmed with the floating roof manufacturer prior to tank fabrication and amended if required.

All components of the cover position indicator shall be fabricated of corrosion-resistant material suitable for the methanol environment. The working mechanism shall be enclosed within the gaugeboard's protective housing. The housing shall be anodized aluminum with a silk-screened cable. Internal components shall be stainless steel and aluminum. Sheave elbows shall have cast aluminum housings and delrin sheaves. The cable shall be Type 316 stainless steel and shall be enclosed within a pipe conduit and the weatherproof sheave elbows. The cover position indicator shall be Varec "6700 Liquid Level Indicator" or equal.

2-5.08. Flange Mounted Level Transmitter. One explosion proof flange mounted level transmitter shall be provided as specified in the Pressure and Level Instruments section.

2-5.09. Support and Anti-Rotation Cables. Support and anti-rotation cables for the floating roof will be supplied by the floating roof manufacturer. Connection points shall be provided by the tank manufacturer as required to secure the 1/4-inch stainless steel cables to the tank roof. Number, size, and location of roof penetrations and connection points shall be coordinated with the floating roof manufacturer.

2-5.10. Grounding Connection. The tank shall be furnished with at least two grounding lugs, suitable for connection of the tank grounding wire by the Contractor.

2-5.11. Safety Signs and Labels. Safety signs and labels shall be provided for the tank as specified herein. The signs and labels shall be constructed of laminated plastic. The size, shape, and color of the signs shall be in accordance with the Occupational Safety and Health Administration (OSHA).

Four signs with the following inscription shall be permanently affixed to the tank, placed 90 degrees apart:

"DANGER - NO SMOKING, MATCHES, SPARKS, WELDING, OR OPEN FLAMES"

An additional sign shall be posted at the truck unloading station.

2-5.12. Nameplates. The tank shall be provided with a nameplate to identify the chemical stored. The nameplates shall be of white phenolic material with black engraved lettering 3 inches high, shall be of adequate size to accommodate the legend, and shall be mounted approximately 5 feet above the tank pad. The chemical name and the tank designation number to be engraved on the nameplate shall be as previously specified.

2-5.13. Certification Plate. A stainless-steel certification plate shall be installed below the tank nameplate. At least the following data shall be included on the certification plate:

Name of tank manufacturer.

Date of manufacture.

ASTM Material specifications.

Rated Capacity (in gallons).

Maximum allowable concentration and temperature of the specified chemical solution that can be stored safely.

PART 3 - EXECUTION

3-1. PAINTING. The exterior surfaces of the tank shall be thoroughly cleaned of all foreign material as recommended by the primer manufacturer and painted with a suitable rust-inhibitive primer. The dry film thickness of the primer shall be not less than 4 mils. Field painting shall be as specified in Section 09940, Protective Coatings.

3-2. INSTALLATION. The concrete base shall be constructed in accordance with the provisions of the cast-in-place concrete section and shall be level and smooth to the tolerances permitted by API 650 or the tank manufacturer. A cut-out in the base shall be provided for the tank pump suction/drain flange. The tank shall be installed in accordance with the manufacturer's recommendations and made ready for the installation of the floating roof, piping and other appurtenances as indicated on the Drawings and specified under other sections.

3-3. TESTING. After completion of installation of the tank and floating roof, the tank bottom shall be vacuum-box tested in accordance with API 650. After vacuum-box testing, the tank shall be filled with water to the invert of the overflow nozzle and allowed to stand full for a period of not less than 48 hours. During testing, flanged connections may be plugged by the installation of temporary blind flanges on the outside of the tank but shall not be blocked or plugged on the inside. All leaks or indications of leaks shall be repaired by the Contractor and made completely watertight. A leaking tank, upon repair, shall be retested to the satisfaction of Engineer.

Water required for testing will be provided as stipulated in Section 01500, Temporary Facilities. Water used for testing shall be wasted and disposed of as directed by Engineer.

3-4. CLEANING. After installation has been completed and all connections have been made, all tank surfaces, interior and exterior, shall be thoroughly cleaned as recommended by the manufacturer and to the satisfaction of Engineer. Abrasive cleaning agents shall not be used.

End of Section

Section 13500

INSTRUMENTATION AND CONTROL SYSTEM

PART 1 – GENERAL

1-1. **SCOPE.** This section covers the installation of new tank level and combustible gas detection field instruments and modifications to the existing Methanol Pump Control Panel (MPCP) system located at Howard F. Curren AWTP as part of the Methanol Storage Tank Replacement Project.

The system shall be furnished as specified, complete with all software, hardware, instrumentation, and all devices, accessories, appurtenances, testing, and training necessary for proper operation.

The MPCP panel utilizes a GE RX3i PLC controlling the methanol feed pumps and communicating via existing fiber optic communications network to the Curren AWTP Plant Control System (PCS).

The MPCP panel is connected to five existing combustible gas detectors (AIT-101, AIT-102, AIT-103, AIT-104, & AIT-105) each wired to an MPCP front panel mounted process meter and a PLC analog input channel for remote PCS monitoring of combustible gas level. The MPCP front panel mounted digital indicators each provide an alarm contact for MPCP pump motor interlocks and an alarm contact wired to PLC digital input channel for remote PCS monitoring and alarm annunciation.

The MPCP panel is connected to an existing Yokogawa Model EJA210E-JHS5G-922EN-FF1 level transmitter (LIT-101) wired to an MPCP front panel mounted process meter and a PLC analog input channel for remote PCS monitoring of methanol storage tank level.

Two additional combustible gas detectors (AIT-106, AIT-107) matching the manufacturer and type of the existing gas detectors shall be provided, installed, wired to the existing MPCP, calibrated, and commissioned.

The existing combustible gas detectors are Det-Tronics Model #PIR9400S3P2AW: Part No. 006300-003 and J-Box Pointwatch Part No. 006414-001. Units are setup and calibrated for Methane, 50% LFL, 2.5% by volume using P/N 006468-001 PointWatch Detector Calibration kit.

The MPCP shall be modified to include the following:

- Two additional combustible gas front panel mounted process indicators
- Wiring of each gas detector analog signal through the panel meter to a spare MPCP PLC analog input channel
- MPCP panel wiring modifications for panel mounted process indicator alarm contacts for pump motor interlocks
- Wiring of process panel meter alarm contact to a spare PLC digital input for remote PCS monitoring and alarm annunciation of 50% LEL gas level.

An additional Yokogawa Model EJA210E-JHS5G-922EN-FF1 level transmitter (LIT-102) shall be provided for a new methanol storage tank. The new level transmitter shall include integral field surge protection and all required field mounting hardware and isolation hardware. All transmitter field mounting hardware and isolation hardware shall be constructed of 316 stainless steel.

The existing Yokogawa tank level transmitter shall be re-proposed and re-calibrated for the replacement of existing storage tank with a new second methanol storage tank. Both methanol tank level transmitters shall be installed, wired to the existing MPCP, calibrated, and commissioned. The MPCP shall be modified to include the following:

- An additional tank level front panel mounted process indicator

- Wiring of new tank level transmitter analog signal through the panel meter to a spare MPCP PLC analog input channel.
- MPCP panel wiring modifications for panel mounted process indicator alarm contact for methanol transfer pump motor interlock
- Wiring of process panel meter alarm contact to a spare PLC digital input for remote PCS monitoring and alarm annunciation of high tank level.

Each additional field instrument shall include associated stainless-steel field mounting hardware, MPCP signal surge protection, signal isolator / converter and ancillary power supply (if required) wired in the MPCP panel matching the manufacturer and model of existing signal surge protection, signal isolator / converters, and instrument power supplies. The additional MPCP panel instrument nameplates shall match the style and colors of existing panel nameplates.

The existing MPCP Maple Systems Operator Interface Terminal (OIT) and PCS database and Human-Machine Interface (HMI) displays shall be modified to include the additional field instrument signals and alarms for display and annunciation.

1-1.02. Associated Sections. This section also includes the equipment and services specified in the following sections.

Section 13500-A FIELD INSTRUMENTS LIST

1-2. GENERAL. Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-2.02. Drawings. The Drawings indicate locations and arrangements of equipment and may include installation details and block and one-line diagrams showing connections and interfaces with other equipment.

The new Methanol Storage Tank field instruments are listed as an appendix (13500-A) to 13500.

Principal components of the instrumentation systems shall be as indicated on the P&ID drawings.

1-2.03. Codes, Permits and Agency Approvals. All work performed, and all materials used shall be in accordance with the National Electrical Code, and with applicable local regulations and ordinances. Where mandated by codes, panels, assemblies, materials, and equipment shall be listed by Underwriters' Laboratories. Contractor shall, as part of their work, arrange for and obtain all necessary permits, inspections, and approvals by the authorities having local jurisdiction of such work. This shall include any third-party inspections and testing of panels and equipment.

1-2.04. Supplier's Qualifications. Equipment and software furnished under this section and under other related sections listed in the Scope paragraph above shall be designed, coordinated, and supplied by a single manufacturer or supplier, hereinafter referred to as the System Supplier. The System Supplier shall be regularly engaged in the business of supplying computer-based monitoring, control, and data acquisition systems. The Contractor shall utilize the services of the System Supplier to coordinate all control system related items, to check-out and calibrate instruments, and to perform all testing, training, and startup activities specified to be provided.

The System Supplier shall have the following minimum qualifications:

- The supplier shall maintain a design office staffed with qualified technical design personnel.
- The supplier shall maintain competent and experienced service personnel to service the hardware and software furnished for this project.
- The supplier shall have as a minimum 5 years of experience in the design, coordination and supply of computer-based monitoring, control, and data acquisition systems.

1-2.05. Coordination. Systems supplied under this section shall be designed and coordinated by System Supplier for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications, under other contracts, and, where applicable, with related existing equipment including (but not limited to) existing Owner Plant Control System (PCS) software communicating to the GE RX3i PLC and Maple Systems OIT installed in existing MPCP panel. All equipment shall be designed and installed in full conformity with the Drawings, specifications, engineering data, instructions, and recommendations of the manufacturer, and the manufacturer of the related equipment.

1-2.06. Related Equipment and Materials. Related equipment and materials may include, but will not be limited to, instrumentation, motor controllers, valve actuators, chemical feeders, analytical measuring devices, conduit, cable, and piping as described in other sections or furnished under other contracts.

1-2.07. Device Tag Numbering System. All devices shall be provided with permanent identification tags. The tag numbers shall agree with System Supplier's equipment drawings and shall be as close as practical to the tag numbers used on the Drawings and device schedules. All field-mounted transmitters and devices shall have stamped stainless steel identification tags. Panel, subpanel, and rack-mounted devices shall have laminated phenolic identification tags securely fastened to the device. Hand-lettered or tape labels will not be acceptable.

1-3. GENERAL REQUIREMENTS. The drawings and specifications indicate the extent and general arrangement of the systems. If any departures from the Drawings or Specifications are deemed necessary by System Supplier, details of such departures and the reasons shall be submitted to Engineer for review with or before the first stage submittal. No departures shall be made without prior written acceptance.

The specifications describe the minimum requirements for hardware and software. Where System Supplier's standard configuration includes additional items of equipment or software features not specifically described herein, such equipment or features shall be furnished as a part of the system and shall be warranted as specified herein.

1-3.01. Governing Standards. Equipment furnished under this section shall be designed, constructed, and tested in accordance with IEEE 519, ANSI C37.90, FCC Part 15 - Class A, and NEMA ICS-1-109.60.

1-3.02. Dimensional Restrictions. Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values. The System Supplier shall review the Drawings, the manufacturer's layout drawings and installation requirements, and make any modifications requisite for proper installation subject to acceptance by Engineer. At least three feet of clear access space shall be provided in front of all instrumentation and control system components.

1-3.03. Workmanship and Materials. System Supplier shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard

sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except for testing.

1-3.04. Corrosive Fluids. All parts which are exposed to corrosive conditions shall be made from corrosion resistant materials. System Supplier shall submit certification that the instrument manufacturer approves the selection of materials of primary elements that are in contact with the specified process fluid to be inert to the effects of the process fluid.

1-3.05. Appurtenances. Signal converters, signal boosters, amplifiers, special power supplies, special cable, special grounding, and isolation devices shall be furnished as needed for proper performance of the equipment.

1-3.06. Programming Devices. The system supplier shall utilize their own programming or system-configuring devices for modifications to the GE PLC programming and Maple Systems OIT configuration, and calibration of Yokogawa level transmitters. The system supplier's programming devices and tools shall be compatible with OWNER's existing programming software and equipment.

1-4. SUBMITTALS. Complete dimensional, assembly, and installation drawings, wiring and schematic diagrams; and details, specifications, and data covering the materials used and the parts, devices and accessories forming a part of the system furnished, shall be submitted in accordance with the submittals section. Submittal data shall be grouped and submitted in three separate stages. The submittal for each stage shall be substantially complete. Individual drawings and data sheets submitted at random intervals will not be accepted for review. Equipment tag numbers or identifications used on the Drawings shall be referenced where applicable.

1-4.01. First Stage Submittal. The first stage submittal shall include the following items.

- a. A detailed list of any exceptions, functional differences, or discrepancies between the system proposed by System Supplier and this specification.
- b. Product catalog cut sheets on all hardware and software items, clearly marked to show the model number, optional features, and intended service of each device.
- c. A brief, concise description of the proposed system, including major hardware and software components and personnel training.
- d. A block diagram or schematic drawing showing the principal items of equipment furnished, including model numbers, and their interrelationships.
- f. Environmental and power requirements, including heat release information for each equipment item.
- g. Standard field termination drawings for all process input/output equipment, showing typical terminations for each type of point available in the system.

1-4.02. Second Stage Submittal. Before any equipment is released for shipment to the site and before factory testing is scheduled, the following data shall be submitted.

At System Supplier's option, the first and second stage submittals may be combined.

- a. Detailed functional descriptions of all software modules specified and furnished as part of System Supplier's standard system. The descriptions shall be identified with the applicable specification paragraph.
- b. Complete panel fabrication drawings and details of panel wiring, piping, and painting. Panel and subpanel drawings shall be to scale and shall include overall dimensions, metal thickness, door swing, mounting details, weight, and front of panel

arrangement to show general appearance, with spacing and mounting height of instruments and control devices.

- c. Wiring and installation drawings for all interconnecting wiring between components of the system and between related equipment and the equipment furnished under this section. Wiring diagrams shall show complete circuits and indicate all connections. If panel terminal designations, inter-device connections, device features and options, or other features are modified during the fabrication or factory testing, revised drawings shall be submitted before shipment of the equipment to the site.
- e. Review of drawings submitted prior to the final determination of related equipment shall not relieve System Supplier from supplying systems in full compliance with the specific requirements of the related equipment.
- f. Input/output listings showing point names, numbers, and addresses. Input/output identification numbers from the contract documents shall be cross-referenced in this submittal.

1-4.03. Third Stage Submittal. Complete system documentation, in the form of Operation and Maintenance Manuals, shall be submitted before the commencement of field acceptance testing. Operation and Maintenance Manuals shall include complete instruction books for each item of equipment and software furnished. Where instruction booklets cover more than one specific model or range of device, product data sheets shall be included which indicate the device model number and other special features. A complete set of "as-built" wiring, fabrication, and interconnection drawings shall be included with the manuals. If field-wiring modifications are made after these drawings are submitted, the affected drawings shall be revised and resubmitted.

1-5. PREPARATION FOR SHIPMENT. All electronic equipment and instruments shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements, shall be kept dry at all times, and shall not be exposed to adverse ambient conditions.

Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of Engineer.

Each shipment shall include an appropriate shipping list that indicates the contents of the package, including the specific instrument tags. The shipping list shall be accessible without exposing the instruments to the atmosphere. The shipping list shall also contain any cautionary notes regarding storage of the instruments, including requirements to protect the instrument from static discharge, desensitizing chemicals (solvents, paints, etc.), or ambient atmospheric conditions.

Individual instruments shall be appropriately tagged or labeled to positively identify the device. All identification shall be visible without the need to unpack the instrument from its protective packaging.

Instrument shipment and storage requirements shall be coordinated with Engineer or Owner prior to shipment. System Supplier shall provide adequate storage and be ready to accept the shipment before shipping any equipment to the site. Additional shipping and storage requirements shall be as detailed in the individual instrument specifications.

Components which are shipped loose due to transportation limitations shall be assembled and disassembled by the manufacturer prior to shipment to assure that all components fit together and are adequately supported.

1-6. DELIVERY, STORAGE, AND SHIPPING. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section.

1-7. SPARE PARTS. In addition to spare parts and consumable items specified in other sections, the following spares and consumable items shall be provided:

<u>Spare Parts</u>	<u>Quantity</u>
Combustible Gas Detector Transmitter	One (1)
Local Status Panel Digital Panel Display	One (1)
Instrument signal surge protection	Two (2)

1-7.01. Packaging. All spare parts shall be delivered to Owner before final acceptance of the system. Packaging of spare parts shall provide protection against dust and moisture and shall be suitable for storage. Circuit boards and other electronic parts shall be enclosed in anti-static material. All packages shall be clearly marked with the manufacturer's name, part number or other identification, date of manufacture, and approximate shelf life.

1-7.02. Replacement. System Supplier may utilize spare parts and supplies during system installation, de-bugging, startup, or training, but shall restore all such materials and supplies to the specified quantities before final acceptance of the systems.

PART 2 - PRODUCTS

2-1. GENERAL REQUIREMENTS. All equipment furnished under each section referenced in SCOPE is a part of this section and shall be selected by System Supplier for its superior quality and intended performance. Equipment and materials used shall be subject to review.

2-1.01. Standard Products. The systems furnished shall be standard products. Where two or more units of the same type of equipment are supplied, they shall be the products of the same manufacturer; however, all components of the systems furnished hereunder need not be the products of one manufacturer unless specified herein.

To the extent possible, instruments used for similar types of functions and services shall be of the same brand and model line. Similar components of different instruments shall be the products of the same manufacturer to facilitate maintenance and stocking of repair parts. Whenever possible, identical units shall be furnished.

2-2. PERFORMANCE AND DESIGN REQUIREMENTS. The design of the systems furnished hereunder shall utilize concepts, techniques and features that provide maximum reliability and ease of maintenance and repair. The systems shall include board-level devices such as light emitting diodes or other indicators to facilitate quick diagnosis and repair. Diagnostic software shall be furnished to facilitate system-level troubleshooting.

2-3. POWER SUPPLY AND INSTRUMENT SIGNAL. Power supply to all control system equipment will be 120 volts, 60 Hz, single phase or powered from existing MPCP panel. System Supplier shall be responsible for distribution of power among new devices installed within the existing MPCP enclosure.

2-4. SERVICE CONDITIONS AND ENVIRONMENTAL REQUIREMENTS. The equipment provided for the instrumentation and control system shall be suitable for the service conditions specified in the attached equipment sections.

All equipment shall be designed and selected to operate without degradation in performance throughout the environmental extremes specified. Equipment shall be designed to prevent the generation of electromagnetic and radio frequency interference and shall be in compliance with FCC Rules and Regulations, Part 15, for Class A computing devices.

2-4.01. Ambient Temperature and Elevation. All system equipment located in air-conditioned rooms shall be suitable for operation in ambient temperatures from 10°C to 35°C and a relative humidity of 10 to 80 percent, noncondensing. All equipment located in non-air-conditioned indoor areas shall be suitable for an ambient temperature range of 0°C to 50°C and a relative humidity of 10 to 95 percent, noncondensing. All equipment located outdoors shall be suitable for operation in an ambient temperature range -20°C to 60°C and a relative humidity of 5 to 100 percent. Heaters and air conditioning/cooling equipment shall be provided where essential to maintain equipment within its manufacturer-recommended operating ranges.

All equipment and instruments shall be designed to operate at the site elevation of 50 feet.

2-4.02. Deleterious Effects. All system equipment will be installed in areas without anti-static floor construction and without any provisions for control of particulates or corrosive gases other than ordinary office-type HVAC filtering. System Supplier shall furnish any additional air cleaning equipment, anti-static chair pads, or other protective measures necessary for proper operation of the system.

All input/output hardware shall meet or exceed, without false operation, all requirements of NEMA ICS-1-109.60, Electrical Noise Tests.

2-4.03. Noise Level. The equivalent "A" weighted sound level for any system equipment located in the control room, except printers, shall not exceed 35 dBA. The sound level for printers shall not exceed 65 dBA. Sound reduction enclosures shall be provided where necessary to comply with these limits.

2-4.04. Lightning Protection. In addition to other environmental protection specified herein, the entire system shall be provided with lightning protection. Lightning protection measures shall include the following.

2-4.04.01. Grounding. All major components of the system shall have a low resistance ground connection. Grounding system provisions indicated on the Drawings shall be modified as recommended by System Supplier.

