

The Enclosed Document Is Provided For Your Convenience.

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

Please Let Us Know If You Plan To Bid

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 17-C-00047

David L. Tippin Water Treatment Facility Research Lab Renovation

SHELTERED MARKET

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

NOVEMBER 2017

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):

Only City of Tampa Certified Small Local Business Enterprises and Underutilized WMBEs may submit bids for this project.

CONTRACT NO.: 17-C-00047; David L. Tippin Water Treatment Facility Research Lab Renovation – Sheltered Market.

BID DATE: December 12, 2017 **ESTIMATE:** \$100,000 **SCOPE:** The project comprises selective demolition, cutting and patching, termite control, concrete slab repair, building insulation, architectural finishes, repair of existing 1 hour fire rated partition, equipment purchase and installation, laboratory casework, related mechanical, electrical, and plumbing work, with all associated work required for a complete project in accordance with the Contract Documents. **PRE-BID CONFERENCE:** Tuesday, November 28, 2017, 10:30a.m. at the David L. Tippin Water Treatment Facility Maintenance Building Conference Center located at 7125 N. 30th Street, Tampa, FL 33604. Please send an email referring to this pre-bid conference and listing the names and companies represented for all attendees a minimum of 24 hours in advance to Israel.Vigier@ci.tampa.fl.us to obtain security clearance. 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>.

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NOTICE TO BIDDERS
CITY OF TAMPA, FLORIDA
Contract 17-C-00047; David L. Tippin Water Treatment Facility Research Lab Renovation

Sealed Proposals will be received by the City of Tampa no later than 1:30 P.M., December 12, 2017, in the 4th Floor Conference Room, Tampa Municipal Office Building, 306 E. Jackson Street, Tampa, Florida, there to be publicly opened and read aloud.

Only bids from current City certified Small Local Business Enterprises (SLBEs), or Underutilized Women/Minority Business Enterprises (WMBEs) within the industry category of "Construction" shall be considered (see MBD Form-70).

NOTE: The City of Tampa's WMBE policies are narrowly-tailored to identify Underutilized WMBEs by industry category. WMBE Bidders/Proposers who are certified in the Underutilized category for the work/score detailed herein are eligible for award. In all cases, the Bidder/Proposer must be WMBE and/or SLBE certified prior to the opening date and time of the bid/proposal. As proof of certification, include copies of the applicable City of Tampa WMBE and SLBE certificates in the bid/proposal.

The proposed work is to include, but not be limited to, selective demolition, cutting and patching, termite control, concrete slab repair, building insulation, architectural finishes, repair of existing 1 hour fire rated partition, equipment purchase and installation, laboratory casework, related mechanical, electrical, and plumbing work, 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.

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

I-1.01 GENERAL:

The proposed work is the David L. Tippin Water Treatment Facility Research Lab Renovation 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, with notice given to all prospective bidders at the respective fax numbers or e-mail addresses furnished, for such purposes. 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 90 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.

I-1.10 EQUAL BUSINESS OPPORTUNITY PROGRAM / WMBE-SLBE / REQUIREMENTS

BIDDERS MUST SUBMIT COMPLETED FORMS MBD-10 AND MBD-20 WITH BIDS. BIDS SUBMITTED WITHOUT THE COMPLETED FORMS (INCLUDING SIGNATURES) WILL BE DEEMED NON-RESPONSIVE.

In accordance with the City of Tampa's Equal Business Opportunity Program, no Goal has been established for subcontracting with Women-Minority Business Enterprises (WMBEs) and Small Local Business Enterprises (SLBEs) certified by the City.

INSTRUCTIONS TO BIDDERS
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SHELTERED MARKET for SLBEs or Underutilized WMBEs: This bid/proposal is a Sheltered Market solicitation for current City of Tampa certified Small Local Business Enterprises (SLBEs) and Underutilized Women/Minority Business Enterprises (WMBEs) identified on MBD Form-70 for "Construction". Only submissions from current certified SLBEs and Underutilized WMBEs on MBD Form-70 will be reviewed. To determine if your company is eligible as a City of Tampa Small Local Business Enterprise and/or Women/Minority Business Enterprise, please contact the Minority and Small Business Development Office at (813) 274-5512.

DIVERSITY MANAGEMENT INITIATIVE, DMI, DATA REPORTING FORMS REQUIRED - Bidders must submit, with its bid, "DMI-Solicited" forms listing all subcontractors solicited and "DMI-Utilized" forms listing all subcontractors to be utilized. Supplemental forms, documentation, or information may be submitted at bid time or as requested by the City.

After an award, "DMI-Payments" forms are to be submitted with payment requests to report payments to subcontractors.

Bidders may visit the Minority Business Development web page at TampaGov.net for other information about the program, FAQ's, and the latest directory of certified firms.

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;

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- (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.

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,

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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 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;

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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.

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.

Section 287.135, Florida Statutes, prohibits agencies or local governmental entities from contracting with companies for goods or services of \$1,000,000 or more 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, created pursuant to Section 215.473, Florida Statutes, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statutes, (effective October 1, 2016), or is engaged in a boycott of Israel (effective October 1, 2016), or is engaged in business operations in Cuba or Syria. A company that is on either the Scrutinized Companies with Activities in Sudan List or the

INSTRUCTIONS TO BIDDERS
SECTION 1 - SPECIAL INSTRUCTIONS

Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to Section 215.473, Florida Statutes, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statutes, (effective October 1, 2016) or is engaged in a boycott of Israel (effective October 1, 2016) or is engaged in business operations in Cuba or Syria 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 \$1,000,000 or more. Contractor certifies that it is not in violation of Section 287.135, Florida Statutes. For contracts \$1,000,000 and greater, if the City determines the Contractor submitted a false certification under Section 287.135(5) of the Florida Statutes, or has been placed on the Scrutinized Companies with Activities in the Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or is on the Scrutinized Companies that Boycott Israel List, created pursuant to Section 215.4725, Florida Statutes, (effective October 1, 2016), or is engaged in a boycott of Israel (effective October 1, 2016), or been engaged in business operations in Cuba or Syria, the City shall either terminate the Agreement after it has given the Contractor notice and an opportunity to demonstrate the City's determination of false certification was in error pursuant to Section 287.135(5)(a) of the Florida Statutes, or maintain the Agreement if the conditions of Section 287.135(4) of the Florida Statutes are met.

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.

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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 the 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.

SOLICITATION FOR SUBCONTRACTOR QUOTES

From:
OUR COMPANY NAME:
TELEPHONE NUMBER:
ADDRESS:
FAX NUMBER:
E-MAIL ADDRESS:

To Subcontractor:

Our firm is in the process of preparing a bid for a **City of Tampa Contract**. Please accept this notice as our request for quotes for the scope of work identified below. Please respond to this request by filling in the information below and returning via e-mail or fax to the address or number provided. Please contact us if you need any assistance in obtaining bonding, lines of credit, insurance, assistance in obtaining necessary equipment, supplies, materials, participation in a City-sponsored mentor-protégé program, or if you have any questions.

Plans and Specs for this project are posted at:
<http://www.tampagov.net/contract-administration/programs/construction-project-bidding>

CONTRACT NO.:
CONTRACT NAME:
CITY'S BID OPENING DATE:
DEADLINE FOR YOUR SUBCONTRACTOR BID OR RESPONSE:
SPECIFIC SCOPE OF WORK:

Please complete and submit with your subcontract bid or response:

YOUR FIRM'S NAME:
MAILING ADDRESS:
CITY:
STATE:
ZIP:
FAX NUMBER:
E-MAIL ADDRESS:

Yes, my company is interested in quoting this project for the following items of work:

No, my company will not quote this project for the following reason(s):

(Sample Suggested Sub Solicitation 3-9-9 Tampa MBDO)

PROPOSAL

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

Legal Name of Bidder: _____

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

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

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

Bidder Mailing Address: _____

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

Bidder's License No.: _____ Bidder's FDOS (SUNBIZ) Doc. No.: _____

(See Ch. 489, FS; use entity's, individual's only if applicable)

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

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

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

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

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

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

Contract Item No.	Estimated Quantity	Description and Price in Words	Computed Total Price for Item in Figures
BASE BID	LS	The work includes the furnishing of all labor, equipment, and material for selective demolition, cutting and patching, termite control, concrete slab repair, building insulation, architectural finishes, repair of existing 1 hour fire rated partition, equipment purchase and installation, laboratory casework, related mechanical, electrical, and plumbing work, any allowances that may be listed in Section 01020, and with all associated work required for a complete project in accordance with the Contract Documents.	

		_____ dollars	
		and _____ cents	
	(BASE BID)	LS	\$ _____

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

Computed Total Price in Figures: \$ _____

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

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

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

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

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

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

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

STATE OF _____
 COUNTY OF _____

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

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

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



Good Faith Effort Compliance Plan Guidelines

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

Contract Name _____ Bid Date _____

Bidder/Proposer _____

Signature _____ Date _____

Name _____ Title _____

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

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

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

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

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

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



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

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



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

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

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

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

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

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

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

Failure to Complete, Sign and Submit
this form with your Bid or Proposal
Shall render the Bid Non-Responsive

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

Signed: _____ Name/Title: _____ Date: _____

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



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

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

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

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

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

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



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

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

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

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

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

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

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

No Firms are listed to be utilized because: _____

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

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

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

Failure to Complete, Sign and Submit
this form with your Bid or Proposal
Shall render the Bid N -

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

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

Signed: _____ Name/Title: _____ Date: _____

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



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

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

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

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

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

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

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

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

TAMPA BID BOND
Contract 17-C-00047; David L. Tippin Water Treatment Facility Research Lab Renovation

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 17-C-00047, David L. Tippin Water Treatment Facility Research Lab Renovation.

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 17-C-00047 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 17-C-00047; David L. Tippin Water Treatment Facility Research Lab Renovation, shall include, but not be limited to, selective demolition, cutting and patching, termite control, concrete slab repair, building insulation, architectural finishes, repair of existing 1 hour fire rated partition, equipment purchase and installation, laboratory casework, related mechanical, electrical, and plumbing work, 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 interms of work still to be performed, however, the Contractor shall promptly perform them and then request a reinspection. If, upon such inspection, the Engineer determines that the work is complete, the date of final completion shall be deemed to be the last day of such reinspection.

**SECTION 5
SUBCONTRACTS AND ASSIGNMENTS**

ARTICLE 5.01 LIMITATIONS AND CONSENT

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

Before making any subcontract, the Contractor must submit a

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

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

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

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

ARTICLE 5.02 RESPONSIBILITY

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

**SECTION 6
SECURITY AND GUARANTY**

ARTICLE 6.01 CONTRACT SECURITY

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

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

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

ARTICLE 6.02 CONTRACTORS INSURANCE

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

ARTICLE 6.03 AGAINST CLAIMS AND LIENS

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

ARTICLE 6.04 MAINTENANCE AND GUARANTY

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

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

**SECTION 7
CHANGES**

ARTICLE 7.01 MINOR CHANGES

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

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

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

ARTICLE 7.02 EXTRA WORK

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

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

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

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

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

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

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

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

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

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

ARTICLE 7.03 DISPUTED WORK

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

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

ARTICLE 7.04 OMITTED WORK

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

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

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

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

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

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

SECTION 8 CONTRACTOR'S EMPLOYEES

ARTICLE 8.01 CHARACTER AND COMPETENCY

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

ARTICLE 8.02 SUPERINTENDENCE

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

ARTICLE 8.03 EMPLOYMENT OPPORTUNITIES

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

ARTICLE 8.04 RATES OF WAGES

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

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

ARTICLE 8.05 PAYROLL REPORTS

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

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

SECTION 9 CONTRACTOR'S DEFAULT

ARTICLE 9.01 CITY'S RIGHT AND NOTICE

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

ARTICLE 9.02 CONTRACTOR'S DUTY UPON DEFAULT

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

ARTICLE 9.03 COMPLETION OF DEFAULTED WORK

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

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

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

ARTICLE 9.04 PARTIAL DEFAULT

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

SECTION 10 PAYMENTS

ARTICLE 10.01 PRICES

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

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

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

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

made therefor in the Contract Documents.

ARTICLE 10.02 SUBMISSION OF BID BREAKDOWN

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

ARTICLE 10.03 REPORTS, RECORDS AND DATA

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

ARTICLE 10.04 PAYMENTS BY CONTRACTOR

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

ARTICLE 10.05 PARTIAL PAYMENTS

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

FOR CONTRACT AMOUNTS UNDER \$250,000

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

FOR CONTRACT AMOUNTS OVER \$250,000

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

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

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

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

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

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

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

ARTICLE 10.06 FINAL PAYMENT

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

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

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

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

ARTICLE 10.07 ACCEPTANCE OF FINAL PAYMENT

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

SECTION 11 MISCELLANEOUS PROVISIONS

ARTICLE 11.01 CONTRACTOR'S WARRANTIES

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

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

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

ARTICLE 11.02 PATENTED DEVICES, MATERIAL AND PROCESSES

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

ARTICLE 11.03 SUITS AT LAW

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

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

ARTICLE 11.04 CLAIMS FOR DAMAGES

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

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

ARTICLE 11.05 NO CLAIMS AGAINST INDIVIDUALS

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

ARTICLE 11.06 LIABILITY UNAFFECTED

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

ARTICLE 11.07 INDEMNIFICATION PROVISIONS

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

ARTICLE 11.08 UNLAWFUL PROVISIONS DEEMED STRICKEN

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

ARTICLE 11.09 LEGAL PROVISIONS DEEMED INCLUDED

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

ARTICLE 11.10 DEATH OR INCOMPETENCY OF CONTRACTOR

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

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

ARTICLE 11.11 NUMBER AND GENDER OF WORDS

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

ARTICLE 11.12 ACCESS TO RECORDS

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

**SECTION 12
LABOR STANDARDS**

ARTICLE 12.01 LABOR STANDARDS

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

ARTICLE 12.02 NOTICE TO LABOR UNIONS

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

ARTICLE 12.03 SAFETY AND HEALTH REGULATIONS

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

ARTICLE 12.04 EEO AFFIRMATIVE ACTION REQUIREMENTS

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

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

ARTICLE 12.05 PREVAILING RATES OF WAGES

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

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

* * * * *

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

CITY OF TAMPA, FLORIDA

Bob Buckhorn, Mayor
(SEAL)

ATTEST:

City Clerk

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

Rachel S. Peterkin, Assistant City Attorney

Contractor

By: _____
(SEAL)

Title:

ATTEST:

Witness

TAMPA AGREEMENT (ACKNOWLEDGMENT OF PRINCIPAL)

STATE OF _____)
) SS:
COUNTY OF _____)

For a Corporation:

STATE OF _____
COUNTY OF _____

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

Notary

My Commission Expires:

For an Individual:

STATE OF _____
COUNTY OF _____

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

Notary

My Commission Expires:

For a Firm:

STATE OF _____
COUNTY OF _____

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

Notary

My Commission Expires:

PUBLIC CONSTRUCTION BOND

Bond No. (enter bond number) _____

Name of Contractor: _____

Principal Business Address of Contractor: _____

Telephone Number of Contractor: _____

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

Principal Business Address of Surety: _____

Telephone Number of Surety: _____

Owner is The City of Tampa, Florida

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

_____ Contract Administration Department (280A4N)

Telephone Number of Owner: _____ 813/274-8456

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

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

General Description of Work and Services: _____

KNOW ALL MEN BY THESE PRESENTS That we, _____

(Name of Contractor)

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

(Name of Surety)

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

THE CONDITION OF THIS BOND is that if Principal:

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

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

DATED ON _____, 20__

(Name of Principal)

(Name of Surety)

(Principal Business Address)

(Surety Address)

By _____

By _____
(As Attorney in Fact)*

Title _____

Telephone Number of Surety

Telephone Number of Principal

Approved as to legal sufficiency:

Countersignature:

By _____
Assistant City Attorney

(Name of Local Agency)

(Address of Resident Agent)

By _____

Title _____

Telephone Number of Local Agency

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

SPECIFICATIONS GENERAL PROVISIONS

SECTION 1 SCOPE AND INTENT

G-1.01 DESCRIPTION

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

G-1.02 WORK INCLUDED

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

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

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

G-1.03 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

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

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

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

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

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

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

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

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

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

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

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

SECTION 2 PLANS AND SPECIFICATIONS

G-2.01 PLANS

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

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

G-2.02 COPIES FURNISHED TO CONTRACTOR

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

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

G-2.03 SUPPLEMENTARY DRAWINGS

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

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

G-2.04 CONTRACTOR TO CHECK PLANS AND DATA

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

G-2.05 SPECIFICATIONS

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

G-2.06 INTENT

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

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

SECTION 3 WORKING DRAWINGS

G-3.01 SCOPE

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

These drawings shall accurately and distinctly present the following:

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

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

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

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

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

G-3.02 APPROVAL

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

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

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

1. The Contractor shall submit four complete sets of drawings

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

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

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

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

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

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

SECTION 4 MATERIALS AND EQUIPMENT

G-4.01 GENERAL REQUIREMENTS

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

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

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

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

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

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

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

G-4.02 MANUFACTURER

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

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

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

G-4.03 REFERENCE TO STANDARDS

Whenever reference is made to the furnishing of materials or

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

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

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

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

G-4.04 SAMPLES

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

G-4.05 EQUIVALENT QUALITY

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

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

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

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

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

G-4.06 DELIVERY

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

G-4.07 CARE AND PROTECTION

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

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

G-4.08 TOOLS AND ACCESSORIES

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

Spare parts shall be furnished as specified.

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

G-4.09 INSTALLATION OF EQUIPMENT

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

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

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

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

G-4.10 OPERATING INSTRUCTIONS

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

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

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

G-4.11 SERVICE OF MANUFACTURER'S ENGINEER

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

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

SECTION 5 INSPECTION AND TESTING

G-5.01 GENERAL

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

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

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

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

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

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

G-5.02 COSTS

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

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

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

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

G-5.03 INSPECTIONS OF MATERIALS

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

G-5.04 CERTIFICATE OF MANUFACTURE

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

G-5.05 SHOP TESTS OF OPERATING EQUIPMENT

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

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

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

G-5.06 PRELIMINARY FIELD TESTS

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

TEMPORARY STRUCTURES

G-5.07 FINAL FIELD TESTS

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

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

G-5.08 FAILURE OF TESTS

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

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

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

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

G-5.09 FINAL INSPECTION

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

SECTION 6

G-6.01 GENERAL

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

G-6.02 PUBLIC ACCESS

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

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

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

G-6.03 CONTRACTOR'S FIELD OFFICE

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

G-6.04 TEMPORARY FENCE

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

G-6.05 RESPONSIBILITY FOR TEMPORARY STRUCTURES

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

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

SECTION 7 TEMPORARY SERVICES

G-7.01 WATER

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

G-7.02 LIGHT AND POWER

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

G-7.03 SANITARY REGULATIONS

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

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

G-7.04 ACCIDENT PREVENTION

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

G-7.05 FIRST AID

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

G-7.06 HEATING

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

SECTION 8

LINES AND GRADES

G-8.01 GENERAL

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

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

G-8.02 SURVEYS

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

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

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

G-8.03 SAFEGUARDING MARKS

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

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

G-8.04 DATUM PLANE

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

Corps of Engineers.

SECTION 9 ADJACENT STRUCTURES AND LANDSCAPING

G-9.01 RESPONSIBILITY

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

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

G-9.02 PROTECTION OF TREES

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

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

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

G-9.03 LAWN AREAS

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

manner described in the Technical Specifications section.

G-9.04 RESTORATION OF FENCES

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

SECTION 10 PROTECTION OF WORK AND PUBLIC

G-10.01 TRAFFIC REGULATIONS

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

G-10.02 BARRIERS AND LIGHTS

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

No open fires will be permitted.

G-10.03 SMOKE PREVENTIONS

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

G-10.04 NOISE

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

Except in the event of an emergency, no work shall be done between the hours of 7:00 p.m. and 7:00 a.m., or on Sundays.

If the proper and efficient prosecution of the work requires operations during the night, the written permission of the Engineer shall be obtained before starting such items of the work.

**SECTION 13
CLEANING**

G-10.05 ACCESS TO PUBLIC SERVICES

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

G-10.06 DUST PREVENTION

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

G-10.07 PRIVATE PROPERTY

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

**SECTION 11
SLEEVES AND INSERTS**

G-11.01 COORDINATION

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

G-11.02 OPENINGS TO BE PROVIDED

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

**SECTION 12
CUTTING AND PATCHING**

G-12.01 GENERAL

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

G-13.01 DURING CONSTRUCTION

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

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

G-13.02 FINAL CLEANING

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

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

**SECTION 14
MISCELLANEOUS**

G-14.01 PROTECTION AGAINST SILTATION AND BANK EROSION

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

G-14.02 EXISTING FACILITIES

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

G-14.03 USE OF CHEMICALS

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

SPECIFIC PROVISIONS

SP-1 Scope and Contractor Qualifications

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

Furnishing all labor, materials, equipment, services and incidentals for the installation of termite control, concrete slab repair, new building insulation, new architectural finishes, existing 1hour rated partition repair, new equipment, new laboratory (lab) casework, new mechanical systems (including gas), new electrical systems along with associated piping, and ancillary equipment.

The CONTRACTOR must be able to demonstrate the ability and experience to construct, install, and operate the work specifically described in these Specifications and as shown on the Plans, all as required for a complete functional installation, and as described and directed by the ENGINEER, in accordance with the obvious or expressed intent of the Contract.

This work also includes selective demolition, cutting and patching, general cleanup, start-up and testing of all installed equipment to ensure satisfactory operation and all other work required by the Contract Documents necessary to make the renovations complete and functional.

SP-2 Permits and Authorizations

The CONTRACTOR shall have in his possession the proper license to perform the work before submittal of his bid. The CONTRACTOR shall obtain any required City building permits and shall obtain and pay for all other permits, licenses and authorizations required for the execution 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 CONTRACTOR is responsible for complying with all licenses, regulations, ordinances, conditions, and permits of the various authorities having jurisdiction over the work.

City building permit fees will be paid by the CITY.

The CONTRACTOR 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 all required inspections and tests for all phases of work to obtain final approval thereof.

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

SP-3 Environmental Protection

The CONTRACTOR will be held liable for the violation of any and all environmental regulations. Violation citations carry civil penalties and in the event of willful violation, criminal penalties. The fact that the permits are issued to the CITY does not relieve the CONTRACTOR in any way of his environmental obligations and responsibilities. Refer also to Tampa Agreement Article 3.09.

SP-4 Construction Start

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

SP-5 Coordination and Cooperation

In performing work under this Contract, the CONTRACTOR shall coordinate 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.

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

1. Prior to the start of on-site activities, CONTRACTOR must submit a list of employees to the CITY that the CONTRACTOR expects to assign to the project. Each individual on the list will undergo a background check in order to obtain a security clearance from the Tampa Police Department.
2. The above requirement extends to all employees of the Prime CONTRACTOR and all of the CONTRACTOR'S Sub-contractors.
3. The CONTRACTOR shall have a period of five business days following the Notice to Proceed to provide the employee list(s) to the CITY. The list(s) shall include: Employee Name, photo identification, driver license number, race, sex, and date of birth.
4. The CITY will notify the CONTRACTOR when the background checks are complete. The CITY reserves the right to reject any employee on the submitted list(s) (Prime and Subs) and may request that the CONTRACTOR submit additional names, if necessary.
5. During the course of the Work, the CITY will require the CONTRACTOR to submit additional names of employees, as needed, who were not on the original background checklist and who are later proposed to work on the project.
6. Prior to on-site activity, all CONTRACTOR and sub-contractor employees who have been cleared to work on the project will be issued identification badges by the Water Department's Security Supervisor. These badges must be worn and visible at the job site and must be returned to the CITY upon request. All distributed badges are to be returned to the CITY at the completion of the project.

7. The CITY will not approve any request to increase the contract period resulting from the CONTRACTOR'S failure to take into account the review time required to conduct subsequent background checks.

SP-6 Discrepancy between drawing and specs

See General Provision G-2.04.

SP-7 Material and Equipment Approval

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

SP-8 Working Hours

Normal working hours for this project will be from 7:00am to 3:30pm, Monday through Friday. If certain phases of the project require work outside of the normal hours, a minimum of 7-days notice must be provided to allow scheduling of CITY inspectors.

SP-9 Contractor's Field Office

Not Applicable

SP-10 Salvage

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

SP-11 Sequence of Operations

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

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

SP-12 Cleaning and 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. Refer also to General Provisions Section 13.

SP-13 Surface Restoration

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

SP-14 Work Adjacent to Utilities

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

SP-15 Water and Electric Services

The CITY will provide potable water service from existing connection or fixtures in the room. The quantity of water available is limited to that which might flow from a hose connection. Any other water required by the CONTRACTOR for the Work shall be the responsibility of the CONTRACTOR and shall be supplied from his own source of supply (tanker trucks or the like). Construction and removal of piping from existing connections and/or use of a separate construction water service shall be the responsibility of the CONTRACTOR, and such cost shall be included in the Lump Sum Price and no separate payment will be made therefore. This provision supersedes General Provisions Section G-7.01 and Supplementary General Provisions Section 2.6 pertaining to General Provisions Section G-7.01.

The CONTRACTOR may utilize power that is available at existing 120V electrical outlets located in the vicinity of the Work. Additional power, if necessary, will be the responsibility of the CONTRACTOR.

SP-16 Protection of Trees and Shrubs

Not applicable

SP-17 Facility Operations During Construction

CONTRACTOR shall perform all work in recognition of and coordination with on-going lab operation activities and adhere to approved sequence/layout plan and project schedule. The following shall apply:

1. CONTRACTOR shall perform work in a manner to minimize noise, vibration, dust and debris. CONTRACTOR shall coordinate with the CITY'S lab and maintenance supervisors in advance of operations producing excessive noise and/or vibration and the use of non-designated areas in order to avoid disruption or interference with lab operations.
2. Staging and storage of material areas shall be as designated, unless adjustments requested by the CONTRACTOR are pre-approved by the CITY.

3. Deliveries or other use of non-designated areas at the lab shall be coordinated in advance with the CITY. The CONTRACTOR shall notify the designated CITY representative whenever deliveries are expected (Name of supplier, item(s) being delivered) in keeping with security measures in place at the water treatment facility (refer to SP-22).
4. Company vehicles will be allowed on the premises provided they are properly marked.
5. Individual workers will be required to park their personal cars outside the plant's fencing and walk to the Security Guard House. For their first entry, they will be required to present a photo I.D. They will then be issued a badge. At the end of the work day the workers will turn in their badge at the Guard House; the guard at the security gate will re-issue the badge when they come to work the next day. This procedure will be followed every day.
6. CONTRACTOR shall not be allowed to use any facility in the lab. CONTRACTOR is responsible for providing adequate onsite sanitary facilities for his personnel (see General Provision G-7.03). Location of such facilities shall be coordinated with CITY personnel.
7. Provide and install barricades, signage, etc. as needed to designate work areas, as well as protection for persons and existing materials to remain in, and adjacent to, work areas. Maintain protections as needed throughout the course of the Work.
8. Following each and every work day, leave site in clean and orderly fashion with site protections in place.
9. The CONTRACTOR shall have a supervisor on-site with Contract related personnel at all times. Failure to adhere to approved sequencing/layout plan and/or failure to have supervisory personnel present and/or failure to maintain appropriate site conditions will be cause for work stoppage without additional Contract time.

SP-18 Testing

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

SP-19 Monthly Schedules

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

1. Procurement status
2. Selective Demolition with Cutting and Patching

3. Installation of Termite Control
4. Concrete Slab Repair
5. Installation of Building Insulation
6. Installation of Architectural Finishes
7. Repair of Existing 1 Hour Fire Rated Partition
8. Install of Laboratory Case work
9. Purchase and Install Equipment
10. Installation of HVAC and plumbing Items
11. Installation of Electrical Systems and Electrical Items
12. Equipment Testing and Acceptance
13. Final Restoration

SP-20 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. Refer also to Supplementary General Provisions Section G-14.08.

SP-21 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 the equipment and for providing training to CITY personnel in the operation and maintenance of such equipment.

Such manufacturers' services shall be of sufficient time and shall meet the requirements of the contract. Additional time shall be provided if necessary.

The cost of all services of manufacturers' representatives shall be included in the total Lump Sum Price, and no separate payment will be made therefore. Refer also to General Provisions Section G-4.11.

SP-22 Storage of Materials

The CONTRACTOR may use an area near the Research Lab Building for storage of material and equipment at the specific location identified by the CITY. Payment for use and restoration of storage areas will be included in the lump sum price and no separate payment will be made therefore.

SP-23 Temporary Work Stoppages

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

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

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

SP-24 Substantial Completion

Not Applicable

SP-25 Final Completion

Acceptable final completion is contingent upon adhering to General Provisions Section 5.

SP-26 Project Photographs

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

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

SP-27 Record Drawings

See Special Condition 11.0 RECORD DRAWINGS.

SP-27 Submittals, RFIs and Shop Drawings

See General Provisions Section 3 and Supplementary General Provisions Section 3 pertaining to General Provisions Section 3.

SP-28 Safety

The CONTRACTOR is solely responsible for the safety of its workers, and shall comply with ALL Local, State, Federal Occupation Safety and Health Act Standards (OSHA) requirements pertaining to safety at the site of the Work. All costs associated with safety measures shall be included in the total lump sum contract price, and no separate payment shall be made therefore. Refer also to the Tampa

Agreement Article 3.07.

After the Contract is awarded, the CITY will conduct a plant safety training session with the CONTRACTOR'S designated Supervisor. The training session will cover actions to be taken by the CONTRACTOR in the event of an emergency at the plant. The CONTRACTOR shall provide the names and contact information of the designated Supervisor and other key employees that will be involved in the Work. The Supervisor will be responsible for informing employees about the plant safety procedures.

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

SP-29 Disposal of Debris

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

SP-30 Pavement Restoration

If applicable, restoration shall conform to standard requirements of CITY and as shown on the Plans.

END OF SECTION



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

[] Partial [] Final

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

Contractor Name: _____ Address: _____

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

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

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

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

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

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

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

Signed: _____ Name/Title: _____ Date: _____



Page 2 of 2 – DMI Payment

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

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

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

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

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

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

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

0 1 2 3 4 5 6 7 8

Sign Information

Building a Better Tampa

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

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

Orion Marine Construction, Inc.