2-4.04.02. Surge Suppressors. Surge and lightning suppressors shall be non-faulting, non-interrupting, and shall protect against line-to-line and line-to-ground surges. Devices shall be solid-state metal oxide varistor (MOV) or silicon junction type, with a response time of less than 50 nanoseconds. Surge protective devices shall be applied for the following:

- a. All analog signal circuits where any part of the circuit is outside of the building envelope. Circuits shall be protected at both the transmitter and the control system end of the circuit. Surge protection devices shall not impede or interfere with the use of smart transmitter calibration/communication. Protection devices located near the transmitter shall be Telematic "TP48." Protection devices in control panels shall be Transtector "PDS Series or FSP Series", Telematic "SD Series", Phoenix Contact "PipeTrab Series", or Citel "BP1-24."

2-5. SOFTWARE DOCUMENTATION. System Supplier shall furnish complete documentation on all software supplied with the systems specified herein. Operating systems, compilers, assemblers, and utility and diagnostic programs that are standard commercial products of third parties need not be included in the optical media backup. Software documentation shall consist of the following principal items.

- a. One backup set of any integrated circuit or solid-state memory-based plug-in firmware used.
- b. Two complete back-up copies of system and application software in executable format on optical media compatible with the system furnished.

- c. Three sets of user reference manuals for all standard system and application software.
- d. One set of user reference manuals for all operating system software.
- e. Three sets of printed as-built reference documentation for any special software provided specifically for this contract.
- f. For each licensed software product, all documentation provided by the product manufacturer shall be provided. This includes all reference manuals and any other documents that were provided by the manufacturer. One set of this documentation shall be supplied for each and every piece of equipment provided. Multiple pieces of similar equipment or software require multiple copies of this documentation.

2-6. SOFTWARE LICENSE. All software programs supplied as a standard part of System Supplier's products for this project shall be licensed to Owner for use on the system specified herein. Such license shall not restrict Owner from using the software on the system provided hereunder or its replacement. Owner shall have the right to make copies of the software for use on the system provided. Specific requirements of System Supplier's software license are subject to review and approval by Owner and Engineer.

2-7. INSTALLATION TEST EQUIPMENT. All necessary testing equipment for calibration and checking of system components shall be provided by System Supplier. System Supplier shall also furnish calibration and maintenance records for all testing and calibration equipment used on the site if requested by Engineer.

PART 3 – EXECUTION

3-1. INSTALLATION REQUIREMENTS. The installation of equipment furnished hereunder shall be by the Contractor or their assigned subcontractors.

3-1.01. Field Wiring. Field wiring materials and installation shall be in accordance with the electrical section.

3-1.02. Instrument Installation. Instruments shall be mounted so that they can be easily read and serviced and so that all appurtenant devices can be easily operated. Installation details for some instruments are indicated on the Drawings.

All outdoor instrumentation shall be protected from direct sun exposure. Instruments shall be placed in locations to limit south and west sun exposure. Sunshades shall be provided on instruments that are subject to the direct sun exposure. Sunshades shall be located so the opening faces north or east where possible. Sunshades shall be provided as shown on the Drawings.

3-1.03. Salvage of Existing Equipment. Existing equipment and materials removed or replaced under this contract shall be delivered to Owner at a location designated by Owner or shall be properly disposed of at Owner's discretion. Care shall be taken to avoid damage to equipment delivered to Owner.

Any mounting brackets, enclosures, stilling wells, piping, conduits, wiring, or openings that remain after removal of equipment and support hardware shall be removed or repaired in a manner acceptable to Owner and Engineer.

Transmitters or switches containing mercury shall be removed and disposed of by personnel trained in the handling of hazardous materials and using approved procedures.

3-2. SYSTEM SOFTWARE CONFIGURATION. The System Supplier shall modify the existing PCS database and HMI displays to display, log, and annunciate new MPCP field instrument process signals and alarms.

3-3. SYSTEMS CHECK. System Supplier shall provide the services of a trained and experienced field supervisor to assist the installation contractor during installation, and to calibrate, test, and advise others of the procedures for installation, adjustment, and operation.

3-3.01. Field Manager. Not used.

3-3.02. Field Inspection at Delivery. The field supervisor shall inspect major equipment items within five working days of delivery, to assure that the equipment was not damaged during shipment and shall supervise or assist with unpacking, initial placement, and initial wiring of the system.

3-3.03. Field Calibration of Instruments. After each instrument has been installed, a technical representative of System Supplier shall calibrate each instrument and shall provide a written calibration report for each instrument, indicating the results and final settings. The adjustments of calibrated instruments shall be sealed or marked, insofar as possible, to discourage tampering. Instrument calibration shall be done before checkout of the system operation. A typical instrument calibration report is attached to the end of this section.

3-3.04. Training for Installation Personnel. Not Used.

3-3.05. Field Inspection Prior to Start Up. Not used.

3-3.05.01. Analog Signals. Analog input signals shall be simulated at the transmitting source, and verified to be operational within the MPCP PLC, and displayed properly on the MPCP OIT and PCS HMI.

3-3.05.02. Discrete Signals. Discrete input and output signals shall be simulated and verified to be operational within the MPCP PLC and displayed properly on the MPCP OIT and PCS HMI.

3-3.05.03. Devices by Other Suppliers. If interrelated devices furnished by other suppliers, under other contracts, or by Owner, such as valve actuators, motor controls, chemical feeders, and instruments, do not perform properly at the time of system checkout, the field supervisor shall use suitable test equipment to introduce simulated signals to and/or measure signals from these devices to locate the sources of trouble or malfunction.

3-3.05.04. System Check Out Report. The System Supplier shall submit a written report on the results of such tests to Engineer. Additional documentation shall be furnished as requested by Engineer to establish responsibility for corrective measures. System Supplier shall verify, in writing, to Engineer and Owner that System Supplier has successfully completed the external connection check before beginning system startup or field acceptance testing.

3-3.06. Start Up Assistance. After the system supplier has completed the system check and submitted his report, System Supplier shall supply a factory-trained engineer / programmer to provide on-site start up assistance. During the startup period, these personnel shall thoroughly check all equipment, correct any deficiencies, and verify the proper operation of all components. One (1) working days shall be included for this task.

3-4. TESTING. The system shall be acceptance tested on site.

System Supplier shall prepare a testing procedure to be approved by Owner and Engineer that shall demonstrate that the system conforms to the specifications. The testing procedure shall be submitted at least 30 days in advance of testing. The testing shall be conducted by System Supplier and witnessed by Owner and/or Engineer.

System Supplier shall notify Engineer and Owner in writing at least 14 days before the proposed testing date. If the factory acceptance test is concluded unsuccessfully, the test shall be repeated. System Supplier shall reimburse Owner and Engineer for all expenses incurred in connection with attending repeated site testing necessitated by system failure or inadequate preparation.

3-4.01. Factory Acceptance Testing. Not Used.

3-4.02. Site Acceptance Testing. After installation and checkout by System Supplier's personnel, the system shall be subjected to an acceptance test.

Site acceptance testing shall be scheduled after receipt of the System Check Out Report. System Supplier shall verify that all field signal changes are reflected in the proper address locations in the MPCP PLC and MPCP OIT.

System Supplier shall coordinate with Owner on testing requirements to confirm field instruments are functioning and properly communicated and displayed on the PCS HMI.

The site acceptance test shall be conducted on complete system, including all field I/O devices.

The operational demonstration shall confirm that the additional status, alarm, and process variable signals are valid and are present on the MPCP PLC I/O, MPCP panel motor interlocks, MPCP OIT, and PCS HMI. Any errors or abnormal occurrences shall be recorded by System Supplier's field representative. System Supplier's field representative need not be continuously present during the site acceptance testing but shall be available to respond to the site within twenty-four hours of notification.

3-4.02.01. Failure of Redundant Equipment. Not Used.

3-4.02.02. Completion of Test. Successful completion of the site acceptance test, including the operational demonstration, is prerequisite to Substantial Completion as specified in the Supplementary Conditions.

3-5. TRAINING. Not Required.

End of Section

INSTRUMENT NAME & SERVICE:		
BRAND & MODEL NO.:		
TAG OR LOOP NO.:		
INPUT/OUTPUT RANGE:		
INPUT	ACTUAL OUTPUT	DESIRED OUTPUT
PROPORTIONAL BAND:		
RESET:		
POSITION OF SWITCHES, JUMPERS, ETC.		
COMMENTS:		
DATE OF CALIBRATION: CALIBRATED BY:		
Black & Veatch	INSTRUMENT CALIBRATION REPORT	Figure 1-13500

Field Instruments

- Item.** This is an arbitrary sequential number which is for reference only.
- Tag.** This is the ISA (or similar) alpha tag representing the function of the instrument.
- PLC.** This is the PLC location ID where the designated instrument signal is connected.
- Service Description.** This is the description of the instrument service (i.e. Pump Discharge Pressure).
- Device Type & Size.** This is the instrument device type and should match the description as listed in the specification. Where appropriate, the size of the device (such as diameter of flowmeters) will be listed.
- Output Type.** This generally will be '4-20 mA' or 'Dry Contact'. It could also be a serial output for smart devices (such as HART or FLD-BUS) but only if the serial output is the primary I/O interface.
- Output Range.** This is the calibrated range for analog devices or the trip point(s) for discrete devices.
- Power.** This will typically be either 24 VDC or 115 VAC for dry contact sense voltage, or 115 VAC for AC powered devices. Loop-powered devices will be designated as 2-wire, 24 VDC.
- Inst. Det.** This is a reference to the applicable installation detail on the drawings if applicable.
- Loc. Dwg.** This is the drawing number of the electrical plan or instrument location plan where the device is shown.
- P&I Drawing** This is the drawing number of the P&ID where the device is shown.
- Comments/Notes.** This column may include a cross reference to another specification section where applicable, or to a note which provides additional information. Notes are appended to the end of the device schedule listings.

13500-A

Item	Tag	Connection	Service Description	Device Type & Size	Output Type	Output Range	Device Power	Elec. Dwg.	I&C Dwg.	Comments
1	LIT-102	MPCP PLC	Methanol Tank 02 Level	Pressure Indicating Level Transmitter	4-20ma	Calibrate to Tank	2-wire, 24VDC, MPCP PLC	E-02	I-02	Yokogawa EJA210E-JHS5G-922EN-FF1 - No Exceptions
2	AIT-106	MPCP PLC	Methanol Tank 02 Combustible Gas Detector AIT-106	Combustible Gas Detector	4-20ma	Calibrate to 2.5% methane gas by volume	2-wire, 24VDC, MPCP PLC	E-02	I-02	Det-Tronics Model PIR9400S3P2AW, Part No. 006300-003 and J-Box Pointwatch Part No. 006414-001
3	AIT-107	MPCP PLC	Methanol Tank 02 Combustible Gas Detector AIT-107	Combustible Gas Detector	4-20ma	Calibrate to 2.5% methane gas by volume	2-wire, 24VDC, MPCP PLC	E-02	I-02	Det-Tronics Model PIR9400S3P2AW, Part No. 006300-003 and J-Box Pointwatch Part No. 006414-001

Section 15010

VALVE INSTALLATION

PART 1 - GENERAL

1-1. **SCOPE.** This section covers the installation of new valves and actuators purchased by Contractor as part of this Work.

Cleaning, disinfection, pressure and leakage testing, insulation, and pipe supports are covered in other sections.

The following specification sections are applicable to valves to be installed:

Title

Miscellaneous Ball Valves

Check Valves

Resilient-Seated Gate Valves

Plug Valves

1-2. **GENERAL.** Equipment installed under this section shall be erected and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

1-2.01. **Coordination.** When manufacturer's field services or installation check services are provided by the valve manufacturer, Contractor shall coordinate the services with the valve manufacturer. Contractor shall give Engineer written notice at least 30 days prior to the need for manufacturer's field services.

Flanged connections to valves including the bolts, nuts, and gaskets are covered in the appropriate pipe specification section. Valve ends shall match piping.

PART 2 - PRODUCTS

Not Applicable.

PART 3 - EXECUTION

3-1. **INSPECTION.** All valves and accessories shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and re-cleaned to the original requirements by Contractor. Such material shall be segregated from the clean material and shall be inspected and approved by Owner or his representative before its use.

3-2. INSTALLATION.

3-2.01. **General.** Valves shall be installed with sufficient clearance for proper operation of any external mechanisms, and with sufficient clearance to dismantle the valve for in-place maintenance. Installation shall be in accordance with the valve manufacturer's recommendations.

Unless otherwise indicated on the Drawings or specified, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of piping having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating

handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems oriented to facilitate the most practicable operation, as reviewed by Engineer.

3-2.02. Installation Checks. When specified in the valve sections, the valve manufacturer will provide installation checks. For installation checks, the manufacturer's field representative will inspect the valve installation immediately following installation by Contractor. The manufacturer's representatives will revisit the site as often as necessary to ensure installation satisfactory to Owner.

3-2.03. AWWA Butterfly Valves. Not used.

3-2.04. Check Valves.

3-2.04.01. Swing Check Valves. Install valves oriented for the correct flow direction. Only valves designed for vertical installation shall be installed in vertical piping.

3-2.05. Plug Valves.

3-2.05.01. Eccentric Plug Valves. Not used.

3-2.05.02. Plug Valves.

3-2.06. Resilient Seated Gate Valves.

3-2.06.01. Resilient Seated Gate Valves. Valves shall be handled and installed in accordance with the recommendations set forth in the Appendices to ANSI/AWWA C509 and C515 and with the recommendations of the manufacturer.

3-2.06.02. Double Disc Gate Valves. Not used.

3-2.07. Air Release and Combination Air Valves. Not used.

3-2.08. Hydrants. Not used.

3-2.09. Valve Boxes. Valve boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves, with the top of the box brought flush with the finished grade. After each valve box is placed in proper position, earth fill shall be placed and thoroughly tamped around the box.

3-3. VALVE ACTUATORS. Valve actuators and accessories shall be factory mounted on the valve, calibrated, and tested by the valve or actuator manufacturer.

3-4. FIELD QUALITY CONTROL.

3.4.01. Field Testing. After installation, all valves shall be tested in accordance with the Pipeline Pressure and Leakage Testing section.

3-4.01.01. Pressure Tests. Pressure testing shall be in accordance with the Pipeline Pressure and Leakage Testing section.

3-4.01.02. Leakage Tests. All valves shall be free from leaks. Each leak that is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of Contractor. This requirement applies whether pressure testing is required or not.

3-5. ADJUSTING. After installation, the opening and closing time shall be adjusted as needed for each pneumatic, hydraulic and electric actuated valve.

End of Section

Section 15020

MISCELLANEOUS PIPING AND ACCESSORIES INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the installation of piping and accessories as indicated on the Drawings for the following piping sections:

Section Title

Miscellaneous Steel Pipe, Tubing, and Accessories

Contractor shall furnish all necessary jointing materials, coatings, and accessories that are specified herein.

Pipe supports, and anchors shall be furnished by Contractor, and are covered in the Pipe Supports section. Pipe trenching and backfilling are covered in the Trenching and Backfilling section.

1-2. GENERAL.

1-2.01. Coordination. Materials installed under this section shall be installed in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the manufacturer, unless exceptions are noted by Engineer.

1-3. SUBMITTALS.

1-3.01. Drawings and Data. Complete specifications, data, and catalog cuts or drawings shall be submitted in accordance with the Submittals Procedures section. Items requiring submittals shall include, but not be limited to, the following:

Materials as specified herein.

1-3.02. Welder Certification. Prior to the start of the work, Contractor shall submit a list of the welders he proposes using and the type of welding for which each has been qualified. Copy of certification and identification stamp shall be submitted for each welder. Qualification tests may be waived if evidence of prior qualification is deemed suitable by Engineer.

1-3.03. Spool Drawings. Not Used.

1-4. QUALITY ASSURANCE.

1-4.01. Welding and Brazing Qualifications. All welding and brazing procedures and operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of Section IX of the ASME Code. All procedure and operator qualifications shall be submitted to the Engineer for review.

1-4.02. Tolerances. These tolerances apply to in-line items and connections for other lines.

The general dimension, such as face-to-face, face or end-to-end, face- or end-to center, and center-to-center shall be 1/8 inch.

The inclination of flange face from true in any direction shall not exceed 3/64 inch per foot
Rotation of flange bolt holes shall not exceed 1/16 inch.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

PART 2 - PRODUCTS

2-1. SERVICE CONDITIONS. Pipe, tubing, and fittings covered herein shall be installed in the services indicated in the various pipe sections.

2-2. MATERIALS.

Threaded Fittings

Anti-Seize Thread Lubricant	Jet-Lube "Nikal", John Crane "Thred Gard Nickel", Never-Seez "Pure Nickel Special", or Permatex "Nickel Anti-Seize".
Teflon Thread Sealer	Paste type; Hercules "Real-tuff", John Crane "JC-30", or Permatex "Thread Sealant with Teflon".
Teflon Thread Tape	Hercules "Tape Dope" or John Crane "Thread-Tape".

Solvent Welded Fittings

Solvent cement for PVC Systems	ASTM D2564.
Solvent cement for CPVC Systems	ASTM F493.
Sodium Hypochlorite, Sodium Hydroxide, and Sodium Bisulfite Service	IPS Corporation "Weld-On 724"
Primer for PVC Systems	ASTM F656.

Solder or Brazed Fittings

Solder	Solid wire, ASTM B32, ANSI/NSF 61 certified, Alloy Grade Sb5, (95-5).
Soldering Flux	Paste type, ASTM B813.
Brazing Filler Metal	AWS A5.8, BCuP-5; Engelhard "Silvaloy 15", Goldsmith "GB-15", or Handy & Harman "Sil-Fos".
Brazing Flux	Paste type, Fed Spec O-F-499, Type B.

Insulating Fittings

Threaded	Dielectric steel pipe nipple, ASTM A53, Schedule 40, polypropylene lined, zinc plated; Perfection Corp. "Clearflow Fittings".
Flanged	EpcO "Dielectric Flange Unions" or Central Plastics "Insulating Flange Unions".

Pipe Insulation	See Mechanical Insulation section.
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Watertight/Dusttight Pipe Sleeves	O-Z Electrical Manufacturing "Thruwall" and "Floor Seals", or Thunderline "Link-Seals"; with modular rubber sealing elements, nonmetallic pressure plates, and galvanized bolts.
Pipe Sleeve Sealant	Polysulfide or urethane, as specified in the Caulking section or as indicated on the Drawings.
Protective Coatings	
Tape Wrap	ANSI/AWWA C209, except single ply tape thickness shall not be less than 30 mils; Protecto Wrap "200" or Tapecoat "CT".
Primer	As recommended by the tape manufacturer.
Coal Tar Epoxy	High-build coal tar epoxy; PPG Amercoat "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy for aeration and process air piping	Shop or field applied high solids epoxy; suitable for protection at continuous pipe wall temperatures up to 300 F. Coating shall be abrasion resistant. The finished coating shall have a minimum total film thickness of 10 mils. The surface shall be prepared in accordance with SSPC-SP7 as a minimum unless otherwise recommended by the coating manufacturer. The coating shall be Carboline "Thermaline 450", PPG Amercoat "Amerlock 400 with Amercoat 880 Additive", or approved equal.
Chlorine Tank Car Unloading Connection	Special flanged hose assembly conforming to materials and details on Drawing No. 135, The Chlorine Institute, Inc.

PART 3 - EXECUTION

3-1. INSPECTION. All piping components shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and recleaned to the original requirements by Contractor. Such material shall be segregated from the clean material and shall be inspected and approved by Owner or his representative before its use.

3-2. PREPARATION.

3-2.01. Field Measurement. Pipe shall be cut to measurements taken at the site, not from the Drawings. All necessary provisions shall be made in laying out piping to allow for expansion and contraction. Piping shall not obstruct openings or passageways. Pipes shall be held free of contact with building construction to avoid transmission of noise resulting from expansion.

3-3. INSTALLATION.

3-3.01. General. All instruments and specialty items shall be installed according to the manufacturer's instructions and with sufficient clearance and access for ease of operation and maintenance.

Flat faced wrenches and vises shall be used for copper tubing systems. Pipe wrenches and vises with toothed jaws will damage copper materials and shall not be used. Bends in soft temper tubing shall be shaped with bending tools.

3-3.02. Pipe Sleeves. Piping passing through concrete or masonry shall be installed through sleeves that have been installed before the concrete is placed or when masonry is laid. Pipe sleeves installed through floors with a special finish, such as ceramic or vinyl composition tile, shall be flush with the finished floor surface and shall be provided with nickel or chromium plated floor plates. Unless otherwise indicated on the Drawings, in all other locations where pipes pass through floors, pipe sleeves shall project not less than 1 inch nor more than 2 inches above the floor surface, with the projections uniform within each area. In the case of insulated pipes, the insulation shall extend through pipe sleeves. Where the Drawings indicate future installation of pipe, sleeves fitted with suitable plastic caps or plugs shall be provided.