Improvement Project

City of Tampa Florida
 Mayor Bob Buckhorn

Project Contact:
 Don Cermeno
 Contract Administration
 City of Tampa
 Don.Cermeno@tampagov.net

For information call:
 (813) 635-3400



Building a Better Tampa

David L. Tippin Water Treatment Facility Caustic Soda Piping Improvements

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

\$TBD investment
 Scheduled for completion in TBD 2014

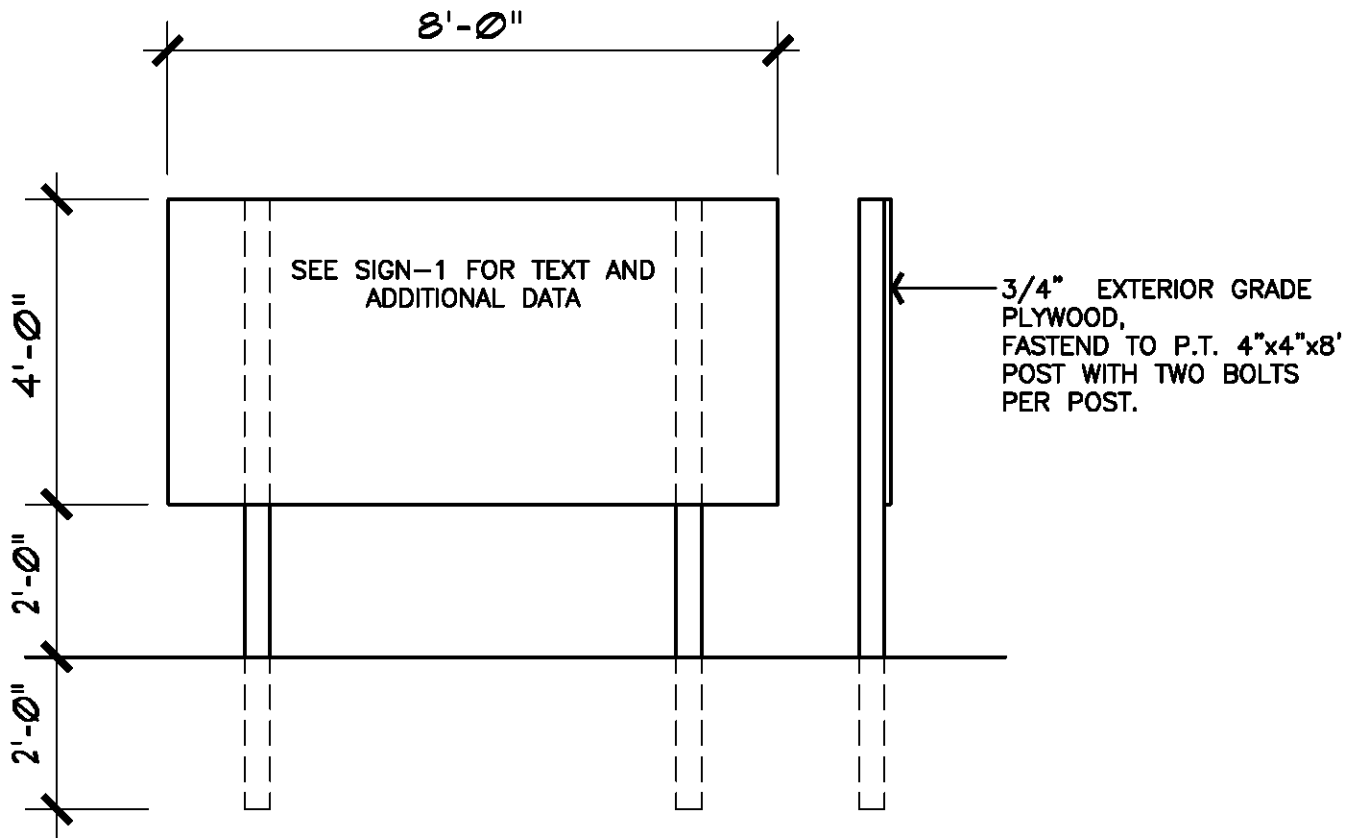
TBD

Colors
 Blue: Sherwin Williams Naval SW6244
 Green: Sherwin Williams Center Stage SW6920
 White: Sherwin Williams Pure White SW7005

SIGN EXAMPLE ONLY GRAPHIC TO BE DEVELOPED BY CONTRACTOR

scale: 3" 3"

Font
 Franklin Gothic



SECTION 23 0000 - MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Work herein shall conform to all applicable laws, ordinances, and to regulations of the local utility companies. The general conditions and all requirements of the contract documents shall apply to all work of this section. Work shall be in accordance with the requirements of:
 - 1. Florida Building Code (FBC) 5th Edition (2014): This code includes The 2014 FBC Building, Mechanical, Plumbing, Fuel Gas and Energy Conservation Volumes. Further, see "Referenced Standards" in the FBC, Building Chapter 35; FBC, Plumbing Chapter 14; FBC, Mechanical Chapter 15; FBC, Fuel Gas Chapter 8, FBC, Energy Conservation Chapter 5.) (Effective June 30, 2015)
 - 2. 5th Edition of the Florida Fire Prevention Code (FFPC): (This code also includes the Florida versions of NFPA 1 and NFPA 101.) (Effective December 31, 2014)
 - 3. 2011 National Electrical Code
- B. Cooperate with all other trades and install work as fast as the progress of the job will permit.
- C. Use only mechanics skilled in the work they are to perform and have a competent representative on the job when any work is being done.
- D. No work shall be done unless the Superintendent of the Contractor is on the job site. Work shall be properly protected, all rubbish removed promptly, and exposed work shall be carefully cleaned prior to final acceptance.
- E. The term "provide" shall include labor, materials, and equipment necessary to furnish and install, complete and operable, the item or system indicated.
- F. In decisions arising from discrepancies, interpretation of Drawings and Specifications, substitutes, and other pertinent matters, the decision of the Owner's representative's approval shall be final.

1.2 SPECIFICATIONS AND DRAWINGS

- A. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval shall not be permitted at the job site. Submittals shall be made for all equipment and systems as indicated in the respective specification section.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification and drawing requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- C. Shop and erection drawing submittals shall conform to the requirements of the General Conditions and Division-1 specifications except as modified herein.
- D. Submit required and/or requested shop and erection drawings, for review by Engineer before ordering or installing any equipment or material. Equipment or material ordered or installed before Engineer review may not be accepted and may have to be removed from the project if deemed unacceptable.
- E. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs, including descriptive literature which shall clearly indicate the construction, material, physical dimensions, wiring diagrams and complete operating data clearly marked for each item. Data of general nature shall not be accepted.
- F. Shop drawings on paper larger than 11"x17" shall be submitted in the form of one set of paper and one set full size PDF files. All drawings are to be submitted no later than 60 days after the contract has been awarded.
 - 1. Coordination drawings shall show major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.
- G. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals shall not be considered for approval. Submittals shall be submitted for all applicable products and materials specified in each individual section of these specifications.
- H. Make submittals for the equipment and materials in accordance with the following:
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_(FILL IN SECTION #)_".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. The submittals shall include the following:

- a. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required. Provide any additional information specifically requested in the individual specification section or on the drawings.
 - b. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 - I. Shop drawings on paper 11"X17" or smaller in size shall be submitted in tabbed and indexed three ring binder. The binder shall not exceed 11-5/8" height. Partial submittals are unacceptable. The index shall indicate the related specification section number.
 - J. If engineering review of drawings received after the time allotted as described in "F" above or for plans that have been rejected two or more times due to non-compliance or incompleteness shall result in a letter written to the owner stating that the contractor is delaying the project and may result in schedule delays.
 - K. The Contractor shall certify that all electrical shop drawings are in conformance with the plans and specifications. Deviations from the plans and specifications shall be noted, and the specific area of the deviation clouded and in contrasting color (green) with a complete explanation for the reasons for the deviation. Any redesign of the system shall be Certified by a Professional Engineer currently registered in the State of Florida, and shall be accompanied by the fees as described in "J" above.
 - L. Carefully examine all shop drawings and mark-up as necessary before submitting to the Engineer for review. The consultant shall only consider shop drawings bearing the contractor's stamp of approval.
 - M. The engineer's review shall not relieve the contractor from the responsibility for deviations from drawings and specifications. The engineer's review shall be construed to apply only to general arrangement and shall not relieve the contractor from the responsibility for the correctness of details and dimensions and provision of the correct equipment.
 - N. The contractor shall retain copies of all reviewed shop drawings on the job site for reference.
 - O. In addition to the requirement of SUBMITTALS, the Owner reserves the right to request the manufacturer to arrange for the Owner's representative(s) to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.
- 1.3 PERMITS, FEES AND INSPECTIONS:
- A. The Contractor shall satisfy the terms of the permits.
 - B. Obtain all required certificates of inspection for work and deliver them to the Owner before requesting acceptance and final payment for the work.
 - C. The Contractor shall include in the work, without extra cost to the Owner, any labor, materials, services, apparatus and drawings required to comply with all applicable laws, ordinances, rules and regulations.
 - D. The Contractor shall inform the Owner of any work or materials which conflict with any of the applicable codes, standards, laws and regulations before submitting his bid.
- 1.4 GENERAL
- A. Materials or products specified herein and/or indicated on drawings by trade name, manufacturer's name and/or catalog number shall be provided as specified. Substitutions shall not be permitted except as described herein and in the Supplementary and General Conditions.
 - B. Since manufacturers reserve the right to change their products at any time, contractors shall verify all dimensions, performance data, etc. for each piece of equipment submitted to assure compliance with the intent of the drawings and specifications.
 - C. All materials shall be new and of quality as specified, and when required, be clearly labeled and/or stamped as manufactured in the United States.
 - D. Where an accepted substitution or deviation requires different quantity or arrangement of foundations, supports, ductwork, piping, wiring, conduit, and any other equipment or accessories normal to this equipment, contractor shall furnish said changes and additions and pay all costs for all changes and additions to his work and the work of others affected by this substitution or deviation.
 - E. Deviations mean the use of any listed approved manufacturer other than those on which the drawings are based.
- 1.5 SHOP AND ERECTION DRAWINGS AND SAMPLES
- A. The Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval shall not be permitted at the job site. Submittals shall be made for all equipment and systems as indicated in the respective specification section.
 - B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Engineer to ascertain that the proposed equipment and materials comply with specification and drawing requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.

- C. Shop and erection drawing submittals shall conform to the requirements of the General Conditions and Division-1 specifications except as modified herein.
 - D. Submit required and/or requested shop and erection drawings, for review by Engineer before ordering or installing any equipment or material. Equipment or material ordered or installed before Engineer review may not be accepted and may have to be removed from the project if deemed unacceptable.
 - E. Shop drawings shall consist of manufacturer's scale drawings, cuts or catalogs, including descriptive literature which shall clearly indicate the construction, material, physical dimensions, wiring diagrams and complete operating data clearly marked for each item. Data of general nature shall not be accepted.
 - F. Shop drawings on paper larger than 11"x17" shall be submitted in the form of one set of paper and one set full size PDF files. All drawings are to be submitted no later than 60 days after the contract has been awarded.
 - 1. Coordination drawings shall show major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for installing, servicing and maintaining equipment, valve stem movement, and similar requirements. Indicate movement and positioning of large equipment into the building during construction.
 - G. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals shall not be considered for approval. Submittals shall be submitted for all applicable products and materials specified in each individual section of these specifications.
 - H. Make submittals for the equipment and materials in accordance with the following:
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION_(FILL IN SECTION #)_".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. The submittals shall include the following:
 - a. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required. Provide any additional information specifically requested in the individual specification section or on the drawings.
 - b. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 - I. Shop drawings on paper 11"x17" or smaller in size shall be submitted in tabbed and indexed three ring binder. The binder shall not exceed 11-5/8" height. Partial submittals are unacceptable. The index shall indicate the related specification section number.
 - J. The Contractor shall certify that all electrical shop drawings are in conformance with the plans and specifications. Deviations from the plans and specifications shall be noted, and the specific area of the deviation clouded and in contrasting highlighter color (green) with a complete explanation for the reasons for the deviation. Any redesign of the system shall be Certified by a Professional Engineer currently registered in the State of Florida.
 - K. Carefully examine all shop drawings and mark-up as necessary before submitting to the Engineer for review. The consultant shall only consider shop drawings bearing the contractor's stamp of approval.
 - L. The engineer's review shall not relieve the contractor from the responsibility for deviations from drawings and specifications. The engineer's review shall be construed to apply only to general arrangement and shall not relieve the contractor from the responsibility for the correctness of details and dimensions and provision of the correct equipment.
 - M. The contractor shall retain copies of all reviewed shop drawings on the job site for reference.
 - N. In addition to the requirement of SUBMITTALS, the Owner reserves the right to request the manufacturer to arrange for the Owner's representative(s) to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.
- 1.6 EXPERIENCE
- A. The Contractor performing this work shall be a licensed, reputable firm, regularly performing the type of work incorporated in this project and who also maintains, as part of the firm, a service department with qualified personnel who regularly perform this type of work. The Contractor shall, upon request, show evidence of at least two jobs of similar character and size installed within the preceding two years.
- 1.7 COORDINATION WITH OTHER TRADES
- A. Contractor shall coordinate his work with other trades to avoid interferences and delays. He shall assist in working out space requirements to make a satisfactory installation.
 - B. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with the work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

- C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.
- 1.8 STORAGE OF MATERIALS
- A. All materials shall be stored on-site shall be coordinated with plant staff. All materials shall be properly protected from injury or deterioration. Materials shall not be stored in contact with ground or floor.
 - B. Do not remove manufacturer's packing materials until ready to install. Materials showing signs of corrosion, improper handling or storage shall be replaced at no cost to the Owner.
 - C. Provide continuous protection for all equipment already installed.
- 1.9 CUTTING, PATCHING, EXCAVATION, BACKFILL, AND LAYOUT
- A. Provide openings and excavation required for the installation of the work. Patch work and backfill as required. Finished work shall match the existing adjoining work.
 - B. Verify all conditions affecting the work to be performed under this contract.
 - C. Carefully verify measurements at the site, determine the exact location of chases and openings required. Provide sleeves, inserts, and hangers as required. No columns, beams, joists, building foundations nor any other structural building component shall be cut, drilled or disturbed in any way. Conflicts shall immediately be brought to the attention of the Engineer.
 - D. All excavation on sites containing existing buildings and existing services, shall be done with hand shovel to avoid damage to existing services. Any damage incurred by the Contractor shall be repaired by the Contractor in a manner approved by the Engineer at no cost to the Owner and with no extension of time limitation.
- 1.10 REMOVAL OF RUBBISH
- A. Contractor shall keep premises free from accumulations of waste material or rubbish caused by his employees or work in accordance with Section 01700 - Construction Procedures. At completion of work, he shall remove all his tools, scaffolding, surplus materials, and rubbish from building and site. He shall leave premises and his work in a clean orderly condition acceptable to the Engineer.
- 1.11 ELECTRICAL WORK FOR MECHANICAL SYSTEMS
- A. Factory installed starters, controllers, and control equipment mounted in manufactured mechanical equipment necessary for mechanical equipment operation shall be furnished under Division 15 Mechanical.
 - B. Power wiring for motors and installation of starters shall be under Division 16 Electrical.
 - C. Temperature, humidity, pressure and similar controls essential to the operation of mechanical systems, and wiring and conduit thereof, including interlock wiring, shall be under Division 15 of Specifications, installed in accordance with requirements of Division 16.
 - D. Motors shall be furnished under Division 15 Mechanical of capacity required to operate equipment specified, but shall not be less than that specified.
 - E. Furnish and install all low voltage (120V and under) temperature control wiring for equipment provided under this division.
 - F. Provide conduit when required for control wiring.
- 1.12 MOTORS
- A. All motors shall be furnished and installed under Division 15 Mechanical and shall be wired under Division 16 Electrical.
 - B. All motors shall be built in accordance with the current applicable IEEE, ASA, and NEMA standards. All general purpose motors shall be open drip-proof machines for installation indoors and/or in protected locations. Totally enclosed fan cooled (TEFC) motors shall be used in all areas of exposure to weather or other environmental contamination. Motors shall be rated explosion proof when located in hazardous atmospheres. Type II weather protected motors may be used in lieu of TEFC motors on roof mounted fan units and similar equipment.
 - C. Unless indicated otherwise, motors shall be NEMA Design B with a service factor of 1.15 with total temperature rise of 90 degrees C. (resistance measured) in 40 degrees C. ambient when powered from the system voltage feeding the motor. TEFC motors shall have a service factor of 1.00 with total temperature rise of 80 degrees C. in the above conditions. Motors located in areas exceeding 40 degrees C. ambient shall be factory rated for the ambient temperature of the motor environment. Single phase motors shall generally be NEMA Design N split phase induction motors with built-in thermal protectors. Single phase motors connected on loads requiring high starting torque shall be capacitor-start induction motors. Single phase motors of 1/10 HP or less may be shaded pole induction motors.
 - D. If the Contractor proposes to furnish motors varying in horsepower and/or characteristics from those specified, he shall first inform the Engineer of the change and shall then coordinate the change and shall pay all additional charges in connection with the change.
 - E. All motors supplied on this project three (3) HP and larger shall have a power factor not less than 85 percent under rated load conditions. Power factor of less than 85 percent shall be corrected to at least 90 percent

under rated load conditions. Power factor corrective devices, installed to comply with this Code, shall be switched with the utilization equipment.

- F. All motors supplied on this project shall be energy efficient. All efficiency testing and labeling shall be performed in accordance with the NEMA Standard MG 1-12.54 and IEEE 112 Test Standard, Method B. Minimum efficiencies shall conform to the following listing:

Motor HP	Efficiency (%)
3/4	80.0
1	82.5
1-1/2	84.0
2	85.5
3	87.5
5	87.5
7-1/2	89.5
10	89.5
15	91.0
20	91.7

1.13 QUIET OPERATION AND VIBRATION

- A. All equipment provided under this section shall operate under all conditions of load free of objectionable sound and vibration. Sound and vibration conditions considered objectionable shall be corrected in an approved manner.
- B. Vibration and sound control shall be by means of approved vibration eliminators or sound attenuators in a manner as specified and as recommended by the manufacturer.

1.14 EQUIPMENT IDENTIFICATION

- A. Each unit shall be identified by its system number and other appropriate designation by stenciling in letters of approved size and wording. Equipment requiring identification shall include: supply and exhaust fans, air conditioning and heating machinery and apparatus, pumps, piping, control cabinets, and other equipment units as may be directed by the Engineer.

1.15 CLEANING AND ADJUSTMENTS

- A. Upon completion of the work, Contractor shall clean and lubricate fans, motors, and other running equipment and apparatus which he has installed and make certain such apparatus and mechanisms are in proper working order and ready to test.
- B. Scratched or damaged painting shall be touched up as necessary to return the painting to "new" condition and appearance.
- C. All piping and equipment shall be thoroughly blown out under pressure and cleared of all foreign matter, wasting air, gas or water through temporary connections as long as necessary to thoroughly clean system before system is placed in operation. Use every precaution to prevent pipe compound, scale, dirt, welding and other objectionable matter from getting into the piping system and equipment.
- D. During blow out period, baskets from strainers shall be removed, traps and control valves, etc., shall be by-passed.
- E. All cleaning shall be done prior to any sterilization, pressure testing, flow balancing or equipment adjustment procedures.
- F. During construction protect all piping and equipment from damage and dirt. Cap the open ends of all piping and equipment.

1.16 WATERPROOFING

- A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Owner before the work is done.
- B. Provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight. Waterproof flashing materials shall be compatible with base materials.

1.17 TESTS

- A. Contractor shall make all tests required to establish the adequacy, quality, safety, completed status and satisfactory operation of all systems to the satisfaction of the Engineer. Provide all instruments, labor and services necessary to conduct tests.

1.18 INSTRUCTIONS

- A. Fully instruct Owner's personnel in the care and operation of mechanical systems and furnish a letter to the Engineer advising the particular person who has received such instruction.

1.19 GUARANTEE

- A. Equipment shall be started, tested, adjusted, and placed in satisfactory operating condition. Furnish a letter addressed to the Engineer advising that the completed systems have been installed in accordance with the Plans and Specifications and that they are in proper operating condition. The Owner shall receive a written guarantee covering all defects in workmanship and material for a period of one year from date of final acceptance. Any defects appearing within this year period shall be repaired without additional cost to the Owner.

1.20 ACCEPTANCE

- A. Before requesting final inspection:
 - 1. Complete all work required. If any items are held in abeyance as incomplete for final inspection, list such items together with explanation for delay.
 - 2. Submit statement that equipment is properly installed, adjusted, fully lubricated and operation is satisfactory.
 - 3. Certify in writing to the Engineer that the Owner's representative has been instructed as to the care and operation of the system and that catalog service and maintenance information has been turned over to the Engineer.
 - 4. Submit copy of written guarantee.
 - 5. Submit copy of other data as may be outlined in these specifications.
- B. Copies of the above data shall be submitted to the Engineer prior to requesting final inspection.

1.21 facility startup BROCHURE

- A. At the completion of work, Contractor shall provide startup instruction in accordance with Section 01700 and shall submit a bound brochure containing the following:
 - 1. Shop Drawings
 - 2. Maintenance Manuals
 - 3. Control Wiring and Piping Diagrams
 - 4. Operating Instructions
 - 5. Copy of Guarantee
 - 6. Certificate of Instruction of Owner's Representative
 - 7. Certificate of Job Completion
 - 8. Record Documents
- B. Where projects are of sufficient size to make a single brochure impractical, several brochures shall be prepared by trade and As-Built Drawings may be submitted as a separate item.
- C. Brochure shall be indexed and divided for reasonable clarity.
- D. Brochure shall be turned over to the Engineer for review and approval. The contractor shall make modifications to the brochure as deemed necessary for compliance and clarity, by the Engineer, and re-submit the final brochure to the Engineer to be forwarded to the Owner.

END OF SECTION 23 0000

SECTION 23 0113 - LOW PRESSURE DUCTWORK

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
 - A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 DESCRIPTION OF WORK:
 - A. Extent of low pressure ductwork is indicated on drawings and in schedules, and by requirements of this section. Low pressure ductwork is hereby defined as ductwork subjected to velocities of 2500 fpm or less, and operating pressure of 2" w.g. or less, positive or negative.
 - B. Types of low pressure ductwork required for project include the following:
 - 1. Heating supply and return air systems.
 - 2. Air-conditioning supply and return air systems.
 - 3. Fresh air supply systems.
 - 4. Mechanical exhaust systems.
 - 5. Air relief systems.
 - C. Refer to Division-15 insulation sections for external insulation required in conjunction with low pressure ductwork; not work of this section.
- 1.3 QUALITY ASSURANCE:
 - A. SMACNA Standards: Comply with SMACNA "HVAC Duct Construction Standards – Metal and Flexible, 1995" for fabrication and installation of low pressure ductwork.
 - B. NFPA Compliance: Comply with ANSI/NFPA 90A "Standard for the Installation of Air-Conditioning and Ventilating Systems".
- 1.4 SUBMITTALS:
 - A. Product Data: Submit manufacturer's specifications on manufactured products and factory-fabricated ductwork, used for work of this section.
 - B. Shop Drawings: Submit dimensioned layouts of ductwork, showing both the accurately scaled ductwork and its relation to space enclosure. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.
 - C. Record Drawings: At project closeout, submit record drawings of installed ductwork, duct accessories, and outlets and inlets; in accordance with requirements of Division 1.
- 1.5 DELIVERY, STORAGE, AND HANDLING:
 - A. Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings.
 - B. Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

- 2.1 DUCTWORK MATERIALS:
 - A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, oil canning, stains and discolorations, and other imperfections, including those which would impair painting.
 - B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ANSI/ASTM A 527, lockforming quality, with ANSI/ASTM A 525, G90 zinc coating; mill phosphatized for exposed locations.
 - C. Stainless Steel Sheet: Fume hood exhaust ductwork and as otherwise indicated, fabricate ductwork from stainless steel complying with ANSI/ASTM A 167; AISI type 304 with No. 4 directional polish where exposed to view in occupied spaces. Provide welded seams. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.
- 2.2 MISCELLANEOUS DUCTWORK MATERIALS:
 - A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

- B. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant (type applicable for fabrication/installation detail) as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.
- C. Duct Cement: Non-hardening migrating mastic or liquid neoprene based cement (type applicable for fabrication/installation detail) as compounded and recommended by manufacturer specifically for cementing fitting components, or longitudinal seams in ductwork.
- D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
- E. Except where space is indicated as "High Humidity" area, interior support materials of not less than 1/4" diameter or 3/16" thickness may be plain (not galvanized).

2.3 FABRICATION:

- A. Shop fabricate ductwork in 4, 8, 10 or 12-foot lengths, unless otherwise indicated or required to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for re-assembly and coordinated installation.
- B. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "Low Pressure Duct Standards - 5th Edition".
- C. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.
- D. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Duct Accessories" for accessory requirements.
- E. Fabricate ductwork with perforated steel duct liner in each section of duct where indicated. Provide a continuous polyethylene liner on the acoustical liner to isolate the liner material from the airstream. Provide a perforated steel inner liner for strength and sound absorption.

2.4 FACTORY-FABRICATED DUCTWORK:

- A. General: At installer's option, provide factory-fabricated duct and fittings, in lieu of shop-fabricated duct and fittings.
- B. Material: Galvanized sheet steel complying with ANSI/ASTM A 527, lockforming quality, with ANSI/ASTM A 525, G90 zinc coating, mill phosphatized.
- C. Gage: 28 ga. minimum for round and oval ducts and fittings, 4" through 24" diameter.
- D. Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint.
- E. Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.
- F. Manufacturer: Subject to compliance with requirements, provide factory-fabricated ductwork of one of the following:
 - 1. Lindab
 - 2. United Sheet Metal Div., United McGill Corp.

PART 3 - EXECUTION

3.1 INSTALLATION OF DUCTWORK:

- A. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight (5% leakage) and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling.
- B. Seal ductwork, after installation, to seal class recommended, and method prescribed in SMACNA "HVAC Duct Construction Standards - 1995 - 2nd Edition".
- C. Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.
- D. Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent-enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not

encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

- E. Electrical Equipment Spaces: Do not run ductwork through transformer vaults and their electrical equipment spaces and enclosures.
 - F. Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct-plus insulation with sheet metal flanges of same gage as duct. Overlap opening on 4 sides by at least 1-1/2".
 - G. Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
 - H. Support ductwork in manner complying with SMACNA "Low Pressure Duct Standards - 5th Edition" hangers and supports section.
- 3.2 CLEANING AND PROTECTION:
- A. Clean ductwork internally, unit-by-unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.
 - B. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.
 - C. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.
- 3.3 BALANCING:
- A. Refer to Division-15 section "Testing, Adjusting, and Balancing" for air distribution balancing of low pressure ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION 23 0113

SECTION 23 0523 - VALVES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification sections, apply to work of this section.
 - B. This section is a Division 15 Basic Mechanical Materials and Methods section, and is part of each Division 15 section making reference to valves specified herein.
- 1.2 DESCRIPTION OF WORK:
- A. Extent of valves required by this section is indicated on drawings and/or specified in other Division 15 sections.
 - B. Types of valves specified in this section include the following:
 1. Gate Valves.
 2. Drain Valves.
 3. Ball Valves.
 4. Butterfly Valves.
 - C. Valves furnished as part of factory-fabricated equipment, are specified as part of equipment in other Division 15 sections.
- 1.3 QUALITY ASSURANCE:
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of valves, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
 - B. Valve Types: Provide valves of same type by same manufacturer.
 - C. Valve Identification: Provide valves with manufacturer's name (or trademark) and pressure rating clearly marked on valve body.
 - D. Codes and Standards:
 - E. MSS Compliance: Mark valves in accordance with MSS-25 "Standard Marking System for Valves, Fittings, Flanges and Unions".
 - F. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged- or welded-end valve bodies, comply with ANSI B16.10 "Face-to-Face and End-to-End Dimensions of Ferrous Valves".
- 1.4 SUBMITTALS:
- A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing manufacturer's figure number, size, location, and valve features for each required valve.
 - B. Shop Drawings: Submit manufacturer's assembly-type (exploded view) shop drawings for each type of valve, indicating dimensions, weights, materials, and methods of assembly of components.

PART 2 - PRODUCTS

- 2.1 VALVES:
- A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide end connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
 - B. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
 - C. Operators: Provide handwheels, fastened to valve stem, for valves other than quarter-turn. Provide lever handle for quarter-turn valves, 6" and smaller.
- 2.2 GATE VALVES:
- A. Comply with the following standards:
 1. Cast-Iron Valves: MSS SP-70.
 2. Bronze Valves: MSS SP-80.
 3. Steel Valves: ANSI B16.34.
 - B. Manufacturer: Subject to compliance with requirements, provide gate valves of one of the following:
 1. Crane Co.
 2. Fairbanks Co.
 3. Hammond Valve Corp.
 4. ITT Grinnell Valve Co., Inc.
 5. Jenkins Bros.
 6. Lunkenheimer Co.
 7. Milwaukee Valve Co., Inc.
 8. Nibco, Inc.
 9. Powell (Wm) Co.
 10. Stockham Valves and Fittings.

11. Walworth Co.

2.3 DRAIN VALVES:

- A. Comply with the following standards:
 - 1. Water Heater Drain Valves: ASSE 1005.
- B. Manufacturer: Subject to compliance with requirements, provide globe valves of one of the following:
 - 1. Hammond Valve Corp.
 - 2. Lee Brothers; Div. Phelps Dodge Brass Co.
 - 3. Mansfield Plumbing Products.
 - 4. Nibco Inc.
 - 5. Prier Brass Mfg. Co.
 - 6. Tanner Mfg. Co.

2.4 BALL VALVES:

- A. Comply with the following standards:
 - 1. Cast-Iron Valves: MSS SP-72.
 - 2. Steel Valves: ANSI B16.34.
- B. Manufacturer: Subject to compliance with requirements, provide ball valves of one of the following:
 - 1. Conbraco Industries, Inc.
 - 2. Crane Co.
 - 3. Fairbanks Co.
 - 4. Hammond Valve Corp.
 - 5. ITT Grinnell Valve Co., Inc.
 - 6. Jamesbury Corp.
 - 7. Jenkins Bros.
 - 8. Metraflex Co.
 - 9. Nibco, Inc.
 - 10. Powell (The Wm.) Co.
 - 11. Stockham Valves and Fittings, Inc.
 - 12. Walworth Co.
 - 13. Watts Regulator Co.

2.5 BUTTERFLY VALVES:

- A. General: Comply with MSS SP-67. Provide lug-body type valves for all applications.
- B. Manufacturer: Subject to compliance with requirements, provide butterfly valves of one of the following:
 - 1. Center Line; Mark Controls Corp.
 - 2. Crane Co.
 - 3. Demco; Div. Cooper Industries, Inc.
 - 4. Fairbanks Co.
 - 5. ITT Grinnell Valve Co., Inc.
 - 6. Jamesbury Corp.
 - 7. Jenkins Bros.
 - 8. Keystone Valve USA.
 - 9. Nibco, Inc.
 - 10. Powell (The Wm.) Co.
 - 11. Stockham Valves and Fittings.

2.6 VALVE FEATURES:

- A. General: Provide valves with features indicated and, where not indicated otherwise, provide proper valve features as determined by Installer for installation requirements. Comply with ASME B31.9 for building services piping, and ASME B31.1 for power piping.
- B. Flanged: Valve flanges complying with ANSI B16.1 (cast iron), ANSI B16.5, (steel), or ANSI B16.24 (bronze).
- C. Threaded: Valve ends complying with ANSI B2.1.
- D. Socket-Welding: Valve ends complying with ANSI B16.11.
- E. Solder-Joint: Valve ends comply with ANSI B16.18.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Except as otherwise indicated, comply with the following requirements:
 - 1. Install valve where required for proper operation of piping and equipment, including valves in branch lines where necessary to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary.

2. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane unless unavoidable. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.
- C. Mechanical Actuators: Install mechanical actuators with chain operators where indicated. Extend chains to about 5' above floor and hook to clips to clear aisle passage.
- D. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
 1. Tube Size 2" and Smaller: Soldered-joint valves.
 2. Pipe Size 2" and Smaller: One of the following, at Installer's option:
 - a. Threaded valves.
 - b. Butt-welding valves
 - c. Socket-welding valves.
 - d. Flanged valves.
 3. Pipe Size 2 1/2" and Larger: One of the following, at Installer's option.
 - a. Grooved-end valves.
 - b. Butt-welding valves.
 - c. Socket-welding valves.
 - d. Flanged valves.
- E. Valve System: Select and install valves with outside screw and yoke stems, except provide inside screw non-rising stem valves where headroom prevents full opening of OS&Y valves.
- F. Non-Metallic Disc: Limit selection and installation of valves with non-metallic discs to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.
- G. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.
- H. Fluid Control: Except as otherwise indicated, install gate, ball, and butterfly valves to comply with ANSI B31.9. Where throttling is indicated or recognized as principal reason for valve, install butterfly valves, unless indicated otherwise on the plans.

3.2 ADJUSTING AND CLEANING:

- A. Valve Adjustment: After piping systems have been tested and put into service, but before final testing, adjusting, and balancing, inspect each valve for possible leaks. Adjust or replace packing to stop leaks, replace valve if leak persists.
- B. Valve Identification: Tag each valve in accordance with Division 15 section "Mechanical Identification".
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.3 VALVE SCHEDULE:

- A. General: Provide the following valves for various valve types listed in Division 15 piping sections.

3.4 GATE VALVES:

- A. 2" and Smaller: Class 125, bronze, screw-in bonnet, rising stem, solid wedge.

	Threaded Ends	Solder Ends
Crane:	428	1334
Fairbanks:	0252	0282
Grinnell:	3010	3010-SJ
Hammond:	IB640	IB635
Jenkins:	47	1242
Lunkenheimer:	2127	2132
Milwaukee:	148	1149
Nibco:	T-111	S-111
Powell:	500-S	1821-S
Stockham:	B-100	B-108
Walworth:	55	55-SJ

- B. 2" and Smaller: Class 125, bronze, screw-in bonnet, non-rising stem, solid wedge.

	Threaded Ends	Solder Ends
Crane:	438	1324
Fairbanks:	0250	0280
Grinnell:	3000	3000-SJ
Hammond:	IB645	IB647
Jenkins:	370	1240
Lunkenheimer:	2129	2133
Milwaukee:	105	1145
Nibco:	T-113	S-113
Powell:	507	1822
Stockham:	B-103	B-104
Walworth:	55	4-SJ

C. 2 1/2" and Larger: Flanged ends, class 125, iron body, bolted bonnet, solid wedge, bronze mounted.

	OS&Y	Non-Rising Stem
Crane:	4651/2	461
Fairbanks:	0405	0403
Grinnell:	6020	6060
Hammond:	IR1140	IR1138
Jenkins:	651A	326
Lunkenheimer:	1430	1428
Milwaukee:	F-2885	F-2882
Nibco:	617-O	F-619
Powell:	1793	1787
Stockham:	G0623	G-612
Walworth:	8726-F	8719-F

D. Hose End, 2 1/2": FM, 174 psi, bronze body, solid wedge, inside screw, non-rising stem.

Provide cap and chain.

Fairbanks:	0210.
Jenkins:	707.
Lunkenheimer:	366.
Nibco:	T-103-HC.
Walworth:	115.

E. Threaded End; 2" and Smaller: FM, UL-listed, 175 psi, bronze body, solid wedge, outside screw and yoke, rising stem.

Crane:	459.
Fairbanks:	0222.
Hammond:	IB681.
Jenkins:	175U.
Nibco:	T-104-O.
Stockham:	B-133.
Walworth:	904.

F. Flanged End; 2 1/2" and Larger: FM, UL-Listed, 175 psi, iron body bronze mounted, solid wedge, outside screw and yoke, rising stem.

Crane:	467.
Fairbanks:	0412.
Hammond:	IR1154.
Jenkins:	825-A.
Nibco:	F-607-O.
Stockham:	G-634.
Walworth:	8713-F.

3.5 DRAIN VALVES:

A. Class 125: Bronze body, screw-in bonnet, rising stem, composition disc, 3/4" hose outlet.

	Threaded Ends	Solder Ends
Hammond:	712	711
Lee:	717-20	717-12
Mansfield:	526.40	526.41
Nibco:	73	72
Prier:	C-73ST	C-71ST
Tanner:	806	851

3.6 BALL VALVES:

A. 1" and Smaller: 150 psi, bronze body, standard port, bronze trim, 2-piece construction, TFE seats and seals.

	Threaded Ends	Solder Ends
Conbraco:	70	70
Crane:	2182	2182
Grinnell:	3700	3700-SJ
Jamesbury:	21-1100	-
Jenkins:	900T	902T
Metraflex:	IT	IS
Nibco:	T-585	S-585
Powell:	4520R20	421OR
Stockham:	S-216BRRT	S-216BRRS
Watts:	B-6000	B-6001

A. 1 1/4" to 2": 150 psi, bronze body, standard port, 3-piece body, TFE seats with bronze trim.

	Threaded Ends	Solder Ends
Conbraco:	82	82
Fairbanks:	0851	-
Nibco:	T-595-Y	S-959-Y
Powell:	4201-R	4201-R
Watts:	B-6800	B-6801

3.7 BUTTERFLY VALVES:

A. 6" and Smaller: 150 psi, cast-iron body, extended neck, aluminum bronze disc, reinforced resilient EDPM seat, manual lever and lock.

	Lug
CenterLine:	Series LT
Crane:	14
Demco:	Series CE
Fairbanks:	3502
Grinnell:	WC-LC-8211
Hammond:	33824
Jamesbury:	8815L

	Lug
Keystone:	10
Nibco:	WL-NL-082-3
Powell:	Series5000
Stockham:	LD-711-BS3E

Grooved Ends: Victaulic Series 700.

B. 8" and Larger: 150 psi, cast-iron body, extended neck, aluminum bronze disc, reinforced resilient EDPM seat, gear operator.

	Lug
CenterLine:	SeriesLT
Crane:	14
Demco:	SeriesCE
Fairbanks:	602
Grinnell:	LC-8212
Keystone:	122
Nibco:	NL-082-5
Powell:	Series5000
Stockham:	LD-721-BS3E

Grooved Ends: Victaulic Series 701.

SECTION 23 0529 - SUPPORTS AND ANCHORS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - B. This section is Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to supports and anchors specified herein.
- 1.2 DESCRIPTION OF WORK:
- A. Extent of supports and anchors required by this section is indicated on drawings and/or specified in other Division-15 sections.
 - B. Types of supports and anchors specified in this section include the following:
 - 1. Horizontal-Piping Hangers and Supports.
 - 2. Hanger-Rod Attachments.
 - 3. Building Attachments.
 - 4. Saddles and Shields.
 - 5. Miscellaneous Materials.
 - 6. Anchors.
 - 7. Equipment Supports.
 - C. Supports and anchors furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division-15 sections.
- 1.3 QUALITY ASSURANCE:
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
 - B. Codes and Standards:
 - 1. Code Compliance: Comply with Standard Plumbing Code 1994 pertaining to product materials and installation of supports and anchors.
 - 2. UL and FM Compliance: Provide products which are UL-listed and FM approved.
 - 3. MSS Standard Compliance:
 - a. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.
 - b. Select and apply pipe hangers and supports, complying with MSS SP-69.
 - c. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
 - d. Terminology used in this section is defined in MSS SP-90.
- 1.4 SUBMITTALS:
- A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of support and anchor.
 - B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of support and anchor, indicating dimensions, weights, required clearances, and methods of assembly of components.

PART 2 - PRODUCTS

- 2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS:
- A. General: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - B. Adjustable Steel Clevis Hangers: MSS Type 1.
 - C. Steel Double Bolt Pipe Clamps: MSS Type 3.
 - D. Steel Pipe Clamps: MSS Type 4.
 - E. Pipe Hangers: MSS Type 5.
 - F. Split Pipe Rings: MSS Type 11.
 - G. Clips: MSS Type 26.
 - H. Pipe Saddle Supports: MSS Type 36, including steel pipe base-support and cast-iron floor flange.
 - I. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base-support and cast-iron floor flange.

2.3 HANGER-ROD ATTACHMENTS:

- A. General: Except as otherwise indicated, provide factory-fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
- B. Steel Turnbuckles: MSS Type 13.

2.4 BUILDING ATTACHMENTS:

- A. General: Except as otherwise indicated, provide factory-fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.
- B. Concrete Inserts: MSS Type 18.
- C. Top Beam C-Clamps: MSS Type 19.
- D. Side Beam or Channel Clamps: MSS Type 20.
- E. Center Beam Clamps: MSS Type 21.
- F. Steel Brackets: One of the following for indicated loading:
 - 1. Light Duty: MSS Type 31.
 - 2. Medium Duty: MSS Type 32.
 - 3. Heavy Duty: MSS Type 33.

2.5 SADDLES AND SHIELDS:

- A. General: Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- B. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.
- C. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.
- D. Thermal Hanger Shields: Constructed of 360° insert of high density, 100 psi, water-proofed calcium silicate, encased in 360° sheet metal shield. Provide assembly of same thickness as adjoining insulation.
- E. Manufacturer: Subject to compliance with requirements, provide thermal hanger shields of one of the following:
 - 1. Elcen Metal Products Co.
 - 2. Pipe Shields, Inc.

2.6 MANUFACTURERS OF HANGERS AND SUPPORTS:

- A. Manufacturer: Subject to compliance with requirements, provide hangers and supports of one of the following:
 - 1. B-Line Systems, Inc.
 - 2. Carpenter and Patterson, Inc.
 - 3. Corner & Lada Co., Inc.
 - 4. Elcen Metal Products Co.
 - 5. Fee & Mason Mfg. Co.; Div. Figgie International.
 - 6. ITT Grinnel Corp.

2.7 MISCELLANEOUS MATERIALS:

- A. Metal Framing: Provide products complying with NEMA STD ML 1.
- B. Steel Plates, Shapes, and Bars: Provide products complying with ASTM A36.
- C. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION:

- A. Proceed with installation of hangers, supports, and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors, and other building structural attachments.
- B. Prior to installation of hangers, supports, anchors, and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section and Architect/Engineer for purpose

of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.3 INSTALLATION OF BUILDING ATTACHMENTS:

- A. Install building attachments at required locations within concrete or on structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert securely to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.

3.4 INSTALLATION OF HANGERS AND SUPPORTS:

- A. General: Install hangers, supports, clamps, and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- C. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.
- D. Provisions for movement: Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 Pressure Piping Codes are not exceeded.
- G. Insulated Piping: Comply with the following installation requirements.
 - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
 - 2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields.
 - 3. Saddles: Where insulation without vapor barrier is indicated, install protection saddles.

3.5 INSTALLATION OF ANCHORS:

- A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install anchor by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.
- C. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe-runs, at intermediate points in pipe-runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

3.6 EQUIPMENT SUPPORTS:

- A. Provide concrete housekeeping bases for all floor-mounted equipment furnished as part of the work of Division 15. Size bases to extend minimum of 4" beyond equipment base in any direction; and 4" above finished floor elevation. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer's templates. Chamfer top and edge corners.
- B. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe and fittings. Provide factory-fabricated tank saddles for tanks mounted on steel stands.

3.7 ADJUSTING AND CLEANING:

- A. Hanger Adjustments: Adjust hangers so as to distribute loads equally on attachments.
- B. Supports Adjustment: Provide grout under supports so as to bring piping and equipment to proper level and elevations.
- C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 0529

SECTION 23 0548 - NOISE AND VIBRATION CONTROL

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - B. This section is Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to vibration isolation work specified herein.
- 1.2 DESCRIPTION OF WORK:
- A. Noise criteria, vibration tolerance, and vibration isolation for HVAC and plumbing work.
- 1.3 RELATED WORK
- A. Flexible Duct Connectors, Sound Attenuators and Sound Absorbing Duct Lining: Section 15910, DUCTWORK ACCESSORIES.
 - B. Sound Tests and Vibration Tests: Section 15990, TESTING, ADJUSTING, AND BALANCING.
- 1.4 QUALITY ASSURANCE
- A. Refer to article, QUALITY ASSURANCE in Section 15010, BASIC METHODS AND REQUIREMENTS (MECHANICAL).
 - B. Noise Criteria:
 1. Noise levels in all 8 octave bands due to equipment and duct systems shall not exceed the values indicated herein. The stated NC levels are "raw" NC levels and do not include room effect. Manufacturer's product data which includes a room attenuation or room effect are not acceptable and must be increased by the room effect.
 2. For equipment which has no sound power ratings scheduled on the plans, the contractor shall select equipment such that the indicated noise criteria, local ordinance noise levels, and OSHA requirements are not exceeded. Selection procedure shall be in accordance with ASHRAE 1995 Applications Handbook, Chapter 43, SOUND AND VIBRATION CONTROL. An average value of 10 dB shall be used as the room attenuating effect, i.e., the difference between sound power level emitted to room and sound pressure level in room.
 3. In absence of specified measurement requirements, measure equipment noise levels three feet from equipment and at an elevation of maximum noise generation.
 - C. Allowable Vibration Tolerances for Rotating, Non-reciprocating Equipment: Not to exceed a self-excited vibration maximum velocity of 0.20-inch per second RMS, filter in, when measured with a vibration meter on bearing caps of machine in vertical, horizontal and axial directions or measured at equipment mounting feet if bearings are concealed. Measurements for internally isolated fans and motors may be made at the mounting feet.
- 1.5 SUBMITTALS
- A. Submit in accordance with Section 01340, SAMPLES AND SHOP DRAWINGS.
 - B. Manufacturer's Literature and Data:
 1. Vibration isolators:
 - a. Hangers.
 - b. Snubbers.
 - c. Thrust restraints.
 - C. Isolator manufacturer shall furnish with submittal load calculations for selection of isolators, including supplemental bases, based on lowest operating speed of equipment supported.
 - D. Sound attenuator manufacturer shall furnish with submittal sound attenuating capability of each sound attenuator provided.
- 1.6 APPLICABLE PUBLICATIONS
- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
 - B. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE):
 1. HVAC Applications Handbook 1991, Chapter 42, Sound and Vibration Control.
 - C. American Society for Testing and Materials (ASTM):
 1. A123-89 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 2. A307-90 Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 3. D2240-86 Rubber Property - Durometer Hardness
 - D. Manufacturers Standardization (MSS):
 1. SP-58-88 Pipe Hangers and supports-Materials, Design and Manufacture
 - E. Occupational Safety and Health Administration (OSHA):
 1. Occupational Noise Exposure

PART 2 - PRODUCTS

2.1 GENERAL

- A. Type of sound attenuator, isolator, base, and minimum static deflection shall be as required for each specific equipment application as recommended by isolator or equipment manufacturer but subject to minimum requirements indicated in the schedule on the drawings.
- B. Group 2: Typical Lab Spaces and Offices NC 35
 - 1. Laboratories, private offices, lobby, corridors and open office areas.