Holes drilled with a suitable rotary drill will be considered instead of sleeves for piping which passes through interior walls and through floors with a special finish.

Unless otherwise indicated on the Drawings, all pipes passing through walls or slabs which have one side in contact with earth or exposed to the weather shall be sealed watertight with special rubber-gasketed sleeve and joint assemblies, or with sleeves and modular rubber sealing elements.

3-3.03. Pipe Joints. Pipe joints shall be carefully and neatly made in accordance with the indicated requirements.

3-3.03.01. Threaded. Not Used.

3-3.03.02. Compression. Not Used.

3-3.03.03. Flared. Not Used.

3-3.03.04. Soldered and Brazed. Not Used.

3-3.03.05. Solvent Welded. Not Used.

3-3.03.06. Epoxy and Adhesive Bonded. Not Used.

3-3.03.07. Heat Fusion Bonded. Not Used.

3-3.03.08. Flanged. Flange bolts shall be tightened sufficiently to slightly compress the gasket and effect a seal, but shall not be torqued less than the minimum value required by the gasket manufacturer. Flange bolts shall not be so tight as to fracture or distort the flanges. A plain washer shall be installed under the head and nut of bolts connecting plastic pipe flanges. Anti-seize thread lubricant shall be applied to the threaded portion of all stainless steel bolts during assembly.

Flange bolt holes shall be oriented as follows, unless otherwise indicated on the spool drawings:

Vertical flange face:	Bolt holes to straddle the vertical centerlines.
Horizontal flange face:	Bolt holes shall be aligned with connecting pipe.

Pipe sealants, thread compounds, or other coatings shall not be applied to flange gaskets unless recommended by the gasket manufacturer for the specified service and approved by Engineer.

Welds at orifice flanges shall have internal surfaces ground smooth to the pipe wall.

Slip-on flanges shall be welded inside and outside. There shall be a distance of approximately 1/16 to 1/8 inch between the edge of the fillet weld and the face of the flange. The seal weld shall be applied so that the flange face shall be free of weld spatter and does not require refacing.

Flat-faced flanges shall be used when mating to Class 125 flanges. Full-face gaskets shall be used with flat-faced flanges and ring gaskets shall be used with raised faced flanges.

Weld neck flanges shall be used with butt-weld fittings. The bore of weld neck flanges shall match the pipe wall thickness.

3-3.03.09. Welded. Welding shall conform to the specifications and recommendations contained in the "Code for Pressure Piping", ANSI B31.1.

Weld cross-sections shall be equal to or greater than the pipe wall thickness. Welds shall be smooth and continuous and shall have interior projections no greater than 1/16 inch. Backing strips or rings shall not be used except with specific prior review by Engineer as to use, material, and design. Root gap inserts that are completely melted and consumed in the weld bead are acceptable only when reviewed in advance by Engineer.

Stainless steel welding shall be inert gas tungsten arc (TIG) or the direct current, straight polarity, inert gas metal arc process (MIG).

Carbon steel welding shall be made by the shielded metal arc process.

For socket weld joints, fully engage the two pipe ends, then separate them by 1/16 inch prior to welding to all space for shrinkage.

3-3.03.10. Grooved Couplings. Not Used.

3-3.03.11. Push-on. Not Used.

3-3.03.12. Rubber-Gasketed. Not Used.

3-3.03.13. Other Pipe Joints. Not Used.

3-3.04. Pipe. Pipe shall be installed as specified, as indicated on the Drawings, or, in the absence of detail piping arrangement, in a manner acceptable to Engineer.

Piping shall be installed without springing or forcing the pipe in a manner which would induce stresses in the pipe, valves, or connecting equipment.

Piping shall be supported in conformance with the Pipe Supports section.

Piping shall be connected to equipment by flanges or unions as specified in the various piping sections. Piping connecting to equipment shall be supported by a pipe support and not by the equipment.

Water, gas, and air supply piping shall be provided with a shutoff valve and union at each fixture or unit of equipment, whether or not indicated on the Drawings, to permit isolation and disconnection of each item without disturbing the remainder of the system. Air supply piping shall be provided with sectionalizing valves and valved air inlet connections as needed for isolation of portions of the system for periodic testing. Gas supply lines to buildings shall be provided with a shutoff valve and union located above grade immediately outside the building. A capped drip leg shall be provided at the bottom of the vertical riser of gas supply piping adjacent to gas-fired appliances.

A union shall be provided within 2 feet of each threaded-end valve unless there are other connections which will permit easy removal of the valve. Unions shall also be provided in piping adjacent to devices or equipment which may require removal in the future and where required by the Drawings or the Specifications.

In all piping, insulating fittings shall be provided to prevent contact of dissimilar metals, including but not limited to, contact of copper, brass, or bronze pipe, tubing, fittings, valves, or appurtenances, or stainless steel pipe, tubing, fittings, valves, or appurtenances with iron or steel pipe, fittings, valves, or appurtenances. Insulating fittings shall also be provided to prevent contact of copper, brass, or bronze pipe, tubing, fittings, valves or appurtenances with stainless steel pipe, tubing, fittings, valves, or appurtenances.

Branch connections in horizontal runs of steam, air, and gas piping shall be made from the top of the pipe.

All chemical piping shall be installed so that lines are readily accessible for cleaning. Tees shall be provided at regular intervals in all chemical piping except chlorine piping, with extra openings plugged, to facilitate cleaning. Teflon thread tape or teflon thread sealer shall be applied to the threads of the plugs so that they can be easily removed. At each point where hose or reinforced plastic tubing is connected to rigid piping, a quick-disconnect coupling shall be provided.

Piping adjacent to flow sensors shall be installed in accordance with the requirements of the manufacturer of the flow sensor and commonly accepted design practices of the appropriate straight pipe runs both upstream and downstream.

Drains required for operation are shown on the Drawings. However, vents at all high points and drains at all low points in the piping that are required for complete draining for pressure test may not be shown on these Drawings. Contractor shall add such items as found to be necessary during detail piping design and/or piping installation.

3-3.05. Reducers. Eccentric reducers shall be installed flat on the bottom for steam, condensate return and digester gas services.

3-3.06. Valves. Isolation valves provided with equipment and instruments shall be located in a manner which will allow ease of access and removal of the items to be isolated. Prior to soldering or brazing valves, teflon and elastomer seats and seals shall be removed to prevent damage.

3-4. PIPING ASSEMBLY.

3-4.01. General. Contractor shall only use labor that has been qualified by training and experience to capably perform the specified activities required to accomplish the work in a satisfactory manner

Any deviations from the Specifications or piping locations shown on the Drawings require prior review and approval by Engineer.

3-4.02. Buttwelded Piping. The specification and qualification of weld joints and welders for buttwelded piping shall be in accordance with ASME Boiler Pressure Vessel Code, Section IX, Welding and Brazing. Weld procedure specifications (WPS) and procedure qualification reports (PQR) shall be submitted to Engineer for review and validation of joint design, efficiencies and strength before installation begins.

Nondestructive examination (NDE) shall be in accordance with the ASME Boiler and Pressure Vessel Code, Section V, Nondestructive Examination. The minimum level of NDE shall be as follows:

- (1) 100 percent visual examination of welds by a qualified examiner (per ASME B31.1), and

(2) Radiographic testing (RT) of 10 percent random sampling of welds.

If the Contractor wants to use alternative techniques or intends to apply alternative methods considered equivalent to those indicated herein, a proposal on such techniques or methods shall be submitted in writing to Engineer for review and approval at least 14 days before intended date of use.

Welding shall not begin until weld joint and welder qualification submittals have been reviewed and approved. NDE shall be performed before the pressure and leakage testing of the piping. Weld acceptance standards shall be in accordance with ASME B31.1, Chapter VI. If a weld fails the NDE, it shall be repaired and the test repeated at no additional cost to the Owner.

3-5. PROTECTIVE COATING. Not Used.

3-6. PRESSURE AND LEAKAGE TESTING. All specified tests shall be made by and at the expense of Contractor in the presence, and to the satisfaction of Engineer. Each piping system shall be tested for at least 1 hour with no loss of pressure. The Contractor shall coordinate this section with the Pipeline Pressure and Leakage Testing section. Piping shall be tested at the indicated pressures:

Service	Test Pressure	Test Medium
Other piping	1-1/2 times working pressure but not less than 50 psi	Suitable fluid or gas; for distilled water piping, distilled water or filtered oil-free compressed air may be used

Compressed air or pressurized gas shall not be used for testing plastic piping unless specifically recommended by the pipe manufacturer.

Leakage may be determined by loss-of-pressure, soap solution, chemical indicator, or other positive and accurate method acceptable to Engineer. All fixtures, devices, or accessories which are to be connected to the lines and which would be damaged if subjected to the specified test pressure shall be disconnected and the ends of the branch lines plugged or capped as needed during the testing.

After completion of the specified pressure tests, all anhydrous ammonia, chlorine and sulfur dioxide gas piping shall be tested for leakage using the appropriate gas chemical at operating pressures. Piping shall be thoroughly cleaned and dried before admitting gas chemical into the system. Gas chemical shall be slowly admitted to the piping system.

For chlorine gas piping, leakage shall be checked by waving a swab soaked in aqua ammonia solution near each fitting. Ammonia solution shall not be applied directly to the fittings. Formation of white fumes will indicate the presence of leaks. All chlorine gas shall be purged from the line before leaks are repaired.

Unless otherwise required by the applicable codes, drainage and venting systems shall be water tested. For water testing, the drainage and venting system shall be filled with water to the level of the highest vent stack. For air testing, the system shall be charged with air to a minimum pressure of 5 psig. Openings shall be plugged as necessary for either type of test. To be considered free of leaks, the system shall hold the water or air for 30 minutes without any drop in the water level or air pressure.

All necessary testing equipment and materials, including tools, appliances and devices, shall be furnished and all tests shall be made by and at the expense of Contractor. Contractor shall give Engineer 5 working days advanced notice of scheduled testing.

All joints in piping shall be tight and free of leaks. All joints which are found to leak, by observation or during any specified test, shall be repaired, and the tests repeated.

3-7. CLEANING. The interior of all pipe, valves, and fittings shall be smooth, clean, and free of blisters, loose mill scale, sand, dirt, and other foreign matter when installed. Before being placed in service, the interior of all lines shall be thoroughly cleaned, to the satisfaction of Engineer.

Metal anhydrous ammonia, chlorine and sulfur dioxide piping shall be cleaned as recommended by the gas chemical feed system supplier. All surfaces which may come into contact with gas chemical shall be thoroughly dry and free of oil or grease before being placed in service. The recommended cleaning procedures shall be submitted for review in accordance with the Submittals section.

Tin-lined copper tubing for distribution of distilled water shall be flushed and cleaned with distilled water in accordance with the tubing manufacturer's recommendations.

3-8. ACCEPTANCE. Owner reserves the right to have any section of the piping system which he suspects may be faulty cut out of the system by Contractor for inspection and testing. Should the joint prove to be sound, Owner will reimburse Contractor on a time-and-material basis as specified in the Contract. Should the joint prove to be faulty, the destructive test will continue joint by joint in all directions until sound joints are found. Costs for replacement of faulty work and/or materials shall be the responsibility of Contractor.

End of Section

Section 15065

MISCELLANEOUS STEEL PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of miscellaneous steel pipe, tubing and accessories that for pipe diameters 24 inches and smaller. Pipe and tubing shall be furnished complete with all fittings, flanges, unions, and other accessories specified herein.

Steel pipe for potable and non-potable water conveyance are covered in the Steel Pipe section.

1-2. GENERAL.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-3. SUBMITTALS.

1-3.01. Drawings and Data. Complete specifications, data, and catalog cuts or drawings shall be submitted in accordance with the Submittals Procedures section. Submittals are required for all piping, fittings, gaskets, sleeves, and accessories, and shall include the following data:

- Name of Manufacturer
- Type and model
- Construction materials, thickness, and finishes
- Pressure and temperature ratings

Contractor shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.

1-4. DELIVERY, STORAGE, AND HANDLING. Shipping shall be in accordance with the Product Delivery Requirements section. Handling and storage shall be in accordance with the Product Storage and Handling Requirements section. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

1-4.01. Coated Pipe. Handling methods and equipment used shall prevent damage to the protective coating and shall include the use of end hooks, padded calipers, and nylon or similar fabric slings with spreader bars. Bare cables, chains, or metal bars shall not be used. Coated pipe shall be stored off the ground on wide, padded skids. Plastic coated pipe shall be covered or otherwise protected from exposure to sunlight.

PART 2 - PRODUCTS

2-1. GALVANIZED STEEL PIPE. Not used.

2-2. STEEL PIPE. Steel pipe materials and service shall be as specified herein.

2-2.01. Material Classification BSP-1. Not used.

2-2.02. Material Classification BSP-2.

BSP-2 – Standard Weight Steel with Socket Welded Fittings. Methanol piping. 2 inch and smaller.	Pipe	ASTM A53/A106, Type S, standard weight, Grade B; Plain ends.
	Fittings	Forged steel socket welded. Fitting shall conform to ANSI B16.11, Class 3000; Bonney, Crane, Ladish, or Vogt.

2-2.03. Material Classification BSP-3.

BSP-3 – Standard Weight Steel with Buttwelded Fittings. Methanol piping. 2-1/2 inch and larger.	Pipe	ASTM A53/A106, Type S, standard weight Grade B; Bevel ends.
	Fittings	Buttwelded. Fitting shall conform to ANSI/ASME B16.9, standard weight.

2-2.04. Material Classification BSP-4. Not used.

2-2.05. Material Classification BSP-5. Not used.

2-2.06. Material Classification BSP-6. Not used.

2-2.07. Material Classification BSP-7. Not used.

2-2.08. Material Classification BSP-8. Not used.

2-2.09. Material Classification BSP-9. Not used.

2-2.10. Material Classification BSP-10. Not used.

2-2.11. Material Classification BSP-11. Not used.

2-2.12. Material Classification BSP-12. Not used.

2-2.13. Material Classification BSP-13. Not used.

2-2.14. Material Classification BSP-14. Not used.

2-2.15. Accessory Materials. Accessory materials for the miscellaneous steel pipe and tubing systems shall be as indicated.

Nipples	ASTM A733, seamless, extra strong (Schedule 80); "close" nipples will be permitted only by special authorization in each case.
Unions (Malleable Iron)	Fed Spec WW-U-53I, Class 2; Type B (galvanized) for galvanized pipe or Type A (black) for ungalvanized pipe.
Flanges	

Standard Weight Pipe	ANSI/ASME B16.5, Class 150, flat faced when connected to flat faced flanges; otherwise, raised face.
Flange Bolts and Nuts	ASTM A193, Grade B7 with ASTM A194 Grade 2H nuts. Length such that, after installation, the bolts will project 1/8 to 3/8 inch beyond outer face of the nut.
Flange Gaskets	
For Chemical Service	Suitable for chemical.
For Other Services	
Flat Faced Flanges	Non-asbestos filler with neoprene or nitrile binder; dimensions to suit flange contact face; 1/16-inch minimum thickness for plain finished surfaces, 3/32-inch minimum thickness for serrated surfaces.
Raised Face Flanges	Continuous stainless-steel ribbon wound into a spiral with non-asbestos filler between adjacent coils with a carbon steel gauge ring. Compressed gasket thickness shall be 0.095 inch \pm 0.005 inch.
Mechanical Couplings	Dresser "Style 38" or Smith-Blair "Type 411 Flexible Coupling"; without pipe stop.
Expansion Joints	
Heating water, chilled water, and other services not specified.	FlexoniBSP "Model H Expansion Compensators" for 3 inch or smaller; FlexoniBSP "Mid-Corr, Series MCB" with flanged ends and stainless-steel bellows for 4 inch or larger. Expansion joints shall be suitable for working pressures up to 150 psig.

PART 3 - EXECUTION

3-1. **INSTALLATION.** Materials furnished under this section will be installed in accordance with the Miscellaneous Piping and Accessories Installation section.

End of Section

Section 15091

MISCELLANEOUS BALL VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of manually operated or remote activated two position (open-close) ball valves as specified herein.

Miscellaneous ball valves shall be provided where AWWA type ball valves are not required.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If the requirements in this section are different from those in the General Equipment Stipulations, the requirements in the section shall take precedence.

1-2.02. Identification. Valves specified herein shall be tagged in accordance with the Equipment and Valve Identification section.

1-3. SUBMITTALS. Complete drawings, details, and specifications covering the valves and their appurtenances shall be submitted in accordance with the Submittals Procedures section. Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft.

PART 2 - PRODUCTS

2-1. CONSTRUCTION. Ball valves shown on the drawing, but not specified herein, shall be selected to match piping material they are installed in.

2-1.01. Valves Type VB-1. Not used.

2-1.02. Valves Type VB-2. Not used.

2-1.03. Valves Type VB-3. Not used.

2-1.04. Valves Type VB-4. Not used.

2-1.05. Valves Type VB-5. Not used.

2-1.06. Valves Type VB-6. Not used.

2-1.07. Valves Type VB-7. Not used.

2-1.08. Valves Type VB-8. Not used.

2-1.09. Valves Type VB-9.

VB-9	Rating	Class 150
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Methanol service 4 inch	Code	ANSI B16.42
	Type	In-line, three-piece, bolted body, firesafe, full port
	Body/Bonnet Trim	Ductile Iron
	Cap/Poppet	Ductile Iron
	Spring	302 Stainless steel
	Stem	PTFE
	Lever arm	Ductile Iron
	Seal Nut/Plug	PTFE
	End Connection	Flanged
	Pres. Limitations	250 psi
	Valve Operator	Lever
Manufacturers		Morrison Bros. Co. "346FDI0400 AV"

2-1.10. Valves Type VB-10. Not used.

2-1.11. Valves Type VB-11. Not used.

2-1.12. Valves Type VB-12. Not used.

2-1.13. Valves Type VB-13. Not used.

2-1.14. Valves Type VB-14. Not used.

2-1.15. Valves Type VB-15. Not used.

VB-15	Rating	Class 600
Methanol service	Code	ANSI B16.34
	Type	In-line, three-piece, bolted body, full port
4 inch		Stainless steel
	Body	
	Trim	Teflon
	Seat	Stainless steel
	Ball	Stainless steel
	Stem	Teflon
	Stem Seal	Socket weld
	End Connection	-100 to 400°F
	Temp. Limitations	Lever
	Valve Operator	Neles-Jamesbury "4D3636XT"
Manufacturers		

2-1.16. Valves Type VB-16. Not used.

2-1.17. Valves Type VB-17. Not used.

2-1.18. Valves Type VB-18. Not Used

2-1.19. Length Tolerance. Unless otherwise specified, the actual length of valves shall be within plus or minus 1/16 inch of the specified or theoretical length.

2-1.20. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Coating Materials

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel (for liquid service)	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus".
Rust-Preventive Compound	As recommended by the manufacturer.

Surfaces to Be Coated

Unfinished Surfaces

Interior Surfaces

Liquid Service

Epoxy enamel.

Exterior Surfaces of Valves to Be Buried, Submerged, or Installed in Manholes or Valve Vaults

Coal tar epoxy.

Exterior Surfaces of all other valves

Universal primer.

2-2. VALVE ACTUATORS. Ball valve, except those which are equipped with power actuators or are designed for automatic operation, shall be provided with manual actuators. Unless otherwise specified or indicated on the drawings, each manual actuator shall be equipped with a lever operator. Ball valves with center lines more than 7'-6" above the floor shall be provided with chain levers.

Valves indicated to be electric motor operated on the drawings shall have reversible electric motor operators designed for 120-volt ac, single phase operation. Actuators shall include integral thermal overload protection and a declutchable manual override. Actuators shall be equipped with motor operation limit switches and two additional single-pole, double-throw limit switches for auxiliary open and closed indication. An internal heater and thermostat shall be provided in each actuator housing to prevent condensation. Actuators in Class I, Division 1 and Division 2, Group D hazardous areas indicated on the drawings shall have NEMA Type 7 housings. Actuators in other areas shall have NEMA Type 4X housings.

2-3. ACCESSORIES. If the drawings indicate the need for extension stems, stem guides; position indicator; floor boxes; valve boxes; or operating stands, refer to the Valve and Gate Actuator section.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with the Valve Installation section.

End of Section

Section 15093

CHECK VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of check valves as specified herein and as indicated in the swing Check Valve Schedule.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL. Equipment furnished under this section shall be fabricated and assembled in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by Engineer.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-2.02. Temporary Number Plates. Not used.

1-2.03. Identification. Valves specified herein shall be tagged in accordance with the Equipment and Valve Identification section.

1-3. SUBMITTALS. Complete drawings, details, and specifications covering the valves and their appurtenances shall be submitted in accordance with the Submittals Procedures section. Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft.