2.2 VIBRATION ISOLATORS

- A. Hangers: Shall be combination neoprene and springs unless otherwise noted and shall allow for expansion of pipe.
 - 1. Combination Neoprene and Spring (Type H): Vibration hanger shall contain a spring and double deflection neoprene element in series. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional travel of 50 percent between design height and solid height. Spring shall permit a 15 degree angular misalignment without rubbing on hanger box.
 - 2. Spring Position Hanger (Type HP): Similar to combination neoprene and spring hanger except hanger shall hold piping at a fixed elevation during installation and include a secondary adjustment feature to transfer load to spring while maintaining same position.
 - 3. Neoprene (Type HN): Vibration hanger shall contain a double deflection type neoprene isolation element. Hanger rod shall be separated from contact with hanger bracket by a neoprene grommet.
 - 4. Spring (Type HS): Vibration hanger shall contain a coiled steel spring in series with a neoprene grommet. Spring shall have a diameter not less than 0.8 of compressed operating spring height. Spring shall have a minimum additional travel of 50 percent between design height and solid height. Spring shall permit a 15 degree angular misalignment without rubbing on hanger box.
 - 5. Hanger supports for piping 2-inches and larger shall have a pointer and scale deflection indicator.
- C. Snubbers: Each spring mounted base shall have a minimum of four all-directional or eight two directional (two per side) seismic snubbers that are double acting. Elastomeric materials shall be shock absorbent neoprene bridge quality bearing pads, maximum 60 durometer, replaceable and have a minimum thickness of 1/4-inch. Air gap between hard and resilient material shall be not less than 1/8-inch nor more than 1/4-inch. Restraints shall be capable of withstanding design load without permanent deformation.
- D. Thrust Restraints (Type THR): Restraints shall provide a spring element contained in a steel frame with neoprene pads at each end attachment. Restraints shall have factory preset thrust and be field adjustable to allow 1/4-inch maximum movement when the fan starts and stops. Restraint assemblies shall include rods, angle brackets and other hardware for field installation.
- E. Manufacturer: Subject to compliance with requirements, provide vibration isolators of one of the following:
 - 1. Vibration Eliminator Co., Inc.
 - 2. Mason Industries

2.3 BASES

- A. Rails (Type R): Design rails with isolator brackets to reduce mounting height of equipment and cradle machines having legs or bases that do not require a complete supplementary base. To assure adequate stiffness, height of members shall be a minimum of 1/12 of longest base dimension but not less than four-inches. Where rails are used with neoprene mounts for small fans or close coupled pumps, extend rails to compensate overhang of housing.
- B. Integral Structural Steel Base (Type B): Design base with isolator brackets to reduce mounting height of equipment which require a complete supplementary rigid base. To assure adequate stiffness, height of members shall be a minimum of 1/12 of longest base dimension, but not less than four-inches.
- C. Inertia Base (Type I): Base shall be a reinforced concrete inertia base. Pour concrete into a welded steel channel frame, incorporating pre-located equipment anchor bolts and pipe sleeves. Level concrete to provide a smooth uniform bearing surface for equipment mounting. Provide grout under uneven supports. Channel depth shall be a minimum of 1/12 of longest dimension of base but not less than six inches. Form shall include 1/2-inch reinforcing bars welded in place on minimum of eight inch centers running both ways in a layer 1-1/2 inches above bottom. Use height saving brackets in all mounting locations. Weight of inertia base shall be equal to or greater than weight of equipment supported to provide a maximum peak-to-peak displacement of 1/16-inch.
- D. Curb Mounted Isolation Base (Type CB): Fabricate from aluminum to fit on top of standard curb with overlap to allow water run-off and have wind and water seals which shall not interfere with spring action. Provide resilient snubbers with 1/4-inch clearance for wind resistance. Top and bottom bearing surfaces shall have sponge type weather seals. Integral spring isolators shall comply with Spring Isolator (Type S) requirements.

2.4 GENERAL ISOLATOR REQUIREMENTS:

- A. Elastomeric isolators shall comply with ASTM D2240 and be oil resistant neoprene with a maximum stiffness of 60 durometer and have a straight-line deflection curve.
- B. Exposure to Weather: Isolators, including springs, exposed to weather shall be hot-dip galvanized after fabrication. Hot-dip zinc coating shall be not less than two ounces per square foot by weight complying with ASTM A123. In addition, provide limit stops to resist wind velocity.

- C. Uniform Loading: Select and locate isolators to produce uniform loading and deflection even when equipment weight is not evenly distributed.
- D. Color code isolator by type and size for easy identification of capacity.

2.5 Duct Sound Attenuators

- A. General: Contractor shall furnish and install prefabricated silencers in the air handling system of the sizes and performance shown on schedule and/or on drawings. They shall be the product of a nationally known manufacturer who has engaged in the manufacture and distribution of this type of equipment for at least 5 years. Manufacturer shall, upon request, provide certified test reports from a nationally known qualified independent laboratory corroborating his cataloged performance. Test reports shall be based on a 24" x 24" cross sectional rectangular and/or 24" diameter tubular silencers of each type and model required for this project. Manufacturer shall obtain prior product approval from the architect and/or consulting engineer not less than 10 days before bid date.
- B. Outer casings shall be of not less than 22 gauge galvanized steel construction. All external seams shall be lockformed and filled with mastic, or continuously welded, and shall be airtight up to 10" water gauge pressure differential. Casings should be suitably stiffened to prevent permanent deformation when tested at 10" pressure differential. They shall not vibrate audibly during normal operation of air handling system.
- C. Interior partitions shall be of not less than 24 gauge galvanized steel perforated to remove not more than 18% of the area. Acoustically absorptive filler material made from an inorganic fiber-glass-like material (mineral wool or spun felt) shall be compressed not less than 5% to eliminate voids and prevent settling. Material shall be vermin and moisture proof and impart no odor to the air. Incombustible filler material shall exhibit not more than the following fire hazard classification values when tested in accordance with standard ASTM E84, NFPA 255 or UL-723 test methods:
 - 1. Flamespread 15
 - 2. Fuel Contributed 15
 - 3. Smoke Developed 0
- D. Provide polyethylene bagging for fill. Bagging shall be continuous and air tight and shall isolate the fill from the air stream.
- E. Acoustical ratings shall be determined by the "duct-to-reverberation room" method as recommended in 1960 by the S1W42 Subcommittee of the American Standards Association. Tests shall be run both with and without air flowing through silencer at not less than three different flow rates. All ratings shall be based on test data from a nationally known qualified independent laboratory. Test method shall eliminate effects due to end reflection, vibration, flanking transmission and standing waves in the reverberant room. Airflow and pressure loss data taken in accordance with AMCA procedures shall be obtained from the same silencer used for acoustic performance tests. Upon request, evidence will be shown of an airflow pressure drop calibration check with an independent laboratory certified by AMCA.
- F. Silencer shall provide the minimum attenuation values indicated on the drawings in terms of dB insertion Loss for models shown on drawings at design air velocities.
- G. The sound power level generated by airflow through silencer in dB re: 10^{-12} watts (PWL_{12}) shall not exceed the values indicated on the drawings at design flow rates.
- H. Airflow pressure drop performance of silencer shall not exceed values indicated on schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Vibration Isolation:
 - 1. No metal-to-metal contact will be permitted between fixed and floating parts.
 - 2. Connections to Equipment: Allow for deflections equal to or greater than equipment deflections. Electrical, drain, piping connections, and other items made to rotating or reciprocating equipment (pumps, compressors, (etc.) which rests on vibration isolators, shall be isolated from building structure for first three hangers or supports.
 - 3. Common Foundation: Mount each electric motor on same foundation as driven machine. Hold driving motor and driven machine in positive rigid alignment with provision for adjusting motor alignment and belt tension. Bases shall be level throughout length and width. Provide shims to facilitate pipe connections, leveling, and bolting.
 - 4. Provide heat shields where elastomers are subject to temperatures over 100 degrees F.
 - 5. Extend bases for pipe elbow supports at discharge and suction connections at pumps. Pipe elbow supports shall not short circuit pump vibration to structure.
 - 6. Non-rotating equipment such as heat exchangers and converters shall be mounted on isolation units having the same static deflection as the isolation hangers or support of the pipe connected to the equipment.
- B. Inspection and Adjustments: Check for vibration and noise transmission through connections, piping, ductwork, foundations, and walls. Adjust, repair, or replace isolators as required to reduce vibration and noise transmissions to specified levels.
- C. Duct Sound Attenuators: Install duct sound attenuators in strict conformance with manufacturer's written instructions. Maintain required lengths of straight duct upstream and downstream of the attenuator.

END OF SECTION 23 0548

SECTION 23 0555 - LAB EXHAUST CONTROL SYSTEMS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
 - A. Drawings and general provisions of Contract, including General and Supplementary Conditions of the Specifications, and Division 1 Specifications sections apply to this work.
 - B. Division 15 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.2 GENERAL REQUIREMENTS:
 - A. Examine other Sections of the Specifications for requirements that affect work of this Division whether or not such work is specifically mentioned in this Division.
 - B. Coordinate work with that of other trades affecting, or affected by work of this Division. Cooperate with those trades to assure steady progress of work under contract. It is this controls contractor's responsibility to neatly "line item" work and responsibilities in their bid, of other subcontractors described in this section that are required for a complete HVAC controls system.
- 1.3 Description
 - A. A laboratory airflow control system shall be furnished and installed to control the airflow into and out of laboratory rooms. The exhaust flow rate of a laboratory fume hood shall be precisely controlled to maintain a constant average face velocity into the fume hood at either a standard/in-use or standby level based on an operator being present in front of the fume hood. The laboratory control system shall vary the amount of make-up/supply air into the room to operate the laboratories at the lowest possible airflow rates necessary to maintain temperature control, achieve minimum ventilation rates, and maintain laboratory pressurization in relation to adjacent spaces (positive or negative).
- 1.4 Acceptable Manufacturers
 - A. The plans and specifications for the laboratory airflow control system are based on systems and equipment manufactured by Phoenix Controls Corporation.
 - B. The laboratory airflow system provider shall be an entity that designs, develops, manufactures and sells products and services to control the environment and airflow of critical spaces using a Quality Management System registered to ISO 9001:2000.
 - C. In strict accordance with this specification, alternative laboratory airflow control systems and equipment shall only be considered for approval provided that the equipment be equal in every respect to the operational characteristics, capacities, and intent of control sequences specified herein. Approval to bid does not relieve the laboratory airflow control system supplier from complying with the minimum requirements or intent of this specification.
 - D. The engineer and owner shall be the sole judges of quality and equivalence of equipment, materials, methods, and life cycle cost.
 - E. Only those systems specifically named in this specification or by addendum shall be considered for approval. Other systems submitted after the bid opening will be returned without review.
 - F. Manufacturer's Qualifications: Firms regularly engaged in manufacture of lab control systems, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- 1.5 Preventive Maintenance
 - A. The laboratory airflow control system supplier, whose system incorporates any of the listed devices, shall provide at no additional cost to the owner during and after the warranty period, five years of required preventive maintenance on all airflow sensors (e.g., pitot tube, flow cross, orifice ring, air bar, hot wire, vortex shedder, side wall sensors, etc.), and flow transducers provided under this section. Airflow sensors shall be removed, inspected and cleaned annually during the five-year period to prevent inaccuracies due to long-term buildup from corrosion, lab tissues, wet or sticky particles, or other materials that foul the sensor. The airflow sensors shall be accessed without removal of the air valve or providing duct access doors. The transducer shall be checked and recalibrated annually to ensure long-term accuracy. Note that auto-zero recalibration of transducers is not acceptable as a substitute for annual recalibration.
- 1.6 Warranty Period
 - A. Parts and labor warranty shall commence upon the date of substantial completion and extend for a period of five years whereupon any defects in materials or laboratory airflow control system performance shall be repaired and calibrated by the supplier at no cost to the owner. Substantial completion inspection shall be done with owner staff representative.

PART 2 - SYSTEM PERFORMANCE REQUIREMENTS

2.1 Airflow Control System Description

- A. Each laboratory shall have a dedicated laboratory airflow control system.
- B. The laboratory airflow control system shall employ individual average face velocity controllers that directly measure the area of the fume hood sash opening and proportionally control the hood's exhaust airflow to maintain a constant face velocity over a minimum range of 20 to 100% of sash travel. The corresponding minimum hood exhaust flow turndown ratio shall be 5 to 1.
- C. The hood exhaust airflow control device shall respond to the fume hood sash opening by achieving 90% of its commanded value within one second of the sash reaching 90% of its final position (with no more than 5% overshoot/undershoot) of required airflow. Rate of sash movement shall be between 1.0 to 1.5 feet per second.
- D. The hood exhaust airflow control device shall be automatically switched between in-use and standby levels based on operator presence immediately in front of the hood. A presence and motion sensor shall activate the switching. The airflow control device shall achieve the required in-use commanded value in less than one second from moment of detection with no more than a 5% overshoot or undershoot.
- E. The laboratory airflow control system shall maintain specific airflow ($\pm 5\%$ of signal within one second of a change in duct static pressure) regardless of the magnitude of the pressure change (within 0.6" to 3.0" wc), airflow change or quantity of airflow control devices on the manifold.
- F. The laboratory airflow control system shall use volumetric offset control to maintain room pressurization. The system shall maintain proper room pressurization polarity (negative or positive) regardless of any change in room/system conditions such as the raising and lowering of any or all fume hood sashes or rapid changes in duct static pressure. Systems using differential pressure measurement or velocity measurement to control room pressurization are unacceptable.
- G. The laboratory airflow control system shall maintain specific airflow ($\pm 5\%$ of signal) with a minimum 16 to 1 turndown to insure accurate pressurization at low airflow and guarantee the maximum system diversity and energy efficiency.

PART 3 - MATERIALS

3.1 Usage Based Control Equipment

- A. For variable air volume (VAV) systems, a sash sensor shall be provided to measure the height of each vertically-moving fume hood sash. A sash sensor shall also be provided for horizontal overlapping sashes. Control systems employing sidewall mounted velocity sensors shall be unacceptable.
- B. A presence and motion sensor shall be provided to determine an operator's presence in front of a hood by detecting the presence and/or motion of an operator, and to command the laboratory airflow control system from an in-use operating face velocity (e.g., 100 fpm) to a standby face velocity (e.g., 60 fpm) and vice versa.
 - 1. The sensor shall define a detection zone that extends approximately 20" (50 cm) from the front of the fume hood. If the sensor does not detect presence and/or motion in its detection zone within five seconds, it shall command the system to the user adjustable standby face velocity. When the sensor detects the presence and/or motion of an operator within the detection zone, it shall command the system to the in-use face velocity within 1.0 second.
 - 2. The sensor shall have a control circuit that adapts to its specific surroundings and automatically adjusts for inanimate objects placed within its detection zone. It shall map the area into memory and, after a period of five minutes, nullify the image of the inanimate object and return to a standby mode. Operators shall enter and leave the zone with the unit automatically adjusting between in-use and standby modes. If the inanimate object is moved or taken out of the zone, the unit shall automatically re-map the area.
 - 3. Wide area motion detectors (on the hood or room level) shall be unacceptable.
- C. The airflow at the fume hood shall vary in a linear manner between two adjustable minimum and maximum flow set points to maintain a constant face velocity throughout this range. A minimum volume flow shall be set to assure flow through the fume hood even with the sash totally closed.
- D. A fume hood monitor shall be provided to receive the sash sensor output and presence and/or motion signal. This same monitor shall generate an exhaust airflow control signal for the appropriate airflow control device in order to provide a constant average face velocity. Audible and separate visual alarms shall be provided for both flow alarm and emergency exhaust conditions. The monitor shall be provided with digital indication of the fume hood face velocity.

3.2 Airflow Control Device—General

- A. The airflow control devices shall be existing to remain and be calibrated to air flows listed on plans.

3.3 Laboratory Control Unit

- A. A laboratory control unit shall control the supply and/or general exhaust airflow control devices to maintain proper room pressurization polarity (positive or negative). Each individual laboratory shall have a dedicated laboratory control unit.
- B. The control unit shall be electronic. The inputs shall accept linear feedback signals from fume hood, canopy, snorkel, biosafety cabinet, and office supply airflow control devices. The output signals shall control supply, general exhaust/return airflow control devices and/or variable frequency drives with signals that are linearly proportional to the desired supply or exhaust airflows.
- C. The control unit shall maintain a constant design offset between the sum of the room's total exhaust and make-up/supply airflows. This offset shall be field adjustable and represents the volume of air that will enter (or exit) the room from the corridor or adjacent spaces.
- D. The control unit shall provide linear signals that are proportional to all airflow sources, sash sensors, and flow alarms. The signals shall be available for hard-wired connection to the facility's direct digital control (DDC) system, or through an integrated control unit that interfaces directly into the facility's DDC system.
- E. The laboratory control unit may be either panel or valve mounted.
- F. Refer to the DDC Control specification for the required input/output summary for the necessary points to be monitored and or controlled.
- G. Each laboratory shall have a dedicated 120 Vac line connection to power the laboratory's airflow control system power supply.
- H. Provide surge suppression devices for protection of all low voltage control and communications circuits. Devices shall be by EDCO, DiTek, Joslyn, or control system manufacturer approved equal, and selected for the appropriate clamping voltage and surge energy capacity for each application.

PART 4 - EXECUTION

4.1 Installation

- A. The automatic temperature controls (ATC) contractor shall install the sash sensors, interface boxes, presence and motion sensor, and fume hood monitor on the fume hood under initial supervision of the laboratory airflow control system supplier. Reel-type sash sensors and their stainless steel cables shall be hidden from view. Bar-type sash sensors shall be affixed to the individual sash panels. Sash interface boxes with interface cards shall be mounted in an accessible location.
- B. The ATC contractor shall install the laboratory control unit (if panel-mounted) and wall-mounted power supply (as required) in an accessible location in the designated laboratory room.
- C. The ATC contractor shall install 24 VAC/14AWG Class 2 service to all airflow control devices, except for constant volume devices.
- D. The ATC contractor shall terminate and connect all cables as required (refer to the chart below). In addition, integrated laboratory control unit connectors shall be furnished by the ATC.
- E. The mechanical contractor shall install all airflow control devices in the ductwork and shall connect all airflow control valve linkages.
- F. The mechanical contractor shall provide and install all reheat coils and transitions.
- G. The mechanical contractor shall provide and install insulation as required.
- H. The electrical contractor shall wire a dedicated, single-phase 120 Vac power circuit to the laboratory control unit or power supply.

4.2 System Start-up and Training

- A. System start-up shall be provided by a factory-authorized representative of the laboratory airflow control system manufacturer. Start-up shall include calibrating the fume hood monitor and any combination sash sensing equipment as required. Start-up shall also provide electronic verification of airflow (fume hood exhaust, supply, make-up, general exhaust, or return).
- B. The balancing contractor shall be responsible for final verification and reporting of all airflows.

END OF SECTION 23 0555

SECTION 23 0593 - TESTING, BALANCING, AND COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions, of this specification division and Division 1 specification sections apply to work of this Section.

1.2 TESTING, BALANCING, AND COMMISSIONING OF HVAC SYSTEMS:

- A. Selection: The Contractor shall procure the services of, and have a contract with, an independent Test, Balance, and Commissioning Test and balance sub-contractor (Test and balance sub-contractor), which specializes in the balancing, testing, and commissioning of heating, ventilating, and air conditioning systems. The Test and balance sub-contractor shall balance, adjust, and test all water circulating and air moving equipment, air distribution, and exhaust systems, and temperature control equipment as herein specified and shown on the drawings.
- B. The Contractor shall award the test, balance and commissioning contract to the Test and balance sub-contractor as soon as possible to allow them to schedule the work in cooperation with other trades and to meet the completion date. The contractor shall prepare a critical path schedule, coordinated with all subcontractors, so as to accomplish all tasks required of the Test and balance sub-contractor as scheduled herein.
- C. Work performed under those sections in Division 15 is herein referred to as the Installer. Refer to specific items of work provided by each installer, and outlined in this section, "MECHANICAL CONTRACTORS RESPONSIBILITIES". Installers shall cooperate with the Test and balance sub-contractor as required during execution of the work under this section.
- D. The Test and balance sub-contractor shall inspect all work under the above sections as it relates to work under this section and report in writing to the Contractor and Engineer any deviations from plans and specifications that will affect the performance of the systems. All correspondence (written, fax, electronic mail, and the like) is to be copied to the owner.

1.3 TEST AND BALANCE SUB-CONTRACTOR QUALIFICATIONS:

- A. The Test and balance sub-contractor shall be a member in good standing with The Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) and shall provide AABC National Project Certification Performance Guaranty, or equivalent, to the owner upon request. The Test and balance sub-contractor must be totally independent, having no affiliation with any contractor, design engineer, or equipment manufacturer/supplier of HVAC related equipment.
- B. The Test and balance sub-contractor shall have a fully staffed office within fifty (50) miles of the site and have been regularly engaged in the testing, balancing, and commissioning of heating, ventilating, and air conditioning systems.
- C. The Test and balance sub-contractor shall provide proof that personnel performing work has successfully completed at least five (5) completed projects of similar size and scope, with at least three (3) completed projects with the City of Tampa. A complete list of reference projects, including name and phone number of contacts, shall be submitted with the bid.
- D. The Test and balance sub-contractor shall have a Florida Registered Professional Engineer on its staff.
- E. All instruments used shall be accurately calibrated within six months of balancing and maintained in good working order. If requested, the test shall be conducted in the presence of the Engineer and/or his representative.

1.4 TEST AND BALANCE SUB-CONTRACTOR SUBMITTALS:

- A. Provide a plan review within thirty days upon receipt of contract. The plan review should include comments and recommendations on any discrepancies that may hinder balancing. This plan review shall be transmitted directly to the Contractor.
- B. Submit to Contractor, equipment start-up forms. After receipt from the contractor of the submittal data, forms will be transmitted by the Test and balance sub-contractor to the Mechanical Contractor for use in equipment start-up. The completed forms will be turned over to the Test and balance sub-contractor prior to the beginning of the test and balance phase.
- C. Submit agenda of test procedures for each system, describing balancing standards for the testing, balancing, and commissioning of the air conditioning, heating, and ventilating systems for the approval of the Engineer. This agenda shall include all forms for each system and component, with specified data from the project plans and specifications included on the forms.
- D. The final Testing, Balancing, and Commissioning Report with the Engineer's letter of acceptance, must be received at least one week prior to the proposed date of the Substantial Completion Inspection.

1.5 TEST AND BALANCE SUB-CONTRACTOR INSPECTIONS AND TESTS:

- A. Make inspections of the systems during construction for proper installation of balancing devices and general construction as related to the test and balance work. The number of inspections will vary with size and complexity of the project, but a minimum of two inspections are required: one at 50% completion of

- ductwork installation, the second at 80% completion of ductwork installation. A written report of each job visit shall be sent to the Construction Manager for transmittal to the Engineer.
- B. Perform Final Test & Balance work associated with the HVAC system as described herein.
 - C. A minimum of one after-occupancy inspection shall be made within 90 days of the final test and balance. At this time, any minor adjustments shall be made for occupant comfort. Major problems, which will require major readjustments, shall be addressed to the Architect / Engineer prior to any readjustments. Any alterations to the final test and balance report shall be transmitted as a revised report to the Construction Manager for transmittal to the Engineer.
 - D. Provide for checking balance during opposite season (if tested in winter, recheck and update data during summer and vice versa). Send Opposite Season Report containing new and revised to the Construction Manager for distribution to the Engineer.
- 1.6 TEST AND BALANCE SUB-CONTRACTOR WARRANTY AND REPORTS:
- A. Provide AABC National Project Certification Performance Guarantee or equivalent.
 - B. Include a one year warranty commencing on the date of substantial completion date of the entire project or commencing on the date of the final Testing, Balancing, Commissioning Report, whichever is later. During the Warranty period, the owner may request a recheck or resetting of any equipment or device listed in test report.
 - C. Provide five copies of tabulated report in neatly organized typed form with AABC approved minimum data, within fifteen working days after completion of test. Report will include start-up reports and drawings to coincide with the test report. All commissioning tests will be included in a separate report format. In addition, all reports shall incorporate a summary page(s) which shall include:
 - 1. General description of project (building type, system type, equipment description, etc.)
 - 2. A descriptive list of all equipment and test results (sorted building by building) which do NOT meet plans and specifications. All equipment and test data NOT listed on the above mentioned summary page(s) will be considered to perform within 10% of design requirements.
 - 3. Copies of reduced plan drawings that uniquely identify and cross reference air devices, VAV boxes, dampers, equipment, etc.
 - 4. HVAC equipment approved submittals.
 - 5. Duct pressure test/leakage reports.
 - 6. Commissioning Reports.
 - 7. Copies of all correspondence (written, fax, electronic mail and the like) between the Test and balance sub-contractor, Construction Manager, Subcontractor(s), Architect, Engineer, etc.
 - D. The Owner reserves the right to provide verification of the test and balance reports and such verification shall be by a second independent test and balance sub-contractor. Reports found to be inaccurate will be disallowed and the test and balance test and balance sub-contractor will be required to repeat operations under the supervision of the second independent test and balance sub-contractor until accurate reports are completed and agreed upon. The cost of initial checking will be borne by the Contractor/Owner, unless the report is found to be inaccurate. In such case, the costs of the verification test and balance and all subsequent costs of supervision in order to secure acceptable reports will be borne by the test and balance test and balance sub-contractor.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

- 3.1 CONTRACTOR'S RESPONSIBILITIES:
- A. Final testing, balancing and commissioning of the HVAC systems shall be performed as specified above. It is the responsibility of the Mechanical Contractor to be completely familiar with all the provisions and responsibilities of the Test and balance sub-contractor, and to provide such certification, cooperation, and support required.
 - B. HVAC systems will not be accepted as complete, or the project accepted as substantially complete, until such time as the Test and balance sub-contractor reports that the HVAC systems are operating within acceptable limits, are in accordance with the contract documents, and are in receipt of approved duct leakage reports.
 - C. The Contractor shall repair all deficiencies noted by the Test and balance sub-contractor in a timely manner. The Test and balance sub-contractor will notify the contractor in writing, on a daily basis, of any deficiencies discovered and Contractor will notify the Test and balance sub-contractor in writing upon completion of the repairs. The cost for extra re-testing by the Test and balance sub-contractor due to un-repaired items that were certified as repaired, will be the responsibility of the Contractor.
 - D. The Contractor shall:
 - 1. Allow adequate time in the construction schedule to perform the Testing & Balancing and Commissioning work.
 - 2. Notify the Construction Manager and the Test and balance sub-contractor immediately upon commencement of work related to the HVAC system.

3. Provide required shop drawings and all equipment data to the Architect / Engineer and to the selected Test and balance sub-contractor, with a copy of the transmittal letter sent to the Architect / Engineer.
 4. Provide test openings as required for testing and balancing HVAC systems.
 5. Provide updated job schedule and timely notice prior to scheduled events.
 6. Provide test openings and temporary end caps or otherwise seal off ends of ductwork to permit leakage testing prior to installation of diffusers, grilles, and similar devices.
 7. Make preliminary tests to establish adequacy, quality, safety, completed status, and satisfactory operation of HVAC systems and components. The systems shall be free of electrical grounds and short circuits.
 8. Perform duct leakage tests, in the presence of the test and balance sub-contractor, on all supply, return, outside air make-up, and exhaust air systems.
 9. Within the intent of the contract documents, provide, at the request of the Test and balance sub-contractor, all equipment, material, supplies, workmen, and supervisions necessary to provide a satisfactory, operating system.
 10. During the test and balance period, operate all HVAC equipment as necessary to permit systems to be tested and balanced as fully operating, functional systems.
 11. Work harmoniously with the Test and balance sub-contractor, providing all courtesies normally extended to professional consultants.
 12. Perform all work necessary to make ceiling space plenums air-tight and functional.
 13. Remove and replace ceilings as necessary to permit test and balance operations.
 14. Remove and replace equipment, lights, or other items which obstruct testing and balancing operations. Where equipment, lights, or other items will interfere with future adjustments of the HVAC system, such equipment, lights, or other items shall be relocated as directed by the Architect / Engineer.
 15. Provide completed start-up forms on each piece of equipment.
 16. Replace belts and drives as required for proper balancing. Drives shall be adjusted and aligned to prevent abnormal belt wear and vibration.
 17. Adjust fan speed to full load motor amperage, but, not over full load.
 18. Open all manually adjustable dampers and test dampers for smooth, vibration-free operation.
 19. Verify that all controls are installed and operating in accordance with the control sequence of operation.
 20. Before requesting final testing and balancing, submit signed statement that HVAC systems are installed, adjusted, fully lubricated, operating satisfactorily, and are ready for use.
 21. Duct Leakage Report: The Mechanical Contractor to make all the supply, return, outside air, and exhaust duct systems operationally air-tight, to be no more than 2% leakage for duct systems rated at 2" w.c. pressure class, and 1% leakage for systems exceeding 2" w.c. pressure class. Leakage test to be performed with all air device openings and fan connections sealed airtight. Test the systems prior to applying any insulation or concealing in soffits or chases. Use a portable fan capable of producing a static pressure equal or greater than the duct test pressure. This fan to have a flow measuring assembly consisting of a straight section of duct with an orifice plate, pressure taps, and a calibrated performance curve for determining leakage rates.
 22. Test each section equal to the external static pressure indicated for that fan or air handler with the portable fan assembly. After the fan achieves that steady state design pressure, record the air flow quantity across the orifice and the percent of design air flow. If the test fails, the contractor shall reseal and retest at no additional cost to the contract.
 23. Repair all duct leaks that can be heard or felt, even if the system has passed the leakage test.
 24. Submit duct leakage reports to the Test and balance sub-contractor and the Engineer for their review and approval.
- 3.2 TEST AND BALANCE SUB-CONTRACTOR'S RESPONSIBILITIES:
- A. Air Balance: The Test and balance sub-contractor shall perform the following tests, and balance system in accordance with the following requirements:
 1. Record minimum data required by AABC forms.
 2. Test and adjust fan rpm to design requirements.
 3. Test and record motor full load amperage/voltage and operating amperage/voltage.
 4. Make pitot tube traverse of main supply, return, OA and exhaust ducts and obtain design cfm at fans (where possible).
 - a. The air flow in rectangular ducts shall be traversed and measured using the log-Tchebycheff method and round duct shall be measured with the log-Linear method (a.k.a. log-Tchebycheff), no exceptions. Refer to the AABC's 1989 National Standards manual Chapter 8; NEBB's latest Procedural Standards, Section 10; and ASHRAE's 2001 Fundamentals Handbook, Chapter 14.
 5. Test and adjust system for design cfm recirculated air.
 6. Test and adjust system for design cfm outside air.
 7. Test and record system static pressure profile.
 8. Adjust all main supply and return air ducts to proper design cfm.
 9. Adjust all zones to proper design cfm, supply, return, and exhaust.
 10. Adjust all VV terminals to design minimum, maximum and/or heat cfm and record controller setpoint.