PART 2 – PRODUCTS

2-1. CONSTRUCTION.

2-1.01. Valves VC-15.

VC-15 Chemical feed service 4 inch and smaller carbon steel pipe	Rating	Class 150
	Type	Integral seat, swing type, bolted cover
	Body/Bonnet	Carbon steel
	Trim	410 Stainless Steel
	Disk	Stellite 6
	Seat	A276 410
	Gasket	A276 410
	Hinge	Carbon Steel A216
	End Connection	Flanged
	Temp. Limitations	0 to 150°F
	Manufacturers	APCO Series 100

2-1.02. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Surfaces To Be Coated

Unfinished Surfaces

Interior Surfaces

Liquid Service

Epoxy enamel.

Exterior Surfaces of Valves To Be Buried, Submerged, or Installed in Manholes or Valve Vaults

Asphalt varnish or coal tar epoxy.

Exterior Surfaces of All Other Valves

Universal primer.

Polished or Machined Surfaces

Rust-preventive compound.

Actuators and Accessories

Universal primer.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with Valve Installation section.

End of Section

Section 15098

PLUG VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of manually operated or remote activated two position (open-close) plug valves.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections. Valve actuators are covered in the Valve and Gate Actuator section.

1-2. GENERAL.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-2.02. Identification. Valves specified herein shall be tagged in accordance with the Equipment and Valve Identification section.

1-3. SUBMITTALS. Complete drawings, details, and specifications covering the valves and their appurtenances shall be submitted in accordance with the Submittals Procedures section. Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft. Submittal drawings shall clearly indicate the country of origin of all cast gray iron and ductile iron valve components.

PART 2 - PRODUCTS

2-1. CONSTRUCTION.

2-1.01. Valves VP-1. Not used.

2-1.02. Valves VP-2. Not used.

2-1.03. Valves VP-3. Not used.

VP-3 Methanol service	Rating	Class 175
	Type	Non-lubricated, tapered plug valve
	Body	Cast Iron ASTM A126 Class B
	Trim Plug Seal	Teflon

	Plug	Ductile Iron ASTM A536 and Chloroprene Faced
	Seal Diaphragm	Teflon
	End Connection	Socket Weld or Flanged
	Temp. Limitations	-20 to 200°F [-29 to 93°C]
	Valve Operator	Lever
	Manufacturers	Dezurik "PEF" (100% Port)

2-1.04. Three-Way Plug Valves. [Not Used].

2-1.05. Length Tolerance. Unless otherwise specified, the actual length of valves shall be within plus or minus 1/16 inch [1.6 mm] of the specified or theoretical length.

2-1.06. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Coating Materials

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel	Ameron "Amercoat 385 Epoxy", Carboline "Carboguard 890", or Tnemec "Series N69 Hi-Build Epoxoline II".
Rust-Preventive Compound	As recommended by the manufacturer.

Surfaces To Be Coated

Unfinished Surfaces

Interior Surfaces	Epoxy.
Exterior Surfaces of Valves To Be Buried, Submerged, or Installed in Manholes or Valve Vaults	Coal tar epoxy.
Exterior Surfaces of All Other Valves	Universal primer.
Polished or Machined Surfaces	Rust-preventive compound.
Actuators and Accessories	Universal primer.

2-2. VALVE ACTUATORS. Requirements for valve actuators shall be as specified in the Valve and Gate Actuators section.

2-3. ACCESSORIES. Requirements for extension stems and stem guides, position indicators, floor boxes, operating stands, and valves boxes shall be as specified in Valve and Gate Actuators section.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with the Valve Installation section.

End of Section

Section 15104

RESILIENT-SEATED GATE VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing resilient-seated AWWA gate valves for clear water service. Resilient-seated gate valves shall be furnished complete with actuators and accessories as specified herein and as specified in the Valve and Gate Actuator section.

1-2. GENERAL. Equipment provided under this section shall be fabricated and assembled in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by Engineer.

Valves shall be furnished with all necessary parts and accessories indicated on the Drawings, specified, or otherwise required for a complete, properly operating installation and shall be the latest standard products of a manufacturer regularly engaged in the production of valves.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-2.02. Governing Standard. Except as modified or supplemented herein, all resilient-seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515.

1-2.03. Temporary Number Plates. Not used.

1-2.04. Identification. Resilient seated gate valves shall be tagged in accordance with the Equipment and Valve Identification section.

1-3. SUBMITTALS. Complete drawings, details, and specifications covering the valves and their appurtenances shall be submitted in accordance with the Submittals Procedures section.

All valves shall be tested in accordance with Section 5 of the governing standard. Certified copies of the results of all tests, together with an affidavit of compliance as indicated in Section 6.3 of the governing standard, shall be submitted to Engineer before the valves are shipped.

PART 2 - PRODUCTS

2-1. MATERIALS. Except as modified or supplemented herein, materials used in the manufacture of resilient-seated gate valves shall conform to the requirements of the governing standard, and shall be compatible with methanol chemical service.

2-1.01. Bronze Components. All bronze valve components in contact with liquid shall contain less than 16 percent zinc. All aluminum bronze components in contact with liquid shall not contain less than 79 percent copper.

2-1.02. Gaskets. Gaskets shall be free of asbestos and corrosive ingredients.

2-1.03. Shop Coatings.

Epoxy

For Raw or Treated Water Service in potable water facilities (NSF certified systems)	PPG Amercoat "Amerlock 400 High-Solids Epoxy ", Carboline "Carboguard 891", Sherwin-Williams "Macropoxy 646NSF" or Tnemec "Series N140 Pota-Pox Plus".
For Liquid Service other than in potable water facilities	PPG Amercoat "Amerlock 385 Epoxy", Carboline "Carboguard 890", Sherwin-Williams "Macropoxy 646" or Tnemec "Series N69 Hi-Build Epoxoline II".
Rust-Preventive Compound	As recommended by manufacturer.
Universal Primer	As recommended by manufacturer

2-2. VALVE CONSTRUCTION.

2-2.01. Ends. Valve ends shall be compatible with connecting piping. Except as modified or supplemented herein, the ends shall conform to the applicable requirements of the governing standard.

Flanges shall be finished to true plane surfaces within a tolerance limit of 5 mils. The finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.002 inch per inch of flange diameter.

2-2.02. Stem Seals. Valve stem shall be the rising type. Stuffing box stem seals shall be provided for all gate valves with rising stems (outside screw-and-yoke type). O-ring stem seals shall be provided for all buried gate valves, and for all gate valves with non-rising stems.

2-2.03. Rotation. The direction of rotation of the handwheel or the wrench nut to open the valve shall be to the left (counterclockwise).

2-2.04. Shop Coatings. All interior and exterior ferrous metal surfaces of valves and accessories shall be shop coated for corrosion protection. Except as specified below, the valve manufacturer's standard fusion-bonded coating will be acceptable, provided it is functionally equivalent to the specified coating and is compatible with the specified field coating.

Surfaces shall be coated as follows:

Unfinished Surfaces

Interior Surfaces	Epoxy.
Exterior Surfaces of Valves to be Buried or Installed in Manholes or Valve Vaults	Epoxy.
Exterior Surfaces of Valves to be Submerged	Epoxy.
Exterior Surfaces of All Other Valves	Universal primer.

Polished or Machined Surfaces

Flange Faces	Rust-preventive compound.
Other Surfaces	Epoxy.

Alternatively, the manufacturer's standard coating may be used, and the interior surfaces of each valve shall be subjected to a nondestructive holiday test in accordance with ASTM G62, Method A, and shall be electrically void-free.

Interior coatings shall comply with ANSI/AWWA C550 and shall be free of holidays. The total dry film thickness of shop-applied coatings shall be not less than:

<u>Type of Coating</u>	<u>Minimum Dry Film Thickness</u>
Epoxy	10mils.
Universal Primer	3 mils.

2-3. VALVE ACTUATORS. Requirements for valve actuators shall be as specified in the Valve and Gate Actuator section.

2-4. ACCESSORIES. When the Drawings indicate the need for extension stems, stem guides, position indicators, floor boxes, valve boxes, or operating stands, refer to the Valve and Gate Actuator section.

PART 3 - EXECUTION

3-1. INSTALLATION. Valves shall be installed in accordance with Valve Installation section.

3-1.01. Installation Check. An experienced, competent, and authorized representative of the manufacturer shall visit the site of the Work and inspect, check, adjust if necessary, and approve the equipment installation. The representative shall be present when the equipment is placed in operation in accordance with the Startup Requirements section and shall revisit the jobsite as often as necessary until all trouble is corrected and the equipment installation and operation are satisfactory in the opinion of Engineer.

The manufacturer's representative shall furnish a written report certifying that the equipment has been properly installed and lubricated; is in accurate alignment; is free from any undue stress imposed by connecting piping or anchor bolts; and has been operated under full load conditions and that it operated satisfactorily.

All costs for these services shall be included in the contract price.

End of Section

Section 15140

PIPE SUPPORTS

PART 1 - GENERAL

1-1. **SCOPE.** This section covers the furnishing and installation of pipe hangers, brackets, supports, bracing, anchorage, and the design for the pipe support system for pipes 12 inches and smaller. Pipe supports shall be furnished complete with all necessary inserts, bolts, nuts, rods, washers, and other accessories. This section also covers the spacing of expansion joints in pipes 12 inches in diameter and smaller. Expansion joint products and materials are covered in the respective piping sections.

This section covers pipe supports for the following pipe materials:

Steel (other)

1-2. **GENERAL.** Contractor shall provide pipe supports, anchors, flexible couplings, and expansion joints for all piping systems. The Drawings indicate pipe supports, anchors, flexible couplings, and expansion joints for pipes larger than 12 inches in diameter, and in special cases for pipes that are 12 inches and smaller. Contractor shall design anchors, pipe supports, expansion joints, and flexible couplings not already shown on the Drawings, in accordance with the requirements specified herein.

Contractor's design shall include pipe supports, bracing, and anchorage adjacent to expansion joints, couplings, valves, in-line devices, equipment, wyes and tees, or changes in direction as required for dismantling piping, removing valves or other in-line devices, disconnecting piping from equipment, and pipe support, in addition to supports in accordance with the maximum spacing specified herein. The pipe support system design by Contractor shall rigidly support pipe so there is no visible movement or visible sagging between supports. The system shall comply with specified piping code requirements.

Contractor shall not delete or relocate the supports, expansion joints, or couplings indicated on the Drawings without written approval of Engineer.

1-2.01. **General Equipment Stipulations.** The General Equipment Stipulations shall apply to all supports furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-3. **SUBMITTALS.** Complete data, catalog information, and drawings covering fabricated pipe supports, fabricated inserts, and stainless steel, galvanized, and copper-plated and plastic-coated pipe supports shall be submitted in accordance with the Submittals Procedures section.

Data shall include a listing of the intended use and general location of each item submitted.

When a wind and/or seismic design is required, Contractor shall submit confirmation of compliance with the Meteorological and Seismic Design Criteria section.

PART 2 - PRODUCTS

2-1. **MATERIALS.** Unless otherwise indicated, all pipe supports shall comply with ANSI/MSS SP-58 and MSS SP-69.. All pipe support materials shall be packaged as necessary to ensure delivery in satisfactory condition.

Unless otherwise specified or indicated on the Drawings, pipe supports shall be fabricated of manufacturer's standard materials and provided with manufacturer's standard finish.

Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.

Pipe supports shall be manufactured for the sizes and types of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item. Continuously threaded rod is not acceptable for hanger rods over 12 inches in length.

Unless accepted by Engineer, the use of supports which rely on stressed thermoplastic components to support the pipe will not be permitted.

Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Portions of pipe supports which come into contact with other metals that are dissimilar shall be rubber or vinyl coated. Supports for brass or copper pipe or tubing shall be copper plated or plastic coated.

Stainless steel supports shall be AISI Type 304 or 316 stainless steel, except for stainless steel supports fabricated by welding which shall be AISI Type 304L or 316L. Stainless steel supports shall be provided in the methanol containment area.

Pipe support types and application shall comply with Table 1.

2-2. WIND AND SEISMIC LOADS. Wind and seismic loads for worst case conditions of either full, partially full, or empty pipes shall be considered in the design. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

PART 3 - EXECUTION

3-1. APPLICATION. Concrete inserts or anchor bolts shall be used to support piping from new cast-in-place concrete. Fastening of supports to existing concrete and masonry shall be in accordance with the Anchorage in Concrete and Masonry section.

Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as specified to force expansion and contraction movement to occur at expansion joints, loops, or elbows, and as needed to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.

When expansion joints are required, pipe guides shall be provided adjacent to bellows type expansion joints. Guides will not be required where mechanical couplings are permitted as expansion joints. Guides shall be located on both sides of expansion joints, except where anchors are adjacent to the joint. Unless otherwise indicated on the Drawings, one guide shall be within four pipe diameters from the joint and a second guide within 14 pipe diameters from the first guide. Pipe supports shall allow adequate movement; pipe guides shall not be used for anchoring pipe against longitudinal forces. Pipe guides shall be provided at locations as recommended by the manufacturer.

Pipe supports for insulated cold piping systems shall be sized for the outside diameter of the insulated pipe, and an insulation protection shield shall be installed between the support and the insulation. Rigid insulation inserts shall be installed between the pipe and the insulation shields for piping larger than 2 inches or when needed to prevent crushing of the insulation. Inserts shall be of the same thickness as the adjacent insulation and shall be vapor sealed.

Insulated hot piping systems shall be supported by clevises, clamps, support saddles, or rollers. Pipe clamps shall be attached directly to the pipe. Support saddles and rollers shall be sized for the outside diameter of the insulated pipe, and an insulation protection saddle shall be installed at the support.

3-2. TYPES OF SUPPORTS. The products for pipe support shall be as indicated in Table 1 for the specified type and size of support. Where stainless steel is specified for pipe supports but is not available from the name suppliers for the model specified in Table 1, Contractor shall provide a heavier duty support that is available in stainless steel.

TABLE 1 - TYPES OF SUPPORTS

<u>Description and Service</u>	<u>MSS SP 69 Type (Note 1)</u>	<u>Specification</u>
Hangers		
2-1/2 inch and smaller pipe		
Other services		
J-style	5	B-Line "B3690", Anvil "67", Unistrut "J Hanger", or Piping Technology & Products Fig. 67.
Clevis	1	B-Line "B3104", Anvil "260", or Piping Technology & Products Fig 83.
3 Through 12-inch pipe (Note 3)		
Other services		
Clevis	1	B-Line "B3100" or Anvil "260" for steel pipe; B-Line "B3102", Anvil "590", or Piping Technology & Products Fig. 83 C. L. for cast iron pipe.
Concrete Inserts, Steel		
12 inch and smaller pipe	18	Channel 12 ga, galv, 1-5/8 by 1-3/8 inches, min. 8 inches long, anchor lugs on 4-inch centers, at least three lugs, end caps, and filler strip.
Beam Clamps, Malleable Iron or Steel, 12 inch and smaller pipe	21	B-Line "3050" and "3055", Anvil "133" and "134", or Piping Technology & Products Fig. 130 and Fig. 130 (SP).
	28, 29	Anvil "292" or Piping Technology & Products Fig. 140.
	30	B-Line "3054", Anvil "228", or Piping Technology & Products Fig. 140.
Side Beam Bracket	34	B-Line "B3062", Anvil "202", or Piping Technology & Products Fig. 20L.
Wall Supports and Frames, Steel, 12 inch and smaller pipe (Note 2)		
Brackets	32	B-Line "B3066", Anvil "195", or Piping Technology & Products Fig. 76.

TABLE 1 - TYPES OF SUPPORTS

<u>Description and Service</u>	<u>MSS SP 69</u>	
	<u>Type (Note 1)</u>	<u>Specification</u>
	33	B-Line "B3067", Anvil "199", or Piping Technology & Products Fig. 76.
Prefabricated channels	--	12 ga, galv, 1-5/8 inches, with suitable brackets and pipe clamps.
Offset pipe clamp, 1-1/2 inch and smaller pipe	--	Galv, 1-1/4 by 3/16-inch steel, with 3/8-inch bolts.
Offset pipe clamp, 2 to 3-1/2-inch pipe	--	Galv, 1-1/4 by 1/4-inch steel, with 3/8-inch bolts.
Floor Supports, Steel or Cast Iron		
6 inch and smaller pipe	37 (with base)	B-Line "B3090", Anvil "259" or Piping Technology & Products Fig. 48.
Pipe Alignment Guides	--	B-Line "B3281" through "B3287", Anvil "255", or Piping Technology & Products Fig. 6.
Turnbuckles Steel	13	B-Line "B3202", Anvil "230", or Piping Technology & Products Fig. 30.
Hanger Rods, Carbon Steel, Threaded Both Ends, 3/8-inch minimum size	--	B-Line "B3205", Anvil "140", or Piping Technology & Products Fig. 128.
Weldless Eye Nut, steel	17	B-Line "B3200", Anvil "290", or Piping Technology & Products Fig. 40.
Insulation Protection Saddle	39	B-Line "B3160 Series", Anvil "160 Series", or Piping Technology & Products Fig. 184.
Insulation Protection Shield	40	B-Line "B3151", Anvil "167", or Piping Technology & Products Fig. 183.

Table 1 Notes:

1. MSS SP-69 supports and hangers are illustrated on Figure 1-15140.
2. Pipe clamps or other devices which rely on the application of a clamping force to the supported pipe in order to maintain the clamp position or location in a prefabricated channel or track will not be acceptable for use with nonmetallic pipe or tubing.
3. Alternatively, pipe hangers for 12-inch pipe may be saddle type as indicated on the Drawings.

3-3. SUPPORT SPACINGS. Pipe supports, and expansion joints shall be spaced in accordance with Tables 2, 3, 4, and 5. The types of pipes to be supported are as specified herein. Table 2 covers spacings for the standard operating conditions specified for each pipe material. Tables 3 and 4 cover PVC and FRP pipe spacings where operating conditions are in excess of the temperature and specific gravity requirements covered in Table 2. Table 5 covers PVC and FRP pipe which carries air or liquids with a specific gravity other than 1.0. Spacing in the tables is the maximum spacing considering gravity loads. Where Contractor's design includes lateral and longitudinal forces due to seismic loads, wind loads, and other forces, the spacing requirement may be less than that indicated in the tables.

TABLE 2 – MAXIMUM PIPE SUPPORT SPACING AT STANDARD TEMPERATURES AND SERVICES

<u>Type of Pipe</u>	<u>Pipe Support Max Spacing</u> <u>feet</u>	<u>Max Run Without</u> <u>Expansion Joint,</u> <u>Loop, or Bend</u> <u>(Note 1)</u> <u>feet</u>	<u>Expansion</u> <u>Joint Max</u> <u>Spacing</u> <u>(Note 2)</u> <u>feet</u>	<u>Type of</u> <u>Expansion</u> <u>Joints</u>
Steel, for other services				
1-1/4 inch and smaller	7	30	100	Note 3
1-1/2 to 4 inch	10	30	100	Note 3
Over 4 inch	15	80	80	Note 6

Table 2 Notes:

1. Unless otherwise acceptable to Engineer, an expansion joint shall be provided in each straight run of pipe having an overall length between loops or bends exceeding the maximum run specified herein.
2. Unless otherwise acceptable to Engineer, the spacing between expansion joints in any straight pipe run shall not exceed the maximum spacing specified herein.
3. Expansion joint fittings are specified in the respective piping sections.
4. At least two properly padded supports for each pipe section.
5. At least one support for each pipe section.
6. Expansion joints shall be mechanical couplings.
7. No expansion joints are required.
8. Supports for 5 and 10-foot-long pipe sections shall be located within 18 inches of each joint. Supports shall be positioned to maintain the piping alignment and to prevent the piping from sagging.
9. References to specific gravity refer to liquid specific gravity and are referenced to water which is assumed to have a specific gravity of 1.0.

3-3.01. Temperature Adjustments for PVC Pipe. Not used.

3-3.02. Temperature Adjustments for FRP Pipe. Not used.

3-4. INSTALLATION.

3-4.01. General. All piping shall be supported in a manner which will prevent undue stress on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, and adjacent to flexible couplings. Pipe supports, and hangers shall not be installed in equipment access areas.

Where horizontal piping is arranged with two or more parallel lines, trapeze hangers may be used in lieu of individual hangers. Trapeze assembly shall consist of structure attachments as previously specified with rod size dependent upon total weight supported. Spacing of assemblies shall be determined by the minimum pipe size included in the group supported. Trapeze horizontal assemblies shall be structural angle or channel section of sufficient size to prevent measurable sag between rods when pipes are full. All lines shall be attached to the horizontal with intermediate pipe guides and U-bolts or one-hole clamps. Pre-engineered support equipment may be used when selected and installed in accordance with the manufacturer's recommendations.

Where copper pipe is installed on a support system of dissimilar metal with other pipes, the copper pipe shall be galvanically isolated from the support using Neoprene strips or other material acceptable to Engineer.

No piping shall be supported from the pipe above.

Horizontal piping hanger support rods shall attach to steel beams with center-loading l-clamps, or welded beam clips. Hanger support rods shall attach to concrete slabs or beams with inserts.

Anchorage shall be provided to resist both lateral and longitudinal seismic forces.

3-4.02. Inserts. Concrete inserts or anchor bolts shall be used to support piping from new cast-in-place concrete. Fastening of supports to existing concrete and masonry shall be in accordance with the Anchorage in Concrete and Masonry section. Reference building structural concrete Drawings for concrete inserts. When not provided as part of the building concrete structure, provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

Where concrete slabs form finished ceilings, provide inserts flush with the slab surface.

Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. NDE (Non-Destructive Evaluation) shall be used to locate existing reinforcing before drilling.

3-4.03. Pipe Hangers and Supports. Install hangers to provide a minimum 1/2-inch space between finished covering and adjacent work.

A hanger shall be placed within 18 inches of each horizontal elbow, and on both sides of all piping accessories and valves weighing 20 lbs or more.

Hangers shall have 1-1/2 inches minimum vertical adjustment.

Support horizontal cast iron, ductile iron and no-hub piping systems adjacent to each joint.

Support vertical piping at every floor using riser clamps.

Support riser piping independently of connected horizontal piping.

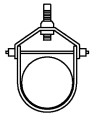
Hanger and hanger components shall be sized specifically for the pipe size it is to be used on.

3-5. PLACEMENT. The maximum spacing for pipe supports and expansion joints shall be as indicated in Table 2.

Rubber hose and flexible tubing shall be provided with continuous angle or channel support.

Unless otherwise indicated on the Drawings or acceptable to Engineer, piping shall be supported approximately 1-1/2 inches out from the face of walls and at least 3 inches below ceilings.

End of Section



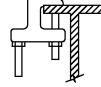
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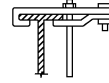
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BAND HGR
TYPE-7



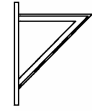
STEEL TURNBUCKLE
TYPE-13



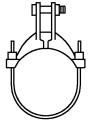
TOP BEAM
C-CLAMP
TYPE-19



TOP I-BEAM CLAMP
TYPE-25



LIGHT WELDED
STEEL BRACKET
TYPE-31



ALLOY STEEL
PIPE CLAMP
TYPE-2



EXTENSION PIPE ON
RISER CLAMP
TYPE-8



STEEL CLEVIS
TYPE-14



SIDE I-BEAM ON
CHANNEL CLAMP
TYPE-20



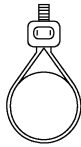
CLIP
TYPE-26

MEDIUM WELDED
STEEL BRACKET
TYPE-32

HEAVY WELDED
STEEL BRACKET
TYPE-33



CARBON OR ALLOY
STEEL DOUBLE BOLT
PIPE CLAMP
TYPE-3



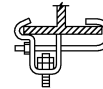
ADJUSTABLE
BAND HGR
TYPE-9



SWIVEL
TURNBUCKLE
TYPE-15



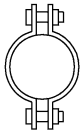
CENTER I-BEAM
TYPE-21



SIDE I-BEAM CLAMP
TYPE-27



SIDE BEAM BRACKET
TYPE-34



STEEL PIPE CLAMP
TYPE-4



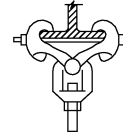
ADJ. SWIVEL RING
BAND TYPE
TYPE-10



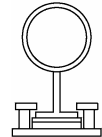
MALLEABLE
IRON SOCKET
TYPE-16



WELDED
ATTACHMENT
TYPE-22
AS SHOWN OR
INVERTED LESS BOLT



STEEL I-BEAM CLAMP
W/ EYE NUT
TYPE-28



PIPE SLIDE &
SLIDE PLATE
TYPE-35



PIPE HANGER
TYPE-5



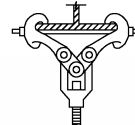
SPLIT PIPE W/WO
TURNBUCKLE ADJ.
TYPE-11



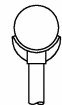
STEEL WELDLESS
EYE NUT
TYPE-17



C-CLAMP
TYPE-23



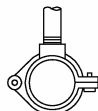
STEEL W.F. CLAMP
W/ EYE NUT
TYPE-29



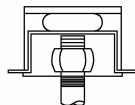
PIPE SADDLE
SUPPORT
TYPE-36



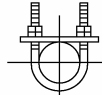
ADJ. SWIVEL PIPE RING
SPLIT RING TYPE OR
SOLID RING TYPE
TYPE-6



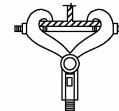
EXTENSION SPLIT
PIPE CLAMP
HINGED OR TWO BOLT
TYPE-12



STEEL OR MALLEABLE
CONCRETE INSERT
TYPE-18



U-BOLT
TYPE-24

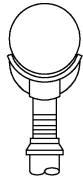


MALLEABLE BEAM CLAMP
W/EXTENSION PIECE
TYPE-30

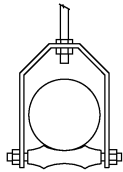


PIPE STANCHION
SADDLE
TYPE-37

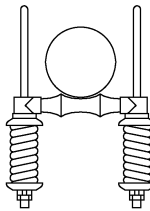
HANGERS AND SUPPORTS



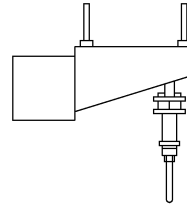
ADJUSTABLE PIPE
SADDLE SUPPORT
TYPE-38



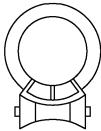
ADJUSTABLE ROLLER
HANGER W/NO SWIVEL
TYPE-43



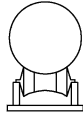
SPRING CUSHION ROLL
TYPE-49



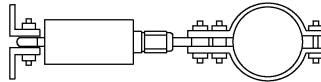
CONSTANT SUPPORT
HORIZONTAL TYPE
TYPE-54



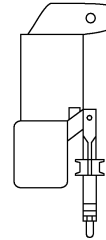
STEEL PIPE COVER
PROTECTION SADDLE
TYPE-39



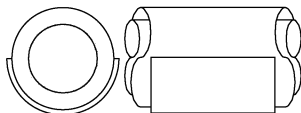
PIPE ROLL
COMPLETE
TYPE-44



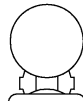
SPRING SWAY BRACE
TYPE-50



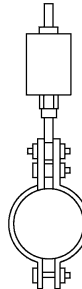
CONSTANT SUPPORT
VERTICAL TYPE
TYPE-55



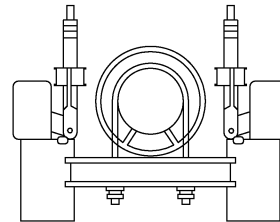
PROTECTION SHIELD
TYPE-40



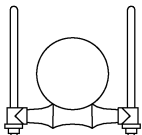
PIPE ROLL & PLATE
TYPE-45



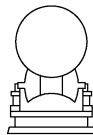
VARIABLE SPRING
HANGER
TYPE-51



CONSTANT SUPPORT
TRAPEZE TYPE
TYPE-56



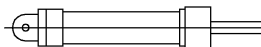
SINGLE PIPE ROLL
TYPE-41



ADJUSTABLE PIPE ROLL & BASE
TYPE-46



CARBON OR ALLOY STEEL
RISER CLAMP
TYPE-42



RESTRAINT CONTROL
DEVICE
TYPE-47



VARIABLE SPRING
BASE SUPPORT
TYPE-52

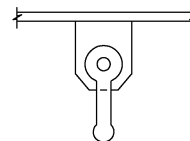
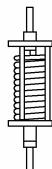
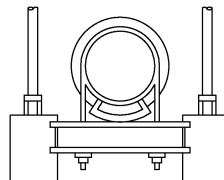


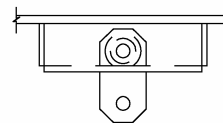
PLATE LUG
TYPE-57



SPRING CUSHION
TYPE-48



VARIABLE SPRING
TRAPEZE HANGER
TYPE-53



HORIZONTAL TRAVELER
TYPE-58

HANGERS AND SUPPORTS

Section 16050

ELECTRICAL

PART 1 - GENERAL

1-1. **SCOPE.** This section covers the furnishing and installation of all equipment and materials needed for the electrical requirements of this Contract. It also covers conduit, wiring, and terminations for electrical equipment installed under Electrical Equipment Installation section.

This section covers the installation and interconnection of electrical equipment furnished under other sections, except electrical items designated to be installed under those sections.

Electrical scope consists of installation of field devices, conduits and cabling associated with new combustible gas detectors and methanol storage tank level transmitters (one new tank level transmitter and one relocated from existing storage tank to a new second storage tank) to existing Methanol Pump Control Panel as shown on plans.

City of Tampa's standard electrical specifications are included under appendix 16050-A. Any conflicts between 16050 and City of Tampa standard electrical specifications W-76 shall be construed and reconciled to the more stringent requirement.

1-2. **GENERAL.** Electrical apparatus on all equipment shall be installed complete and placed in readiness for proper operation.

Electrical materials furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

1-2.01. **General Equipment Stipulations.** The General Equipment Stipulations section shall apply to all equipment provided under this section. If requirements in this section differ from those in the General Equipment Stipulations section, the requirements specified herein shall take precedence

1-2.02. **Seismic Design Requirements.** Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

1-2.03. **Coordination.** Electrical work shall conform to the construction schedule and the progress of other trades.

1-2.04. **Anchor Bolts and Expansion Anchors.** All anchor bolts, nuts, washers, and expansion anchors shall comply with Anchorage in Concrete and Masonry section, except smaller than 3/4 inch [19 mm] will be permitted to match NEMA standard size bolt holes on motors and electrical equipment.

1-2.05. **Drawings.** Supplementing this section, the Drawings indicate locations of equipment and enclosures and provide one-line and schematic diagrams regarding the connection and interaction with other equipment.

1-3. **CODES AND PERMITS.** All work shall be performed, and materials shall be furnished in accordance with the NEC - National Electrical Code, the NESC - National Electrical Safety Code, and the following standards where applicable:

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
Fed Spec	Federal Specification
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
NEIS	National Electrical Installation Standards
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
UL	Underwriters' Laboratories

Equipment covered by this section shall be listed by UL, or by a nationally recognized third-party testing laboratory. All costs associated with obtaining the listing shall be the responsibility of Contractor. If no third-party testing laboratory provides the required listing, an independent test shall be performed at Contractor's expense. Before the test is conducted, Contractor shall submit a copy of the testing procedure to be used.

1-4. SEISMIC DESIGN REQUIREMENT.

1-4.01. Seismic Design Requirements. Submit confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1-5. IDENTIFICATION.

1-5.01. Conduit. Conduits in manholes, handholes, building entrance pull boxes, junction boxes, and equipment shall be provided with identification tags. Identification tags shall be 19 gauge [1 mm thick] stainless steel, with 1/2 inch [13 mm] stamped letters and numbers as indicated on the Drawings. Identification tags shall be attached to conduits with nylon tie wraps and shall be positioned to be readily visible.

1-5.02. Conductors. All conductors in power, control, and instrumentation circuits shall be identified and color coded as described herein.

1-5.02.01. Conductor Identification Number. Except for lighting and receptacle circuits, each individual conductor in power, control, and instrumentation circuits shall be provided with wire identification markers at the point of termination.

The wire markers shall be of the heat-shrinkable tube type, with custom typed identification numbers.

The wire numbers shall be as indicated on the equipment manufacturer's drawings.

The wire markers shall be positioned to be readily visible for inspection.

1-5.02.02. Conductor Color Coding. Power conductors shall be color coded as indicated below. For conductors 6 AWG and smaller, the color coding shall be the insulation finish color. For sizes larger than 6 AWG, the color coding may be by marking tape. The equipment grounding conductor shall be green or green with one or more yellow stripes if the conductor is insulated.

The following color-coding system shall be used:

120/240V single-phase — black, red, and white
120/208V, three-phase — black, red, blue, and white
120/240V, three-phase — black, orange, blue, and white
277/480V, three-phase — brown, orange, yellow, and gray
2400/4160V, three-phase — black, red, blue, and white
7200/12470V, three-phase — black, red, blue, and white

Where 120/240- and 120/208-volt systems share the same conduit or enclosure, the neutral for either the 120/240 volt system or the 208 volt system shall be white with a permanent identifiable violet stripe.

Control and instrumentation circuit conductors shall be color coded as indicated in the Cable Data Figures at the end of this section.

1-5.03. Motor Starters. Not used.

1-5.04. Control Stations. Not used.

1-5.05. Circuit Breakers. Not used.

1-5.06.
Disconnect
Switches. Not
used.

1-5.07. Arc Flash Hazard Labels. Not Used.

1-6. SUBMITTALS. Complete assembly, foundation, and installation drawings, together with complete engineering data covering the materials used, parts, devices, and accessories forming a part of the work performed by the Contractor, shall be submitted in accordance with the Submittal Procedures section. The drawings and data shall include, but shall not be limited to, the following:

Drawings and data.
Operating manuals.
Samples.
Test reports
Studies

1-6.01. Submittal Identification. Information covering all materials and equipment shall be submitted for review in accordance with the Submittal Procedures section. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment as follows:

- a. Lamp fixture descriptive sheets shall show the fixture schedule letter, number, or symbol for which the sheet applies.
- b. Equipment and materials descriptive literature and drawings shall show the specification paragraph for which the equipment applies.
- c. Sheets or drawings covering more than the item being considered shall have all inapplicable information crossed out.
- d. A suitable notation shall identify equipment and materials descriptive literature not readily cross-referenced with the Drawings or Specifications.

- e. Schematics and connection diagrams for all electrical equipment shall be submitted for review. A manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted, unless it is clearly marked to show the intended connections.
- f. Surge protective device submittals shall include drawings (including unit dimensions, weights, component and connection locations, mounting provisions, and wiring diagrams), equipment manuals that detail the installation, operation and maintenance instructions for the specified unit(s), and manufacturer's descriptive bulletins and product sheets.

Contractor shall submit the name and qualifications of the Engineering and Testing Services firm proposed to perform the protective device study and the on-site testing.

Within 90 days after the Notice to Proceed, Contractor shall furnish a submittal for all types of cable and conduit to be provided. The submittal shall include the cable manufacturer and type, and sufficient data to indicate that the cable and conduit meet the specified requirements.

In addition to the complete specifications and descriptive literature, a sample of the largest size of each type of cable shall be submitted for review before installation. Each sample shall include legible and complete surface printing of the cable identification.

1-6.02. Seismic Design Requirements. Submitted confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1-7. PROTECTION AND STORAGE. During construction, the insulation on all electrical equipment shall be protected against absorption of moisture, and metallic components shall be protected against corrosion by strip heaters, lamps, or other suitable means. This protection shall be provided immediately upon receipt of the equipment and shall be maintained continuously.

PART 2 - PRODUCTS

2-1. POWER SERVICE ENTRANCE. Not Used.

2-2. TELEPHONE SERVICE ENTRANCE. Not used.

2-3. CABLE. All cables of each type (such as lighting cable or 600-volt power cable) shall be from the same manufacturer.

All types of cable shall conform to the Cable Data Figures at the end of this section and as described herein.

2-3.01. Lighting Cable. Lighting and receptacle circuits, shall be as specified for 600 volt (Figure 2-16050 XHHW-2) power cable.

2-3.02. 600 Volt Power Cable. Not Used.

2-3.03. Instrument Cable. Cable for electronic circuits to instrumentation, metering, and other signalling and control equipment shall be two- or three-conductor instrument cable twisted for magnetic noise rejection and protected from electrostatic noise by a total coverage shield. Types of instrument cables shall be (Figure 4-16050 single pair).

2.3.04. Multiconductor Control Cable. Not used.

2-3.05. Medium Voltage Power Cable. Not used.

2-3.06. Tray Cable. Not used.

2-4. RACEWAY. Conduit and cable tray shall be as described in the following paragraphs:

2-4.01. Rigid Steel Conduit. Not Used.

2-4.02. Intermediate Metal Conduit (IMC). Not used.

2-4.03. Liquid-tight Flexible Non-Metallic Conduit. Liquidtight flexible non-metallic conduit shall have a moisture-proof polyvinyl chloride jacket and shall be UL labelled. Rated for continuous use at 140°F. The conduit shall be resistant to oil, water, heat, sunlight, corrosion, most acids, ozone, alkali, strains, abrasions, and crushing. Compatible liquid-tight fittings shall be used for conduit installation.

All flexible conduits size 2 inch or less in non-classified areas shall be non-metallic, liquid-tight, and have a circular cross section. The flexible conduit and fittings shall be as manufactured by Carlon, Kellems, K-Flex, or equal.

All flexible conduits greater than 2 inch in non-classified areas shall be metallic, liquid-tight, and have a circular cross section. The conduit shall be of a light-weight aluminium core, coupled with a PVC jacket. The conduit shall be resistant to sunlight, acid, and oil. The conduit shall be rated for a working temperature between -20°C to 80°C and U.L. listed. The flexible conduit and fittings shall be as manufactured by Thomas & Betts or equal.

2-4.04. Utility (PVC) Duct. Not used.

2-4.05. Rigid Nonmetallic (PVC) Conduit. PVC conduit shall be heavy wall, Schedule 80 UL labelled for aboveground and underground uses, and shall conform to NEMA TC-2 and UL 651 as manufactured by Carlon, Triangle, Allied Tube, or equal.

2-4.06. PVC-Coated Rigid Aluminum Conduit. The conduit shall be rigid aluminium. Before the PVC coating is applied, the aluminium surfaces shall be coated with a primer to obtain a bond between the aluminium substrate and the coating. The PVC coating shall be bonded to the primed outer surface of the conduit. The bond on conduit and fittings shall be stronger than the tensile strength of the PVC coating. The thickness of the PVC coating shall be at least 40 mils [1000 µm]. The PVC material shall conform to the applicable ASTM standards and UL 6A.

A chemically cured two-part urethane coating, at a nominal 2 mil [50 µm] thickness, shall be applied to the interior of all conduit and fittings. The coating shall be sufficiently flexible to permit field bending the conduit without cracking or flaking of the coating.

Every female conduit opening shall have a PVC sleeve extending one conduit diameter or 2 inches [50 mm], whichever is less, beyond the opening. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit before coating. The wall thickness of the sleeve shall be at least 40 mils [1000 µm].

All fittings, condulets, mounting hardware, and accessories shall be PVC-coated. All hollow conduit fittings shall be coated with the interior urethane coating described above. The screw heads on condulets shall be encapsulated by the manufacturer with a corrosion-resistant material.

PVC coated rigid aluminium conduit shall be manufactured by Plasti-Bond, Perma-Coate, KorKap, Calbond, Ocal, or Robroy Industries.

2-4.08. Rigid Aluminum Conduit (RAC). Rigid aluminum conduit and fittings shall be manufactured of 6063-T1 alloy, shall conform to ANSI C80.5 and Fed. Spec. WW-C-540, and shall be manufactured in accordance with UL 6A.

2-4.09. Cable Tray. Not used.

2-5. WIRING DEVICES, BOXES, AND FITTINGS. Concealed conduit systems shall have flush-mounted switches and convenience outlets. Exposed conduit systems shall have surface-mounted switches and convenience outlets.

2-5.01. Conduit Boxes and Fittings.

- a. Stainless steel boxes and fittings shall be manufactured by Crouse-Hinds, Appleton, or O Z Gedney. In applications utilizing aluminum conduit systems, aluminum boxes and fittings manufactured by Crouse-Hinds, Appleton, or O Z Gedney shall be installed.
- b. Rigid PVC device boxes and fittings shall be manufactured by Carlon or Cantex.
- c. Stainless steel device boxes shall be manufactured by Appleton, Raco, or Steel City.
- d. PVC coated device boxes shall be manufactured by Calbond, Ocal, or Robroy Industries.
- e. Hub arrangements on threaded fittings shall be the most appropriate for the conduit arrangement to avoid unnecessary bends and fittings.

2-5.02. Device Plates. Not Used.

2-5.03. Wall Switches. Not Used.

2-5.04. Receptacles. Not Used.

2-5.05. Special Outlets. Not used.

2-6. JUNCTION BOXES, PULL BOXES, AND WIRING GUTTERS.

Outdoor boxes and gutters shall be NEMA Type 4X, ABS or stainless steel and shall be rigidly supported by PVC-coated or stainless-steel framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.

Bolt-on junction box covers 3 feet [900 mm] square or larger, or heavier than 25 lbs [11 kg], shall have rigid handles. Covers larger than 3 by 4 feet [900 by 1200 mm] shall be split.

Where indicated on the Drawings, junction and pull boxes with a removable side opposite the underground conduits shall be provided over building ends of underground conduit banks. Boxes shall be sized in accordance with the National Electrical Code, including space for full size continuations of all underground conduits not originally continued. Conduit arrangement shall leave maximum space for future conduits.

2-7. LIGHTING FIXTURES. Not Used.

2-7.01. Electronic Drivers. Not Used.

2-8. LIGHTING PANELS. Not Used.

2-9. POWER PANELS. Not Used.

2-10. SURGE PROTECTIVE DEVICES. Not Used

2-11. SEPARATELY ENCLOSED MOTOR STARTERS. Not used.

2-12. SEPARATELY ENCLOSED MANUAL STARTERS. Not used.

2-13. CONTROL STATIONS. Not used.

2-14. SEPARATELY ENCLOSED CIRCUIT BREAKERS. Not used.

2-15. DISCONNECT SWITCHES. Not used.

2-16. LIGHTING AND AUXILIARY POWER TRANSFORMERS. Not Used.

2-17. POWER CENTERS. Not used

2-18. POWER FACTOR CORRECTION CAPACITORS. Not used.

2-19. LIGHTING CONTACTORS. Not used.

2-20. PHOTOELECTRIC CONTROLS. Not used.

2-21. RELAY ENCLOSURES. Not used.

2-22. ALARM HORN AND BEACON. Not used.

2-23. HEAT-TRACED PIPING. Not used.

PART 3 - EXECUTION

3-1. INSTALLATION, TESTING, AND COMMISSIONING. All material, equipment, and components specified herein shall be installed, tested, and commissioned for operation in compliance with NECA 1000 – NEIS Specification System. Where required in NECA 1000, testing and commissioning procedures shall be followed prior to energizing equipment.

3-2. ARC FLASH HAZARD ANALYSIS. Not Used.

3-3. PROTECTIVE DEVICE STUDY. Not Used

3-4. POWER AND SERVICE ENTRANCE INSTALLATION. Not Used.

3-5. TELECOMMUNICATIONS SERVICE ENTRANCE INSTALLATION. Not used.

3-6. CABLE INSTALLATION.

3-6.01. General. Except as otherwise specified or indicated on the Drawings, cable shall be installed according to the following procedures, taking care to protect the cable and to avoid

kinking the conductors, cutting or puncturing the jacket, contamination by oil or grease, or any other damage. Circuits to supply electric power and control to equipment and devices, communication and signal circuits as indicated on the one-line diagrams shall be installed continuous and may not be spliced unless approved by the Engineer.

- a. Stranded conductor cable shall be terminated by lugs or pressure type connectors. Wrapping stranded cables around screw type terminals is not acceptable.
- b. Stranded conductor cable shall be spliced by crimp type connectors. Twist-on wire connectors may only be used for splicing solid cable and for terminations at lighting fixtures.
- c. Splices may be made only at junction boxes.
- d. Cable terminations and splices shall be made as recommended by the cable manufacturer for the particular cable and service conditions.
- e. All 5,000-volt rated cable and above shielded cable stress cone terminations shall be IEEE Class 1 molded rubber type. Shielded cable splices shall be tape or molded rubber type as required. Shielded cable splices and stress cone terminations shall be made by qualified splicers. Materials shall be by 3M Company, Plymouth/Bishop, or Raychem Electric Power Products.
- f. Cable shall not be pulled tight against bushings nor pressed heavily against enclosures.
- g. Cable-pulling lubricant shall be compatible with all cable jackets; shall not contain wax, grease, or silicone; and shall be Polywater "Type J".
- h. Cables operating at more than 2000 volts shall be fireproofed in all cable vaults, manholes, and handholes. Fireproofing shall be applied with a half-lapped layer of 3M "Scotch 77 Arc-Proofing Tape", anchored at each end with a double wrap of 3M "Scotch 69 Glass Cloth Tape" or with equivalent tape by Anixter or Plymouth/Bishop.
- i. Where necessary to prevent heavy loading on cable connections, in vertical risers, the cable shall be supported by Kellems, or equal, woven grips.
- j. Spare cable ends shall be taped, coiled, and identified.
- k. Cables shall not be bent to a radius less than the minimum recommended by the manufacturer. For cables rated higher than 600 volts, the minimum radius shall be 8 diameters for nonshielded cable and 12 diameters for shielded cable.
- l. All cables in one conduit, over 1 foot [305 mm] long, or with any bends, shall be pulled in or out simultaneously.
- m. Circuits to supply electric power and control to equipment and devices are indicated on the one-line diagrams. Conductors in designated numbers and sizes shall be installed in conduit of designated size. Circuits shall not be combined to reduce conduit requirements unless acceptable to Engineer.
- n. Instrument cable shields and drain wires shall be continuous over the entire length of the circuit and grounded at one end only. In general, the field end of the shield shall be ungrounded. At the ungrounded termination of the circuit, the shield and drain wire shall be insulated by taping to prevent grounding.
- o. Cables operating at more than 2,000 volts which terminate at medium-voltage padmounted equipment bushings shall include a metal oxide varistor surge protective elbow terminator conforming to IEEE Standard 386. Elbows shall provide a weatherproof, dead-front, hot-stick operable separable connection. Surge protector rating shall be as recommended by the terminator supplier.

3-6.02. Underground Cable Pulling Procedure. Not used.

3-6.03. Medium-Voltage Cable Insulation Test. Not used.

3-7. RACEWAY INSTALLATION. Contractor shall be responsible for routing all raceway. This shall include all conduits indicated on the one-lines, riser diagrams, and home-runs shown on the plan Drawings. Conduits shall be routed as defined in these Specifications. Where conduit routing is shown on plans, it shall be considered a general guideline and shall be field verified to avoid interferences.

Except as otherwise specified or indicated on the Drawings, conduit installation and identification shall be completed according to the following procedures.

3-7.01. Installation of Interior and Exposed Exterior Conduit. This section covers the installation of conduit inside structures, above and below grade, and in exposed outdoor locations. In general, conduit inside structures shall be concealed. Large conduit and conduit stubs may be exposed unless otherwise specified or indicated on the Drawings. No conduit shall be exposed in water chambers unless so indicated on the Drawings.

Unless otherwise indicated on the Drawings, Contractor shall be responsible for routing the conduit to meet the following installation requirements:

- a. Conduit installed in all exposed indoor locations, except corrosive areas indicated on the Drawings, and in floor slabs, walls, and ceilings of hazardous (classified) locations, shall be rigid aluminium. Exposed conduit shall be rigidly supported by stainless steel hardware and framing materials, including nuts and bolts.
- b. Conduit installed in floor slabs and walls in non-hazardous locations shall be rigid Schedule 80 PVC.
- c. Conduit installed in all exposed outdoor locations shall be PVC-coated rigid aluminium, rigidly supported by PVC-coated framing materials. Mounting hardware, which includes nuts, bolts, and anchors, shall be stainless steel. All damaged coatings shall be repaired according to the manufacturer's instructions.
- d. Final connections to dry type transformers, to motors without flexible cords, and to other equipment with rotating or moving parts shall be liquid-tight flexible non-metallic conduit with watertight connectors installed without sharp bends and in the minimum lengths required for the application, but not longer than 6 feet [1.8 m] unless otherwise acceptable to Engineer.
- e. Terminations and connections of rigid aluminum conduit shall be taper threaded. Conduits shall be reamed free of burrs and shall be terminated with conduit bushings.
- f. Exposed conduit shall be installed either parallel or perpendicular to structural members and surfaces.
- g. Two or more conduits in the same general routing shall be parallel, with symmetrical bends.
- h. Conduits shall be at least 6 inches [150 mm] from high temperature piping, ducts, and flues.
- i. Conduit installed in corrosive chemical feed and storage areas as indicated by Area Type on the Drawings shall be rigid Schedule 80 PVC. Exposed conduit in corrosive areas shall be supported by FRP framing materials with stainless steel hardware, including nuts and bolts.
- j. Rigid Schedule 80 PVC conduit shall have supports and provisions for expansion as required by NEC Article 352.
- k. Metallic conduit connections to metal enclosures shall be securely fastened by locknuts inside and outside.
- l. Rigid Schedule 80 PVC conduit shall be secured to metal device boxes using a male terminal adapter with a locknut inside or by using a box adapter inserted through the knockout and cemented into a coupling.

- m. Conduits in walls or slabs, which have reinforcement in both faces, shall be installed between the reinforcing steel. In slabs with only a single layer of reinforcing steel, conduits shall be placed under the reinforcement. Conduits larger than 1/3 of the slab thickness shall be concrete encased under the slab.
- n. Conduits that cross structural joints where structural movement is allowed shall be fitted with concrete-tight and watertight expansion/deflection couplings, suitable for use with metallic conduits and rigid Schedule 80 PVC conduits. The couplings shall be Appleton Type DF, Crouse-Hinds Type XD, or O-Z Type DX.
- o. Conduit shall be clear of structural openings and indicated future openings.
- p. Conduits through roofs or metal walls shall be flashed and sealed watertight.
- q. Conduit installed through any openings cut into non-fire rated concrete or masonry structure elements shall be neatly grouted. Conduit penetrations of fire rated structure elements shall be sealed in a manner that maintains the fire rating as indicated on the Architectural Drawings.
- r. Conduits shall be capped during construction to prevent entrance of dirt, trash, and water.
- s. Exposed conduit stubs for future use shall be terminated with pipe caps.
- t. Concealed conduit for future use shall be terminated in equipment or fitted with couplings plugged flush with structural surfaces.
- u. Where the Drawings indicate future duplication of equipment wired hereunder, concealed portions of conduits for future equipment shall be provided.
- v. Horizontal conduit shall be installed to allow at least 7 feet [2.1 m] of headroom, except along structures, piping, and equipment or in other areas where headroom cannot be maintained.
- w. Conduit shall not be routed across the surface of a floor, roof, or walkway unless approved by Engineer.
- x. PVC-coated rigid aluminum conduit shall be threaded and installed as recommended by the conduit manufacturer's installation procedure using appropriate tools.
- y. All conduits that enter enclosures shall be terminated with acceptable fittings that will not affect the NEMA rating of the enclosure.
- z. Conduit which turns out of concrete slabs or walls, shall be connected to a 90-degree elbow of PVC-coated rigid aluminum conduit before it emerges. Conduits shall have PVC-coated rigid aluminum coupling embedded a minimum of 3 inches when emerging from slabs or walls and the coupling shall extend 2 inches from the wall.
- aa. Power conductors to and from adjustable frequency drives shall be installed in steel conduit.

3-7.02. Underground Conduit Installation. All excavation, backfilling, and concrete work shall conform to the respective sections of these Specifications. Underground conduit shall conform to the following requirements:

- a. All underground conduits shall be concrete encased unless indicated otherwise on the Drawings. Concrete encasement within 15 feet of building entrances, under and within 5 feet of roadways, and within 10 feet of indicated future excavations shall be reinforced as detailed on the Drawings.
- b. Concrete encased conduit shall be schedule 40 PVC. Conduits shall have PVC-coated aluminum coupling embedded a minimum of 3 inches when emerging from walls and the coupling shall extend 2 inches from the wall. All PVC joints shall be solvent welded in accordance with the recommendations of the manufacturer.
- c. Concrete encasement on exposed outdoor conduit risers shall continue to 6 inches [150 mm] above grade, with top crowned and edges chamfered.

- d. Conduit and concrete encasement installed underground for future extension shall be terminated flush at the bulkhead with a coupling and a screw plug. The termination of the duct bank shall be reinforced with bars 100 diameters long that shall be terminated 2 inches [50 mm] from the bulkhead. Matching splice bars shall be 50 bar diameters long. Each longitudinal bar shall be provided with a Lenton "Form Saver" coupler and plate or a Dayton "Superior DBR" coupler at the bulkhead. The coupler shall be threaded to accept a dowel of like diameter in the future. Threads shall be protected with screw-in plastic caps. A 1-3/4 by 3/4 inch [45 by 20 mm] deep horizontal shear key shall be formed in the concrete encasement above and below the embedded conduits. After concrete placement, conduit and bar connector ends shall be cleaned and coated with two coats of thixotropic coal tar.
- e. Underground conduits indicated not to be concrete encased shall be rigid Schedule 80 PVC.
- f. Underground conduit bend radius shall be at least 2 feet [600 mm] at vertical risers and at least 3 feet [900 mm] elsewhere.
- g. Underground conduits and conduit banks shall have at least 2 feet [600 mm] of earth cover, except where indicated otherwise.
- h. Underground conduit banks through building walls shall be cast in place, or concreted into boxouts, with water stops on all sides of the boxout. Water stops are specified in the Cast-In-Place Concrete section.
- i. Underground nonmetallic conduits, which turn out of concrete or earth in outdoor locations, shall be connected to 90-degree elbows of PVC-coated rigid aluminium conduit before they emerge.
- j. Conduits not encased in concrete and passing through walls, which have one side in contact with earth, shall be sealed watertight with special rubber-gasketed sleeve and joint assemblies or with sleeves and modular rubber sealing elements.
- k. Underground conduits shall be sloped to drain from buildings to manholes.
- l. Each 5 kV or higher voltage cable, each 250 kcmil [120 mm²] or larger cable, and each conduit group of smaller cables shall be supported from manhole walls by Kindorf "D-990" or Unistrut "P-3259" inserts, with Kindorf "F-721-24" or Unistrut "P-2544" brackets and Unistrut "P1753" or "P1754" fiberglass reinforced polyester cable saddles.
- m. Telephone cables shall not be installed in raceways, conduits, boxes, manholes, or handholes containing other types of circuits.
- n. Intercommunication and instrument cables shall be separated the maximum possible distance from all power wiring in pull-boxes, manholes, and handholes.
- o. Each duct shall be carefully cleaned before and after installation. All inside surfaces shall be free from imperfections likely to injure the cable. After installation of complete duct runs in sizes 2 inches and larger, ducts shall be snaked with an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the duct. Ducts through which the mandrel will not pass shall not be incorporated in the work. After snaking, the ends of dead-ended ducts shall be protected with standard conduit caps to prevent the entrance of water or other foreign matter.

Where ducts enter buildings or at stub-ups to equipment, transitions to aluminium conduits shall be made as noted and detailed. Where it is not otherwise shown, all ducts entering buildings and structures shall have transitions to aluminium conduit at least 5 feet from the outermost edge of the

pile cap or footing supporting the outermost vertical wall of the building or structure.

Transitions from above-grade rigid aluminium conduit to non-metallic conduit shall be accomplished with as threaded adapter. Rigid aluminium conduit installed above grade and extending below grade shall include the first 90° elbow. All rigid aluminium conduits extending below grade shall be coated with two coats of an asphaltum-type paint along its entire length below grade and extending 6" above grade or above the top of the finished slab. The asphaltum-type paint shall conform to Fed. Spec. TT-V_51 and equivalent to Koppers Bitumatic Super Service Black.

3-7.03. Sealing of Conduits. After cable has been installed and connected, conduit ends shall be sealed by forcing nonhardening sealing compound into the conduits to a depth at least equal to the conduit diameter. This method shall be used for sealing all conduits at handholes, manholes, and building entrance junction boxes, and for 1 inch [25 mm] and larger conduit connections to equipment.

Conduits entering chlorine feed and storage rooms shall be sealed in a junction box or conduit body adjacent to the point of entrance.

Conduits entering hazardous (classified) areas and submersible or explosion proof enclosures shall have Appleton "Type ESU" or Crouse-Hinds "EYS" sealing fittings with sealing compound.

3-7.04. Reuse of Existing Conduits. Existing conduits may be reused subject to the concurrence of Engineer and compliance with the following requirements:

- a. A wire brush shall be pulled through the conduit to remove any loose debris.
- b. A mandrel shall be pulled through the conduit to remove sharp edges and burrs.

3-7.05. Cable Tray Installation. Not used.

3-8. WIRING DEVICES, BOXES, AND FITTINGS INSTALLATION. Metallic and nonmetallic conduit boxes and fittings shall be installed in the following locations:

3-8.01. Conduit Boxes and Fittings.

- a. Stainless steel or aluminum boxes and fittings shall be installed in concrete walls, ceilings, and floors; in the outdoor faces of masonry walls; and in all locations where weatherproof device covers are required. These boxes and fittings shall also be installed in exposed rigid steel and intermediate metal conduit systems.
- b. Aluminum or stainless-steel boxes shall be installed in the indoor faces of masonry walls, in interior partition walls, and in joist supported ceilings.
- c. Rigid PVC device boxes shall be installed in exposed nonmetallic conduit systems.
- d. PVC coated boxes and fittings shall be installed in PVC coated conduit systems.
- e. Telephone conduit shall be provided with separate junction boxes and pull fittings.

3-9. EQUIPMENT INSTALLATION. Except as otherwise specified or indicated on the Drawings, the following procedures shall be used in performing electrical work.

3-9.01. Setting of Equipment. All equipment, boxes, and gutters shall be installed level and plumb. Boxes, equipment enclosures, metal raceways, and similar items mounted on water- or earth-bearing walls shall be separated from the wall by at least 1/4 inch [6 mm] thick corrosion-resistant spacers. Where boxes, enclosures, and raceways are installed at locations where walls are not suitable or available for mounting, concrete equipment pads, framing material, and associated hardware shall be provided.

3-9.02. Sealing of Equipment. All outdoor substation, switchgear, motor control center, and similar equipment shall be permanently sealed at the base, and all openings into equipment shall be screened or sealed with concrete grout to keep out rodents and insects the size of wasps and mud daubers. Small cracks and openings shall be sealed from inside with silicone sealant, Dow-Corning "795" or General Electric "SCS1200".

3-10. GROUNDING.

3-10.01. General. The electrical system and equipment shall be grounded in compliance with the National Electrical Code and the following requirements:

- a. All ground conductors shall be at least 12 AWG [4 mm²] soft drawn copper cable or bar, bare or green-insulated in accordance with the National Electrical Code.
- b. Ground cable splices and joints, ground rod connections, and equipment bonding connections shall meet the requirements of IEEE 837, and shall be exothermic weld connections or irreversible high-compression connections, Cadweld "Exothermic" or Burndy "Hyground". Mechanical connectors will not be acceptable. Cable connections to bus bars shall be made with high-compression two-hole lugs.
- c. Ground cable through exterior building walls shall enter within 3 feet [900 mm] below finished grade and shall be provided with a water stop. Unless otherwise indicated, installation of the water stop shall include filling the space between the strands with solder and soldering a 12 inch [300 mm] copper disc over the cable.
- d. Ground cable near the base of a structure shall be installed in earth and as far from the structure as the excavation permits, but not closer than 24 inches [600 mm]. The tops of ground rods and ground cable interconnecting ground rods shall be buried a minimum of 30 inches [750 mm] below grade, or below the frost line, whichever is deeper.
- e. All powered equipment, including lighting fixtures and receptacles, shall be grounded by a copper ground conductor in addition to the conduit connection.
- f. Ground connections to equipment and ground buses shall be made with copper or high conductivity copper alloy ground lugs or clamps. Connections to enclosures not provided with ground buses or ground terminals shall be made with irreversible high-compression type lugs inserted under permanent assembly bolts or under new bolts drilled and inserted through enclosures, other than explosion proof enclosures, or by grounding locknuts or bushings. Ground cable connections to anchor bolts; against gaskets, paint, or varnish; or on bolts holding removable access covers will not be acceptable.
- g. The grounding system shall be bonded to the station piping by connecting to the first flange inside the building, on either a suction or discharge pipe, with a copper bar or strap. The flange shall be drilled and tapped to provide a bolted connection.

- h. Ground conductors shall be routed as directly as possible, avoiding unnecessary bends. Ground conductor installations for equipment ground connections to the grounding system shall have turns with minimum bend radii of 12 inches [300 mm].
- i. Ground rods not described elsewhere shall be a minimum of 5/8 inch in diameter by 10 feet [3 m] long, with a copper jacket bonded to a steel core.
- j. Test wells and covers for non-traffic areas shall be molded high density polyethylene. Test wells for traffic areas shall be precast concrete construction rated for traffic duty with concrete or cast-iron covers.

3-10.02. Grounding System Resistance. The ground system resistance shall comply with National Electrical Code.

3-10.03. Grounding System Testing. The grounding system of each new building or structure and each existing building or structure indicated below, shall be tested to determine the resistance to earth. Testing shall be performed by an independent electrical or grounding system testing organization. Testing shall be completed after not less than three full days without precipitation and without any other moistening or chemical treatment of the soil.

3-10.03.01. New Grounding Systems. Not used.

3.10.03.02. Existing Grounding Systems. Grounding systems of each existing building or structure indicated shall be tested for resistance to earth.

Existing building(s) or structure(s) to be tested	Methanol Storage Tank Area and Methanol Pump Control Panel
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Where existing grounding systems can be isolated from the building power service or utility power service a three-point fall of potential test shall be completed as indicated above. Where isolation of the building grounding system is not practical, a clamp-on resistance test will be an acceptable alternative. Clamp-on resistance testing shall be completed utilizing a ground resistance tester specifically designed for clamp on resistance testing, such as the AEMC "Model 3711". Clamp-on resistance measurements shall be taken at the service side of the service entrance neutral, upstream of the neutral to ground bonding connection to ensure a single path between the grounding system and the utility reference.

3.10.03.03. Grounding System Test Report. A report certified by the testing organization shall be prepared and submitted in accordance with the Submittal Procedures section. The final report shall include complete testing results for each building or structure, graphical representation of the test point results for the three-point fall of potential method, and complete observations of all site weather conditions and other environmental conditions that may affect the test results. Final acceptance of the results reported shall be subject to the review and approval of Engineer.

3-11. LIGHTING FIXTURE INSTALLATION. The Drawings indicate the general locations and arrangements of the lighting fixtures. Fixtures in rows shall be aligned both vertically and horizontally unless otherwise specified. Fixtures shall be clear of pipes, mechanical equipment, structural openings, indicated future equipment and structural openings, and other obstructions.

Conduit and wire for lighting fixture installation is not shown on the Drawings and shall be sized, furnished and installed by Contractor. Circuits to emergency lighting units, exit signs, and fixtures indicated to be night lights shall not be switched. Circuits to lighting fixtures indicated to have

emergency battery packs shall include an additional un-switched hot conductor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch for lighting fixture installation.

3-12. POWER FACTOR CORRECTION CAPACITOR INSTALLATION. Not used.

3-13. HEAT-TRACED PIPING INSTALLATION. Not used.

3-14. MODIFICATIONS TO EXISTING EQUIPMENT. Modifications to existing equipment shall be completed as specified herein and indicated on the Drawings. All existing facilities shall be kept in service during construction. Temporary power or relocation of existing power and control wiring, equipment, and devices shall be provided as required during construction. Coordination and timing of outages shall be as specified in other sections of these Specifications. Electrical power interruptions will only be allowed where agreed upon in advance with Owner, and scheduling at times of low demand may be required.

3-14.01. Demolition. Unless otherwise specified or indicated on the Drawings, all cable and all exposed conduit for power and control signals of equipment indicated to be removed shall be demolished. Conduit supports and electrical equipment mounting hardware shall be removed, and holes or damage remaining shall be grouted or sealed flush. Conduit partially concealed shall be removed where exposed and plugged with expanding grout flush with the floor or wall. Repairs shall be refinished to match the existing surrounding surfaces. Demolished equipment shall be discarded or salvaged as indicated on the Drawings and as specified in other sections of these Specifications.

STANDARD SPECIFICATIONS						
REFERENCE: ICEA S-95-658 (NEMA WC 70).						
CONDUCTOR: Concentric-lay, uncoated copper; strand Class B. Wet/dry maximum operating temperature 90°C.						
INSULATION: Cross-linked thermosetting polyethylene, ICEA S-95-658, Paragraph 3.6.						
SHIELD: None.						
JACKET: None.						
FACTORY TESTS: Cable shall meet the requirements of ICEA S-95-658.						
Cable Details						
Size		Number of Strands	Conductor Insulation Thickness*		Maximum Outside Diameter	
AWG or kcmil	mm ²		in.	μm	in.	mm
14	2.5	7	0.030	760	0.17	4.32
12	4.0	7	0.030	760	0.19	4.83
10	6.0	7	0.030	760	0.21	5.33
8	10.0	7	0.045	1140	0.27	6.86
6	16.0	7	0.045	1140	0.31	7.87
4	25.0	7	0.045	1140	0.36	9.14
2	35.0	7	0.045	1140	0.42	10.67
1	40.0	19	0.055	1400	0.48	12.19
1/0	50.0	19	0.055	1400	0.52	13.21
2/0	70.0	19	0.055	1400	0.57	14.48
4/0	95.0	19	0.055	1400	0.68	17.27
250	120.0	37	0.065	1650	0.75	19.05

350	185.0	37	0.065	1650	0.85	21.59
500	300.0	37	0.065	1650	0.98	24.89
750	400.0	61	0.080	2030	1.22	31.00
1,000	500.0	61	0.080	2030	1.37	34.80

*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 90 percent of the values indicated above.

A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, XLP, XHHW-2, conductor size, and voltage class.

600 Volt, Single Conductor Lighting/Power Cable (600-1-XLP-NONE-XHHW-2)				
BLACK & VEATCH		Cable Data		Figure 2-16050

STANDARD SPECIFICATIONS

REFERENCE:

UL 66, UL 1277.

CONDUCTOR:

16 AWG (1.5 mm²), 7-strand, concentric-lay, uncoated copper. Maximum operating temperature 90°C dry, 75°C wet.

INSULATION:

Polyvinyl chloride, not less than 15 mils (380 μm) average thickness; 13 mils (330 μm) minimum thickness, UL 66, Type TFN.

LAY:

Twisted pair with 1-1/2 inch to 3 inch (38.10 mm - 63.5 mm) lay.

SHIELD:

Cable assembly, combination aluminum-polyester tape and 7-strand, 20 AWG (0.5 mm²) minimum size, tinned copper drain wire, shield applied to achieve 100 percent cover over insulated conductors.

JACKET:

Conductor: Nylon, 4 mils (100 μm) minimum thickness, UL 66.

Cable assembly: Black, flame-retardant polyvinyl chloride, UL 1277, applied over tape-wrapped cable core.

CONDUCTOR IDENTIFICATION:

One conductor black, one conductor white.

FACTORY TESTS:

Insulated conductors shall meet the requirements of UL 66 for Type TFN. Assembly jacket shall meet the requirements of UL 1277. Cable shall meet the vertical-tray flame test requirements of UL 1277.

Cable Details				
	Assembly Jacket Thickness*		Maximum Outside Diameter	
	in.	μm	in.	mm
Single Pair	0.045	1140	0.34	8.64

<p>*The average thickness shall be not less than that indicated above. The minimum thickness shall be not less than 80 percent of the value indicated above.</p> <p>A durable marking shall be provided on the surface of the cable at intervals not exceeding 24 inches (600 mm). Marking shall include manufacturer's name, Type TC, Type TFN, conductor size, single pair, and voltage class.</p>		
600 Volt, Single Pair, Shielded Instrument Cable (600-SINGLE-PAIR-SH-INSTR)		
BLACK & VEATCH	Cable Data	Figure 4-16050

Section 16050-A

City of Tampa Standard Electrical Specifications

SECTION 76 - CONDUIT, WIRE, AND GROUNDING

W-76.01 General

Conduit, wire, and grounding includes furnishing and installing all conduits, underground ducts, bus ducts, wires, cables, and grounding systems as shown, specified, and required for a complete installation. The work includes the furnishing and installation of wires and cables in flexible and rigid conduits, underground ducts, all as required, shown, and specified.

Descriptive literature and technical information relative to conduits, wires, and grounding shall be submitted by the Contractor in conformance with the requirements of the General Provisions.

The Contractor shall, with reference to approved drawings of equipment being installed, prepare detailed plans showing the layout and size of all conduits, ducts, bus ducts, cables and wires, connections between the point of service connection and all utilizing equipment. These plans shall be in sufficient detail to serve as working drawings for the installing electricians. The drawings shall be to scale not less than the Plans and be prepared as the work develops with approval by the Engineer before major steps of work are undertaken.

During construction, careful notes shall be kept of all deviations or changes in the layout or connection diagrams. Upon completion of the work, all working drawings shall be corrected and then marked "Record Drawings". Four sets of final prints, along with an equal number of bound instruction manuals and parts lists shall be given to the Engineer at the end of the job.

Excavation, backfill, form work, concrete, and reinforcing shall be in accordance with the applicable Workmanship and Materials sections.

W-76.02 Underground Ducts

In general, underground ducts for feeders and control wiring shall be plastic conduit. The plastic conduit shall be PVC, Schedule 80, and U.L. Inc. listed for direct burial, as manufactured by Carlon, Triangle, Allied Tube, or equal. The conduit shall be buried a minimum of 18 inches below grade. Manufactured fitted plastic duct spacers shall be used for installation spacing.

Ducts installed under streets, roads, alleys, driveways, and parking lots; and conduits leading from the wet well to junction boxes; shall be rigid aluminum conduit covered with no less than 40 mils of PVC, as manufactured by Plasti-Bond, Perma-Cote, KorKap, or equal. The PVC material shall conform to the applicable ASTM standards and UL 6A. The conduit shall be buried a minimum of 24 inches below grade unless otherwise

noted or allowed by the NEC.

Each duct shall be carefully cleaned before and after installation. All inside surfaces shall be free from imperfections likely to injure the cable. After installation of complete duct runs in sizes 2 inches and larger, ducts shall be snaked with an approved tube cleaner equipped with an approved cylindrical mandrel of a diameter not less than 85 percent of the nominal diameter of the duct. Ducts through which the mandrel will not pass shall not be incorporated in the work. After snaking, the ends of dead-ended ducts shall be protected with standard conduit caps to prevent the entrance of water or other foreign matter.

Where ducts enter buildings or at stub-ups to equipment, transitions to aluminum conduits shall be made as noted and detailed. Where it is not otherwise shown, all ducts entering buildings and structures shall have transitions to aluminum conduit at least 5 feet from the outermost edge of the pile cap or footing supporting the outermost vertical wall of the building or structure.

Transitions from above-grade rigid aluminum conduit to nonmetallic conduit shall be accomplished with a threaded adapter. Rigid aluminum conduit installed above grade and extending below grade shall include the first 90° elbow. All rigid aluminum conduits extending below grade shall be coated with two coats of an asphaltum-type paint along its entire length below grade and extending 6" above grade or above the top of the finished slab. The asphaltum-type paint shall conform to Fed. Spec. TT-V-51 and equivalent to Koppers Bitumastic Super Service Black.

W-76.03 Liquidtight Flexible Nonmetallic Conduit (Size 2 Inch or Less)

All flexible conduits size 2 inch or less in non-classified areas shall be nonmetallic, liquidtight, and have a circular cross section. The conduit shall be resistant to oil, water, heat, sunlight, corrosion, most acids, ozone, alkali, strains, abrasions, and crushing. The conduit shall be rated for continuous use at 140°F and be U.L. Inc. listed. Compatible liquidtight nonmetallic fittings shall be used for conduit installation. The flexible conduit and fittings shall be as manufactured by Carlon, Kellems, K-Flex, or equal.

W-76.03(a) Liquidtight Flexible Metallic Conduit (Greater Than 2 Inch)

All flexible conduits greater than 2 inch in non-classified areas shall be metallic, liquidtight, and have a circular cross section. The conduit shall be of a light-weight aluminum core, coupled with a PVC jacket. The conduit shall be resistant to sunlight, acid, and oil. The conduit shall be rated for a working temperature between -20°C to 80°C and U.L. Inc. listed. Compatible liquidtight metallic fittings shall be used for conduit installation. The flexible conduit and fittings shall be as manufactured by Thomas & Betts or equal.

W-76.04 Metallic Conduit and Boxes

All conduit shall comply with the requirements of the U.L. Inc. Standards. Conduit shall be delivered to the job site in standard bundles having each length suitably marked with the manufacturer's name or trademark and bearing the label of the U.L. Inc.

inspection service. The minimum size conduit service shall be 3/4 inch.

All exposed conduit within buildings and exposed on outdoor structures shall be rigid heavy wall, 6063 alloy, T-1 temper, aluminum conduit. Aluminum conduit shall conform to Fed. Spec. WW-C-540 and ANSI C80.5.

All conduit encased in building structures, exposed in the screen room/wet well area, or otherwise noted, shall be rigid aluminum covered with not less than 40 mils of PVC outside, and 2 mils of urethane inside, as manufactured by Plasti-Bond, Perma-Cote, KorKap, or equal. The physical properties of the PVC and urethane materials shall conform to the applicable ASTM standards and UL 6A.

Cast copper-free aluminum shall be used for outlet boxes and fittings in aluminum conduit systems. Outlet and junction boxes shall be of proper dimensions for each application. Cast metal boxes shall have watertight gaskets and covers secured with stainless steel screws. Outlet boxes shall be Crouse-Hinds type FS, FD, or equal.

PVC coated boxes and fittings shall be used in PVC coated conduit systems.

Conduit fittings, such as elbows, tees, couplings, caps, bushings, nipples, and locknuts shall be constructed of the same material as the conduit and be threaded to provide watertight connections. Conduit bodies shall be copper-free cast aluminum with gasketed aluminum covers secured with stainless steel screws and be type Form 7 or Mark 9 as manufactured by Crouse-Hinds, or equal.

Where it is necessary to use electrical unions, Universal, Erikson, or equal conduit couplings shall be used.

W-76.05 Conduit Installation

All conduits shall be installed as required. The conduit system shall be installed complete with all accessories, fittings, and boxes, in an approved and workmanlike manner to provide proper raceways for electrical conductors.

The Contractor shall note that conduit runs shown are for the purpose of outlining the general method of routing the conduits to avoid interferences.

All other conduit shall be run exposed, except where shown otherwise.

Sizes not shown shall be one size larger than indicated in Tables 1 and 4, Chapter 9, of the NEC. Exposed conduit shall be run parallel to or at right angles from walls or beams and plumb on columns and on walls. Conduit shall not be run through beams except where approved by the Engineer or specifically detailed. Where possible, conduit shall be pitched slightly to drain to the outlet boxes or otherwise installed to avoid trapping of condensate. Where necessary to ensure drainage, Appleton Type ECD, Crouse-Hinds, or equal, 1/4-inch drain fitting shall be installed in the trapped conduit at low points.

Factory made bends or elbows shall be used wherever possible. Field bends shall

be carefully made to prevent conduit damage or reduction in the internal area. The bending radius shall be not less than six times the nominal diameters of the conduit with carefully matched bends on parallel runs to present a neat appearance. The number of crossovers shall be kept to a minimum.

All conduit shall be reamed to remove burrs before installation. Aluminum conduit shall be cut with a saw to prevent reduction in internal area. To seal out air and moisture, lower electrical resistances, and prevent seizing and galling; aluminum conduit threads shall be given a coat of Aluma-Shield surface compound, as manufactured by Thomas & Betts, prior to assembly. All connections and joints in all conduit runs shall be watertight and ensure a low resistance ground path in the conduit system. All conduit runs shall be swabbed to remove foreign matter before wires are pulled in. Conduit terminations in boxes, panels, switchboards, motor control centers, and other sheet metal enclosures shall be bonded together for grounding and be fitted with insulating bushings, O.Z./Gedney Type A, Thomas and Betts, or equal. Where grounding bushings are required by code or shown, O.Z./Gedney Type SBLG, Thomas and Betts, or equal shall be furnished.

Conduit shall be neatly grouped where several lines follow a parallel course, and shall be well supported, using stainless steel clips or hangers of the ring or trapeze type. Clips, hangers, and support rods shall be held by self-drilling anchors, power-driven fasteners, or stainless steel channel insets in the concrete ceilings or walls. Perforated strap hangers will not be accepted.

Conduit runs that enter the building from outdoors, or that pass through refrigerated or air conditioned areas, are subject to moisture accumulation due to condensation. A pull box shall be provided in the conduit run near the point of temperature change to prevent trapping of moisture within the conduit system. A 1/4-inch weep hole shall be drilled in the bottom of the pull box. After the wires and cables are installed, the end of the conduit continuing into the warmer area shall be packed with a nonsetting sealing compound.

All PVC coated aluminum conduit shall be installed using specialized tools and equipment as recommended by manufacturer. The Contractor shall ensure those installing PVC coated aluminum conduit are certified by the manufacturer prior to beginning installation. Installation of PVC coated aluminum conduit shall not begin until a copy of an unexpired Certified Installer Card for each installer is submitted and approved by Engineer.

W-76.06 Conduit Connections to Equipment

The conduit system shall terminate at the terminal box or at the conduit connection point of electric motors, devices, and equipment. Terminations of conduits at such locations shall permit direct wire connections to the motors, devices, or equipment.

Conduit connections shall be made with rigid conduit if the equipment is fixed and not subject to adjustment, mechanical movement, or vibration. Myers water-tight /dust-tight hubs shall be used for outdoor, below grade, or wash down areas. Rigid conduit connections shall have union fittings to permit removal of equipment without cutting or

breaking the conduit.

Conduit connections shall be made with approved flexible nonmetallic conduit if the equipment is subject to adjustment, mechanical movement, or vibration. Flexible conduit connections shall be watertight.

W-76.07 Expansion Fittings

Expansion fittings shall be installed at all expansion joints and where required by codes. Conduit expansion fittings shall be Crouse-Hinds Type XD, O.Z./Gedney Type DX, or equal.

W-76.08 Terminal, Junction, and Pull Boxes

Junction and pull boxes shall be installed as shown and as required.

Surface-mounted junction and pull boxes, unless specified otherwise herein, shall be of cast aluminum complete with mounting lugs, threaded entry bosses and flange or rabbeted gasketed covers.

Surface-mounted junction and pull boxes which would exceed 50 pounds weight if cast or which are shown as fabricated sheet metal boxes shall be made of 1/8-inch sheet aluminum, or equivalent stainless steel, with sides return channel flanged around the cover opening or with approved welded angle or channel supporting frames. Sheet aluminum boxes shall be provided with mounting lugs or channels and with conduit termination hubs. All seams in sheet aluminum boxes shall be continuously welded and ground smooth. All surface boxes larger than 6 inches square shall be mounted a minimum of 3/4 inch clear of the mounting surface by means of offset lugs or support channels.

Fabricated junction and pull boxes which are partially or fully encased in concrete shall be made of 10-gauge sheet stainless steel and fabricated in a similar manner to the sheet aluminum pull boxes specified herein, complete with mounting lugs or channels and conduit termination hubs. Cast aluminum boxes shall be provided in smaller sizes where required for full or partial encasement in concrete.

All junction and pull boxes shall be provided with covers or doors as shown or required. Covers and doors shall be fabricated of materials equal in weight, gauge, structure, and metallic composition as the basic box. All covers shall be gasketed and held in place with stainless steel captive knurled head screw slot bolts. All pull and junction boxes shall be provided with hinged doors. Doors shall have continuous hinges, and 3-point catches with external handles and hasps for padlocks. All doors shall be gasketed.

All boxes shall be provided with partitions as shown and as required.

Fabricated boxes shall be rated NEMA 12 for indoor, above grade areas; rated NEMA 4X for outdoor areas; and manufactured by Hoffman, Hope, or equal.

W-76.09 Hazardous Areas

All conduit and equipment installed in or routed through hazardous areas, as well as other electrical appurtenances installed therein, shall be installed to conform in every respect to Chapter 5 of the NEC for Class I, Division 1, Group D hazardous locations. All material installed in hazardous areas shall be listed as complying with the requirements of the U.L. Inc. for use in Class I, Group D atmospheres. Terminal Boxes and Enclosures mounted in Hazardous Areas shall be NEMA 7, cast aluminum.

Sealing shall be provided for all conduits within and leaving hazardous areas as required.

W-76.10 Grounding System

A complete grounding system shall be in accordance with applicable ANSI, IEEE, and NEC Standards and local codes.

All noncurrent-carrying metal parts of the electrical wiring system shall be grounded. The grounding system shall include, but not be limited to, the following:

1. Motor control center controllers, ground bus, and enclosures.
2. All motor frames.
3. All conduit systems.
4. All mechanical equipment and structures.
5. Distribution and lighting panelboards.
6. Control, relay, and instrumentation panels.
7. Lighting fixtures and receptacles.
8. Fans, blowers, pumps, and similar equipment.
9. Hoist beams, cranes, and similar items.

A grounding connection from the transformer to the City water pipe shall be provided. The wire and conduit shall be attached to the City water pipe with a U.L. Inc. listed cast bronze U-bolt connector with silicon bronze bolts and nuts.

Motor frames shall be grounded by means of stranded, 600-volt insulated copper cables installed within the motor feeder conduit system. The cable shall be lug bolted to the motor terminal box and the ground bus of the motor control center serving the motor.

An equipment grounding conductor shall be installed in all electrical raceways, and shall be sized in accordance with Article 250.95 of the National Electrical Code (NEC).

Exposed or buried ground conductors shall be bare copper wires or bars of the proper sizes.

All exposed ground cables or bars shall be firmly and neatly supported in place at proper intervals. Where subjected to mechanical abuse, protective enclosures shall be provided.

Grounding conductors run in conduits with circuit conductors shall be stranded cable with 600-volt green XHHW, TW, THW, or RHW Code insulation.

Stainless steel ground rods shall be 5/8-inch diameter with the length as required, and made up of a 10-foot section with 5-foot sections added as required. Rods shall be driven to permanently moist soil.

Connections to ground rods, transformer case ground bus bars, case grounds, bare ground grid conductors, and the like, shall be made by an exothermic welding process or by clamps specifically designed for this application.

Ground conductor connections to ground bus bars in motor control centers, and the like, shall be cable lug bolted terminations equal to line conductor terminations specified hereinafter.

Welds embedded in the ground or concrete shall be cleaned and painted with an asphaltum base paint.

Tests shall be conducted by the Contractor and witnessed by the Engineer to determine the ground impedance for the entire system. The test shall be accomplished by using a ground loop impedance tester. The result shall not exceed 2 ohms at any point of test. If necessary, additional ground rods shall be installed at locations approved by the Engineer.

Care shall be exercised to ensure good electrical connections between the conduits and metallic enclosures of switchgear, control centers, and the like. Grounding jumpers shall be installed where necessary to accomplish this purpose.

W-76.11 Wires and Cables - General

Wires and cables required for all systems shall be complete, connecting all equipment and control components. Conductors shall be of ample size, with suitable insulation as specified hereinafter.

W-76.12 600-Volt Wire and Cable - Conductors

All ground conductors and power, control, and lighting conductors shall be soft-drawn or annealed stranded copper wire meeting the requirements of ASTM B 3 or B 33. For lighting fixture and convenience outlet wiring only, conductors No. 10 AWG and smaller may be solid conductor. Conductors shall be sized to limit the maximum conductor temperature to less than 75°C, except where specifically stated otherwise. Table 310.16 of the NEC shall be the guide in determining 600-volt conductor sizes. The minimum size of conductor for power and lighting wiring shall be No. 12 AWG.

W-76.13 600-Volt Power and Control Cable - Insulation

Low voltage circuits shall be wired with 600-volt insulated conductors, sized as

shown, or as required by the actual load to be served, whichever is larger.

Single Conductor: Insulation for single 600-volt copper conductors shall be cross-linked polyethylene compound, U.L. Inc. listed, NEC Type XHHW-2, with surface print cable identification; as manufactured by Okonite, American, Southwire or equal.

Multiconductor Cables: Individual conductors shall be insulated with 15 mils of polyethylene or PVC and 4-mil nylon jacket. The bundle of conductors shall be wrapped with tape binder and an outer jacket of not less than 45 mils of PVC. Use ICEA Method 1 for color coding wires.

W-76.14 Instrumentation / Data Cables - Insulation

4-20 mA Analog: Shielded two-conductor No. 16 AWG cables for instrumentation shall be properly stranded 600-volt insulated copper wire twisted cables as shown. Conductor insulation shall be polyethylene. Shields shall be overlapped metalized tape providing 100% coverage with tinned copper drain wire. Cable outer jacketing shall be of polyvinyl chloride. Cables shall be Belden #8719, or equal.

Three Conductor: Stranded No. 16 wire, 600 volt polyethylene insulation, twisted conductors, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of PVC. Belden Cat. No. 8618.

Category 5: Provide cable having third party verification to TIA/EIA 568-A Category 5 requirements and constructed of four pair of stranded No. 24 AWG solid copper wire, polyethylene or polypropylene insulation, stranded No. 24 AWG tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of gray PVC. Belden Cat. No. 1624R.

Twinaxial (Data Highway): Provide stranded No. 20 AWG tinned copper wire (9.5 ohms/mile), 78 ohm nominal impedance, 300 volt polyethylene insulation, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and 55 percent tinned copper braid shield (4.1 ohms/mile) and outer jacket of blue PVC. Belden Cat. No. 9463.

1-1/2 Pair (RS-485): Provide three stranded No. 22 AWG tinned copper wires with 300 volt FHDPE insulation, a tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage, 90 percent tinned copper braid shield and a PVC outer jacket. Insulated wires shall be configured as one twisted pair and one reference conductor— 120 Ohms characteristic impedance. Belden Cat. No. 3106A.

W-76.15 600-Volt Wire and Cable - Installation

The 600-volt wires and cables pulled into ducts and conduit shall be installed without the use of lubricants, except where such use is necessary and approved by the cable manufacturers and the Engineer. Wires and cables shall be carefully handled to avoid twists and kinks in the conductors or damage to the insulation. All trapped conduit and duct lines shall be swabbed to remove any accumulated moisture or debris before

wires or cables are pulled in.

Cable reels shall be stored on concrete or other hard surface, or shall be lagged with 2 x 4 wood laggings providing 100% coverage.

No splicing will be permitted, except in junction boxes.

Lug bolting at terminals, devices, or bus bars shall be made up with a flat washer, a Belleville washer, and a locknut.

Lines of nylon or polypropylene, propelled by carbon dioxide or compressed air, shall be used to snake or pull wire and cable into conduits. Flat steel tapes or steel cables shall not be used.

W-76.16 600-Volt Wire and Cable - Splices and Terminations

Splices between copper conductors, size no. 10 AWG and smaller, shall be made up with compression type butt connections. Splices between copper conductors, size no. 8 AWG and larger, shall be made up with U.L. Inc. listed compression type tube connectors. Lug bolting at devices or bus bars shall be made up with a flat washer, a Belleville washer, and a locknut.

Splices and pigtail connections for lighting and receptacle wiring inside the buildings, no. 10 AWG and smaller, shall be made with a pre-insulated spring connectors, or equal.

Splices and lug terminations in 600-volt insulated cables shall be carefully taped and covered, using materials recommended by the cable manufacturer, to provide watertight insulation equal to that of the conductors.

Splices shall not be made within manholes unless specifically approved by the Engineer.

W-76.17 600-Volt Wire and Cable - Tests

The 600-volt insulated cables shall be factory tested prior to shipment in accordance with IPCEA standards for the insulation specified.

The following 600-volt wires and cable shall be tested after installation but before final connections are made up:

1. All feeders from motor control centers to motors 30 horsepower and larger.
2. All feeders from variable speed drive units.
3. All feeders from motor control centers to lighting panels and dry-type transformers.

For the above listed cables, a test voltage of 1,500 volts AC shall be applied for a period of 1 minute between all conductors in the same conduit, and between each

conductor and ground.

All tests shall be made at the Contractor's expense, and certification of the tests shall be submitted to the Engineer. If any failures occur during the tests, the Contractor shall replace the cable.

W-76.18 Identification of Circuits

All wires and cables shall be banded with an identifying number and color code at each end termination and at each splice point in junction boxes. The identifying number of each wire shall be determined at the point of circuit origin, and shall continue unchanged to the point of circuit termination. In each conduit system, the wire identifying numbers shall include the conduit designation with a numeral suffix. The numeral suffix shall start with No. 1 and continue as required.

Where conduits enter motor control centers, switchgear terminal cabinets, and the like, the identification tag shall be fastened to the wire bundle near the conduit termination. The tag shall be held by an adjustable, self-locking nylon "Ty-Rap" as manufactured by Thomas and Betts Co., or equal. The identifying tag shall be of aluminum, brass, rigid fiber, and shall be engraved, stamped, or painted with the scheduled conduit number.

The wire identifying numbers and color code shall be applied as PVC slip-on sleeves, properly fitted to the wire diameter. The sleeves shall be as manufactured by Brady Co., Thomas and Betts Co., or equal.

Color Coding:

240/120 VOLTS	PHASE	480Y/277 VOLTS
Black	A	Brown
Orange (High-Leg)	B	Orange
Blue	C	Yellow
White	Neutral	Gray or White
Green	Ground	Green

W-76.19 Wire and Cable Connections to Equipment

Electrical connections shall be made to all equipment in strict accordance with the manufacturer's approved wiring diagrams, the Plans, or as approved by the Engineer. The Contractor shall be responsible for the accuracy of his work, and shall repair any damage and replace any damaged equipment resulting from erroneous connections.

W-76.20 Painting

Conduit and boxes shall be painted in accordance with the Workmanship and Materials section headed "Painting."

Where aluminum surfaces such as boxes, conduit, or structural supports come in contact with incompatible metals, lime, mortar, concrete, or other masonry materials, the contact areas shall be given one field coat of Koppers Metal Passivator No. 40 and one coat of Koppers Bitumastic Super Service Black or two coats of asphalt varnish conforming to Fed. Spec. TT-V-51.

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Section 16100

ELECTRICAL EQUIPMENT INSTALLATION

PART 1 – GENERAL

1-1. SCOPE. This section covers the installation of electrical equipment.

1-2. GENERAL. Equipment specified to be installed under this section shall be erected and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

The electrical equipment identified as being provided by others will be furnished complete for installation by Contractor. Technical specifications under which the equipment will be purchased are available.

1-2.01. Coordination. When manufacturer's field services are provided by the equipment manufacturer, Contractor shall coordinate the services with the equipment manufacturer. Contractor shall give Engineer written notice at least 14 days prior to the need for manufacturer's field services furnished by others.

Submittals for equipment furnished under the original procurement contract will be furnished to Contractor upon completion of review by Engineer. Contractor shall review equipment submittals and coordinate with the requirements of the Work and the Contract Documents. Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, and field construction criteria.

1-3. DELIVERY, STORAGE, AND HANDLING.

1-3.01. Delivery. When sills are required for electrical equipment, they shall be shipped ahead of the scheduled equipment delivery to permit installation before concrete is placed.

1-3.02. Storage. Upon delivery, all equipment and materials shall immediately be stored and protected by Contractor in accordance with Product Storage and Handling Requirements section, and in accordance with manufacturer's written instructions, until installed in the Work. Equipment shall be protected by Contractor against damage and exposure from the elements. At no time shall the equipment be stored on earth or grass surfaces or come into contact with earth or grass. Contractor shall keep the equipment clean and dry at all times. Openings shall be plugged or capped (or otherwise sealed by packaging) during temporary storage.

1-3.03. Handling. Electrical equipment shall be moved by lifting, jacking, or skidding on rollers as described in the manufacturer's instructions. Special lifting harness or apparatus shall be used when required. Lifting and jacking points shall be used when identified on the equipment. Contractor shall have required unloading equipment on site to perform unloading work on the date of equipment delivery.

1-4. ARC FLASH HAZARD LABELS. Switchgear, switchboards, motor control centers, motor control line-ups, and transfer switches shall be provided with permanent labels warning the risk of arc flash and shock hazard. Contractor shall provide a 4.0 in. x 4.0 in. thermal transfer type label of high adhesion polyester for each work location and each equipment item included in the Arc Flash Analysis.

Labels shall be designed in accordance with

- ANSI Z535.4-1998 – Product Safety Signs and Labels


- UL969 – Standard for Marking and Labeling Systems
- NFPA 70 (National Electric Code) – Article 110.16

The label shall include the following information:

- System voltage
- Flash protection boundary
- Personal Protection Equipment (PPE) category
- Arc Flash Incident energy value (cal/cm²)
- Limited, restricted, and prohibited approach boundaries.
- Study report number and issue date.

Labels applied outdoors must be U.V. and weather resistant. All labels must use high quality fade/smudge resistant lettering.

Contractor shall provide a 4.0 inch x 4.0 inch Arc Flash Hazard warning labels similar to the label provided below:

	
WARNING	
ARC FLASH HAZARD	
Nominal system voltage	_____
Arc flash boundary	_____
Available incident energy	_____
Working distance	_____
Minimum arc rating of clothing	_____
Level of PPE	_____

Labels shall be printed by a thermal transfer type printer, with no field markings.

Arc Flash labels shall be provided for equipment as identified in the study and the respective equipment access areas in accordance with the following:

- Floor Standing Equipment: Labels shall be provided on the front of each individual section. Equipment requiring rear and/or side access shall have labels provided on each individual section access area. Equipment line-ups containing sections with multiple incident energy and flash protection boundaries shall be labeled as identified in the Arc Flash Analysis table.
- Wall Mounted Equipment: Labels shall be provided on the front cover.
- General Use Safety labels shall be installed on equipment in coordination with the Arc Flash labels. The General Use Safety labels shall warn of general electrical hazards

associated with shock, arc flash, and explosions, and instruct workers to turn off power prior to work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3-1. INSTALLATION, TESTING, AND COMMISSIONING. All installation work shall be in accordance with manufacturer's written instructions.

All material, equipment, and components specified to be installed according to this section shall be installed, tested, and commissioned for operation in compliance with NECA 1000 – NEIS Specification System. Where required in NECA 1000, testing and commissioning procedures shall be followed prior to energizing equipment.

Electrical equipment cubicles and vertical sections shall be installed plumb and level. Draw-out equipment carriages, circuit breakers, and other removable components shall operate free and easy without binding or distortion.

Unless otherwise indicated or specified, all indoor floor-mounted electrical equipment and control cabinets shall be installed on concrete equipment pads four inches [102 mm] in height.

Indoor metalclad switchgear shall be bolted to steel floor channels which are installed level and flush with the top of the concrete floor or equipment pad.

Outdoor metalclad switchgear and interrupter gear with integral floor channels or beams shall be secured to concrete pads with anchor bolts and clips.

Motor control centers with integral floor sills shall be secured to concrete floors or equipment pads with anchor bolts.

Adequate bracing shall be provided for seismic forces. The bracing shall be designed to meet the requirements of the Meteorological and Seismic Design Criteria section.

3-1.01. Cleaning. All deposits of oil, grease, mud, dirt or debris shall be cleaned from the electrical equipment following installation and field wiring. A detergent water-based solution, or other liquid cleaners not harmful to material or equipment finishes, shall be used as recommended by the manufacturer.

End of Section

Section 16670

LIGHTNING PROTECTION FOR STRUCTURES

PART 1 – GENERAL

1-1. SCOPE. This section covers furnishing the design of lightning protection systems and the furnishing and installation of lightning protection equipment for the following structures:

Methanol Storage Tanks

Lightning protection systems shall be furnished, installed, and tested as specified. Lightning protection equipment shall meet the requirements specified herein.

Lightning protection systems shall consist of, but not be limited to, air terminals; main, bonding, and down conductors; ground terminals; and all required connectors and fittings required to complete the system.

The lightning protection system shall include the bonding of all roof-mounted mechanical equipment, roof drains, roof mounted ladders, chimneys, antennas, and other roof mounted metal objects.

1-2. GENERAL. Contractor shall furnish all installation drawings, tools, equipment, materials, and supplies and shall perform all labor and obtain all inspections to complete the work as specified, and in compliance with all codes, standards, and regulations.

Contractor shall provide coordination with other contractors and supervision of installation as needed during construction.

The design of the system shall include determination of the overall lightning hazard for the geographic location of the project and for the structures, the selection of Class I and/or Class II materials, the need of corrosion protection for the copper and/or aluminum components used, and consideration of other pertinent factors. The design shall produce a zone of protection from lightning to prevent personal injury, structural damage, and equipment downtime.

Equipment furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of UL unless exceptions are noted by Engineer.

The system shall be installed by an installer who has UL listing and subscribes to the UL Follow-Up Service.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations section shall apply to all equipment furnished under this section. If requirements in this section differ from those in the General Equipment Stipulations section, the requirements specified herein shall take precedence.

1-2.02. Seismic Design Requirements. Seismic design requirements for products specified herein shall be as indicated in the Meteorological and Seismic Design Criteria section.

1-2.03. Governing Standards. All system components furnished under this section shall be designed in accordance with ANSI/UL 96 - Lightning Protection Components. All lightning protection systems furnished under this section shall be designed, constructed, and tested in accordance with UL 96A – Installation Requirements for Lightning Protection Systems and ANSI/NFPA 780 – Standard for the Installation of Lightning Protection Systems.

Lightning protection systems shall be bonded to grounding electrode systems in accordance with the National Electrical Code.

1-2.04. Workmanship and Materials. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, unless required by tests.

1-3. SUBMITTALS. Complete certification of design calculations; assembly, and installation drawings; together with complete engineering data covering the materials used and the parts, devices, and accessories forming the system, shall be submitted in accordance with the Submittals Procedures section.

Submit confirmation of compliance with the requirements of the Meteorological and Seismic Design Criteria section.

1-4. QUALITY ASSURANCE. The lightning protection system shall be inspected and tested after installation by conducting continuity and ground resistance tests as well as a visual inspection. Inspection results and test data shall be submitted in accordance with the Submittals Procedures section. Upon completion of the installation, Contractor shall apply for and deliver the UL Master Label Certificate of Inspection for each structure/building.

PART 2 - PRODUCTS

2-1. ACCEPTABLE MANUFACTURERS. The system components shall be manufactured by a company that has been specializing in the design and manufacture of UL listed lightning protection equipment for at least 5 years.

2-2. MATERIALS. All manufactured and fabricated components shall conform to NFPA 780 Class I or Class II as needed for the structures on which they will be installed. The system components shall be fabricated from the following metals:

Conductors	Copper.
Air Terminals	Copper or bronze.
Grounding Electrodes	Copper clad steel.
Fasteners	Copper or bronze.
Bimetallic Fasteners	Bronze and aluminum.

Aluminum conductors and air terminals shall be mounted on aluminum surfaces only.

All materials furnished for the lightning protection system shall bear the inspection label of UL.

PART 3 - EXECUTION

3-1. INSTALLATION. The lightning protection system shall be installed in a neat and inconspicuous manner so all components will blend in with the appearance of the building. All conductors shall be concealed or semi-concealed during construction using methods recommended in NFPA 780 and UL 96A.

Air terminals shall have base supports designed for the surface on which they are used and shall be securely anchored. All exposed metal eave troughs, roof vents, guy wires, antennas, and air handling equipment shall be bonded to the lightning protection system in such a way that two paths to ground are provided.

The lightning protection system shall be bonded to structure/building electrical ground rings wherever they are available.

End of Section

CONTRACT ITEMS

CONTRACT ITEM 100 – LUMP SUM

Provide, install and test two (2) 50,000 gallons methanol storage tanks to replace (1) existing 100,000 gallons methanol storage tank at the Howard F. Curren Advanced Wastewater Treatment Plant (HFC AWTP).

Scope of work includes furnishing of all labor, equipment, and material to remove and dispose (1) 100,000 gallons methanol storage tank, (1) adjacent fiberglass brewery waste storage tank, and (9) fiberglass liquid alum storage tanks; and install (2) 50,000 gallons methanol storage tanks, modify the existing methanol storage containment area to accommodate the new tanks as specified in construction plans. Work also includes electrical/instrumentation work. Any and all work not specified in additional Contract Items is the responsibility of the contractor to include in the lump sum price. Payment for Lump Sum Work will be made at the appropriate Contract Lump Sum Price.

CONTRACT ITEM 200 – GUARDRAIL AND HANDRAIL POST DETERIORATED CONCRETE RESTORATION AND CONTRACT ITEM 300 – CONTAINMENT WALLS DETERIORATED CONCRETE RESTORATION

The Contractor shall furnish all labor, materials and equipment to rehabilitate the existing structures complete as shown on the Plans, specified, and directed by the Engineer.

The concrete restoration shall conform to the requirements shown on the drawings and Workmanship and Materials section 03920 and 03930 of the specifications. All work shall be done in strict accordance with manufacturer's instructions.

The work comprises installing an approved concrete repair material as specified including surface preparation, cleaning, application of hydraulic cement or other means to fill voids, curing, protection of adjacent facilities, restoring all disturbed areas to preconstruction condition or better, and all appurtenant work. The work also includes concrete repair, stair nosing replacement, providing 100% containment of all concrete dust material and reinstalling existing handrails as detailed in the plans.

Payment for the proposed concrete restoration as specified on the plans will be made at the Contract Unit Price per cubic foot.

CONTRACT ITEM 400 – CONCRETE PROTECTIVE COATING SYSTEM

General

The Contractor shall furnish all labor, materials, and equipment required to applied protective coatings, including surface preparation, protection of surfaces, inspection, and other appurtenant work for equipment and surfaces designated to be coated with heavy-duty maintenance coatings. Regardless

of the number of coats previously applied, at least two field coats in addition to any shop coats or field prime coats shall be applied to all surfaces unless otherwise specified. Refer to Specification 09940.

Scope of Work

The Contractor shall furnish all labor, tools, equipment, supplies, and materials to clean, prepare surface, and apply approved protection system to coat concrete floor surface of containment area including concrete tank base, concrete steps, equipment bases, inside sumps and inside containment walls to the top, including horizontal surfaces. The coating shall extend to 6" below the outside top of containment wall.

There is an estimated 5,500 SF of surface to be coated. The City does not guarantee the actual amount of surface to be coated and will strictly pay the contractor's unit cost up to the estimated amount regardless if the amount is significantly less than estimated.

CONTRACT ITEM 500 - CONTINGENCY

The Contractor shall include a One Hundred Thousand Dollar (\$100,000) contingency sum, to be included as part of the total bid amount for this contract. The contingency is for the purpose of compensating the Contractor for any incidental work that may arise as construction operations proceed and was not addressed as part of the original work portrayed in the Plans and Specifications.

The One Hundred Thousand Dollar (\$100,000) contingency sum if an upset limit. Any amount of the contingency shall be paid only after negotiation.