11. Provide suggestion/corrective measures pertaining to performance related issues.
 12. Test and adjust each diffuser, grille, and register to within 10% of design requirements.
 13. Each grille, diffuser, and register shall be identified as to the location, area, and system.
 14. Test and adjust fan to within 100%-110% of design.
 15. Test and adjust kitchen hoods and fume hoods. Traverse exhaust duct. Seal test holes through the duct access panel with flat head bolts inserted from inside the duct.
- B. Size, AK catalog factors of diffusers, grilles, registers, and all tested equipment shall be identified and listed.
- C. Readings and test of diffusers, grilles, and registers shall include required fpm velocity and test resultant velocity, required cfm, and test resultant cfm after adjustments. When direct cfm measuring instruments are used, velocities are not required.
- D. In cooperation with the controls contractor, set adjustments of automatically operated dampers to operate as specified, indicated, and / or noted.
- E. Check all controls for proper calibrations, and list all controls requiring adjustment by control installers. A software point by point check-out and test, along with verification forms, will be required.
- F. All diffusers, grilles, and registers shall be adjusted to minimize drafts in all areas.
- G. Witness and record the testing of the ductwork for leakage to insure proper sealing. The Test and balance sub-contractor shall randomly select sections of the completed duct system for testing. The sections selected shall not exceed more than 20% of the measured linear footage of supply, return, exhaust or plenum duct length. All selected ductwork shall be leak tested in accordance with SMACNA. Maximum allowable leakage at any tested section shall not exceed 2% of the total air. If any of the selected duct sections exceed the specific leakage allowance, those sections shall be repaired by the Mechanical Contractor and retested by the Test and balance sub-contractor. If initial testing exceeds specification allowance, testing of all remaining ductwork shall be required at the Mechanical Contractor's expense. All additional costs for duct leak repair and retesting shall be the responsibility of the Mechanical Contractor.
- H. Advise Mechanical Contractor in writing of all ductwork that shall be repaired to reduce air leakage. Retest to confirm minimum allowable leakage. The cost of retest of failed systems will be the responsibility of the Mechanical Contractor.
- I. Water Balance: The Test and balance sub-contractor shall prepare the water systems for balancing in the following manner:
1. Open all valves to full open position. Close all bypass valves. Set modulating valve to full coil flow.
 2. Check all strainers where gauge taps are provided, and if required, direct Mechanical Contractor to clean same.
 3. Examine water in system and determine if the water has been treated and cleaned. If water has mud or other entrained matter, test and balance work shall stop and Mechanical Contractor shall clean system as specified in other sections of this Division 15 specification.
 4. Check pump rotation.
 5. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
 6. Check all air vents at high points of water systems and determine all are installed and operating freely.
 7. Check coils for counterflow or parallel flow as called for by design.
 8. Set all temperature controls so all coils are calling for full cooling or heating. This should close all automatic bypass valves at coils.
 9. Check operation of automatic bypass valves.
 10. Check and have control contractor set operating temperatures of chillers / boilers to design requirements.
 11. Complete air balance must have been accomplished before actual water balance is complete.
- J. Chilled Water / Hot Water:
1. Check water temperature at inlet side of coils.
 2. Proceed to balance each water coil. Upon completion of flow readings and adjustments at coils, mark all settings and record data.
 3. All flow devices to be balanced to within +10% of design.
 4. Record and check the following items at each cooling / heating element:
 5. Test and record entering air temperature (DB heating and cooling).
 6. Test and record entering air temperatures (WB cooling).
 7. Test and record leaving air temperatures (DB heating and cooling).
 8. Test and record leaving air temperatures (WB cooling).
 9. Entering and leaving water temperature.
 10. Pressure drop of each coil or vessel.
 11. Calculate gpm.
 12. Calculate total cooling and heating coil capacities.
 13. If test conditions are not within design tolerance, then convert the test conditions to design conditions, or re-test when conditions are closer to design (i.e. opposite season test).
- K. Controls Testing: Test and record control temperature or pressure readout of each device and compare to actual measured condition. Include in report.
1. Test Each Sequence Of Operation for all systems to verify proper operation. Include description of operation in report.

2. Record The Dry Bulb Temperature in each space and in addition, record a wet bulb temperature at each thermostat or sensor.
- L. Deficiencies: All deficiencies shall be noted by the Test and balance sub-contractor in a field report and submitted to Contractor and the Architect on a daily basis.
- M. Upon Correction Of The Deficiency, the Contractor shall notify the Test and balance sub-contractor in writing that the problem is resolved. If the deficiency is not corrected, the Contractor will be responsible for the cost of additional re-testing.
- N. Equipment: All information required as shown, but not limited to, shall be compiled in a neat, orderly, itemized format on 8½" x 11" test forms. The following data shall be submitted to the Owner through the Contractor. This data is the minimum required data except where specified standard (i.e. AABC) requires additional data. In addition, any HVAC equipment specified for the project, but not indicated below, is required per AABC form.
- O. Air Handlers, Fan Coils, And Duct-mounted Coils:
 1. Mark number
 2. Unit manufacturers and model number
 3. Total supply air cfm and rpm - specified and actual
 4. Return air cfm - specified and actual
 5. Outside air cfm - specified and actual
 6. Unit static pressure profile, including total fan static
 7. Specified total and external static pressure
 8. Water gpm flow, coil pressure drop, and entering and leaving temps - specified and actual
 9. Coil - entering and leaving air DB deg F and WB deg F - specified and actual
 10. Outside air DB deg F and WB deg F at time of test
 11. Voltage, phase, and cycle specified load conditions
 12. Btu per hour at test conditions
 13. Btu per hour when converted to specified load conditions
 14. gpm by means of heat transfer test
- R. Fans:
 1. Mark number
 2. Manufacturer and model number
 3. Total cfm supply and rpm - specified and actual
 4. Static pressure (discharge static - suction static)
 5. Full load amperage - specified and actual
 6. Voltage, phase, and cycles - specified and actual
- S. Air Devices (grilles, Registers, Diffusers, and Louvers):
 1. Mark number
 2. Room number
 3. cfm - specified and actual
 4. Size
 5. Effective area
 6. Velocity FPM - specified and actual
- T. Variable Volume Boxes:
 1. Mark number
 2. Unit manufacturer and model number
 3. Location and room number
 4. Air handler number
 5. Maximum / minimum and heating supply cfm - specified and actual
 6. For DDC controls: measure and record computer readout and calibration factor at design conditions.

END OF SECTION 23 0593

SECTION 23 0700 - MECHANICAL INSULATION

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.2 DESCRIPTION OF WORK:
- A. Extent of mechanical insulation required by this section is indicated on drawings and schedules, and by requirements of this section.
 - B. Types of mechanical insulation specified in this section include the following:
 - 1. Piping System Insulation:
 - a. Fiberglass
 - b. Cellular Glass.
 - c. Flexible Unicellular.
 - 2. Duct Work System Insulation:
 - a. Fiberglass.
 - C. Refer to Division-15 section "Supports and Anchors" for protection saddles, protection shields, and thermal hanger shields; not work of this section.
 - D. Refer to Division-15 section "Mechanical Identification" for installation of identification devices for piping, ductwork, and equipment; not work of this section.
- 1.3 QUALITY ASSURANCE:
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.
 - B. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.
 - C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.
 - D. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.
- 1.4 SUBMITTALS:
- A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.
 - B. Maintenance Data: Submit maintenance data and replacement material lists for each type of mechanical insulation. Include this data and product data in maintenance manual.
- 1.5 DELIVERY, STORAGE, AND HANDLING:
- A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
 - B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 - PRODUCTS

- 2.1 ACCEPTABLE MANUFACTURERS:
- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corp.
 - 3. Knauf Fiber Glass GmbH.
 - 4. Manville Products Corp.
 - 5. Owens-Corning Fiberglas Corp.
 - 6. Pittsburgh Corning Corp.
 - 7. Rubatex Corp.
- 2.2 PIPING INSULATION MATERIALS:
- A. Fiberglass Piping Insulation: ASTM C 547, Class 1.

- B. Cellular Glass Piping Insulation: ASTM C 552, Type II, Class 2.
- C. Flexible Unicellular Piping Insulation: ASTM C 534, Type I.
- D. Jackets for Piping Insulation: ASTM C 921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Installers option.
- E. Encase pipe fittings insulation with one-piece premolded PVC fitting covers, fastened as per manufacturer's recommendations.
- F. Encase exterior piping insulation with aluminum jacket with weatherproof construction.
- G. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.
- H. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated.

2.3 DUCTWORK INSULATION MATERIALS:

- A. Rigid Fiberglass Ductwork Insulation: ASTM C 612, Class 1.
- B. Flexible Fiberglass Ductwork Insulation: ASTM C 553, Type I, Class B-4.
- C. Jackets for Ductwork Insulation: ASTM C 921, Type I.
- D. Ductwork Insulation Accessories: Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- E. Ductwork Insulation Compounds: Provide cements, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PLUMBING PIPING SYSTEM INSULATION:

- A. Insulation Omitted: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and pre-insulated equipment.
- B. Cold Piping:
 - 1. Application Requirements: Insulate the following cold plumbing piping systems:
 - a. Interior above-ground sanitary drain pipes which receive condensate.
 - b. Interior above-ground storm water piping.
 - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
 - a. Flexible Unicellular: 1/2" thickness.
- C. Hot Piping:
 - 1. Application Requirements: Insulate the following hot plumbing piping systems:
 - a. Potable hot water piping.
 - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
 - a. Fiberglass: 1" thick for pipe sizes up to and including 6".

3.3 HVAC PIPING SYSTEM INSULATION:

- A. Insulation Omitted: Omit insulation on hot piping within radiation enclosures or unit cabinets; on cold piping within unit cabinets provided piping is located over drain pan; on heating piping beyond control valve, located within heated space; on condensate piping between steam trap and union; and on unions, flanges, strainers, flexible connections, and expansion joints.
- B. Cold Piping (40°F (4.4°C) to ambient).
 - 1. Application Requirements: Insulate the following cold HVAC piping systems:
 - a. HVAC chilled water supply and return piping.
 - b. Air conditioning condensate drain piping.
 - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
 - a. Cellular Glass: 1-1/2" thick for pipe sizes up to and including 4", 2" thick for pipe sizes over 4".

3.4 DUCTWORK SYSTEM INSULATION:

- A. Insulation Omitted: Do not insulate fibrous glass ductwork, or lined ductwork.
- B. Cold Ductwork (Below Ambient Temperature):
 - 1. Application Requirements: Insulate the following cold ductwork.

- a. Outdoor air intake ductwork between air entrance and fan inlet or HVAC unit inlet.
 - b. HVAC supply ductwork between fan discharge, or HVAC unit discharge, and room terminal outlet.
 - c. Insulate neck and bells of supply diffusers.
 - d. HVAC return ductwork between room terminal inlet and return fan inlet, or HVAC unit inlet; except omit insulation on return ductwork located in return air ceiling plenums.
 - e. HVAC plenums and unit housings not pre-insulated at factory or lined.
2. Insulate each ductwork system specified above with one of the following types and thicknesses of insulation:
 - a. Rigid Fiberglass: 1-1/2" thick, increase thickness to 2" in machine, fan and equipment rooms, or
 - b. Flexible Fiberglass: 1-1/2" thick, application limited to concealed locations.
- 3.5 INSTALLATION OF PIPING INSULATION:
- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
 - B. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.
 - C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
 - D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
 - E. Maintain integrity of vapor-barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
 - F. Cover valves, fittings, and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.
 - G. Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise indicated.
 - H. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3" wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3" wide vapor barrier tape or band.
- 3.6 INSTALLATION OF DUCTWORK INSULATION:
- A. General: Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
 - B. Install insulation materials with smooth and even surfaces.
 - C. Clean and dry ductwork prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.
 - D. Maintain integrity of vapor-barrier on ductwork insulation, and protect it to prevent puncture and other damage.
 - E. Extend ductwork insulation without interruption through walls, floors, and similar ductwork penetrations, except where otherwise indicated.
 - F. Corner Angles: Install corner angles on external corners of insulation on ductwork in exposed finished spaces before covering with jacketing.
- 3.7 PROTECTION AND REPLACEMENT:
- A. Replace damaged insulation which cannot be satisfactorily, including units with vapor barrier damage and moisture saturated units.
 - B. Protection: Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION 23 0700

SECTION 23 1060 - PIPES & PIPE FITTINGS

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
 - B. This section is a Division 15 Basic Mechanical Materials and Methods section, and is part of each Division 15 section making reference to pipes and pipe fittings specified herein.
- 1.2 DESCRIPTION OF WORK:
- A. Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division 15 sections.
 - B. Type of pipes and pipe fittings specified in this section include the following:
 - 1. Steel Pipes.
 - 2. Copper Tube.
 - 3. Oxygen Clean Copper Tube.
 - 4. Plastic Pipes.
 - 5. Miscellaneous Piping Materials/Products.
 - C. Pipes and pipe fittings furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division 15 sections.
- 1.3 QUALITY ASSURANCE:
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of pipes and pipe fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- 1.4 Codes and Standards:
- A. Welding: Qualify welding procedures, welders and operators in accordance with ASME B31.1, or ASME B31.9, as applicable, for shop and project site welding of piping work.
 - 1. Certify welding of piping work using Standard Procedure Specifications by, and welders tested under supervision of, National Certified Pipe Welding Bureau (NCPWB).
 - B. Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.
 - C. NSF Labels: Where plastic piping is indicated to transport potable water, provide pipes and pipe fittings bearing approval label by National Sanitation Foundation (NSF).
- 1.5 SUBMITTALS:
- A. Product Data: Submit manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of pipe and pipe fitting. Submit piping schedule showing manufacturer, pipe or tube weight, fitting type, and joint type for each piping system.
 - B. Welding Certifications: Submit reports as required for piping work.
 - C. Brazing Certifications: Submit reports as required for piping work.
 - D. Maintenance Data: Submit maintenance data and parts lists for each type of mechanical fitting. Include this data, product data, and certifications in maintenance manual; in accordance with requirements of Division 1.
- 1.6 DELIVERY, STORAGE, AND HANDLING:
- A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling as required to prevent pipe-end damage and eliminate dirt and moisture from inside of pipe and tube.
 - B. Where possible, store pipe and tube inside and protected from weather. Where necessary to store outside, elevate above grade and enclose with durable, waterproof wrapping.
 - C. Protect flanges and fittings from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

PART 2 - PRODUCTS

- 2.1 GENERAL:
- A. Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
 - B. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment

connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.2 STEEL PIPES AND PIPE FITTINGS:

- A. Black Steel Pipe: ASTM A53, A106 or A120; except comply with ASTM A53 or A106 where close coiling or bending is required.
- B. Malleable-Iron Threaded Fittings: ANSI B16.3.
- C. Malleable-Iron Threaded Unions: ANSI B16.39; selected by Installer for proper piping fabrication and service requirements, including style, end connections, and metal-to-metal seats (iron, bronze or brass).
- D. Threaded Pipe Plugs: ANSI B16.14.
- E. Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing of the following material group, end connection and facing, except as otherwise indicated.
 - 1. Material Group: Group 1.1.
 - 2. End Connections: Buttwelding.
 - 3. Facings: Raised-face.
- F. Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short-radius elbows and returns; rated to match connected pipe.
- G. Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2", and where pipe size is less than 1-1/2", and do not thread nipples full length (no close-nipples).

2.3 COPPER TUBE AND FITTINGS:

- A. Copper Tube: ASTM B88; type (wall thickness) as indicated for each service; hard-drawn temper, except as otherwise indicated.
- B. Cast-Copper Solder-Joint Fittings: ANSI B16.18.
- C. Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
- D. Copper-Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4 PLASTIC PIPES AND PIPE FITTINGS:

- A. Polyvinyl Chloride Pipe (PVC): ASTM D1785.
- B. Polyvinyl Chloride Drain, Waste, and Vent Pipe (PVC): ASTM D2665.
- C. Chlorinated Polyvinyl Chloride Pipe (CPVC): ASTM F441.
- D. PVC Fittings:
 - 1. Schedule 40 Socket: ASTM D2466.
 - 2. Schedule 80 Socket: ASTM D2467.
 - 3. Schedule 80 Threaded: ASTM D2464.
 - 4. DWV Socket: ASTM D2665.
 - 5. Sewer Socket: ASTM D2729.
 - 6. Solvent Cement: ASTM D2564.
 - 7. Solvent Cement (To Join PVC to ABS): ASTM D3138.

2.5 GROOVED PIPING PRODUCTS:

- A. General: As Installer's option, mechanical grooved pipe couplings and fittings may be used for piping systems in mechanical equipment rooms having operating conditions not exceeding 230°F (110°C), excluding steam piping and any other service not recommended by manufacturer, in lieu of welded, flanged, or threaded methods, and may also be used as unions, seismic joints, flexible connections, expansion joints, expansion compensators, or vibration reducers.
- B. Coupling Housings: Malleable iron conforming to ASTM A47 or ductile iron conforming to ASTM A536.
- C. Coupling Housings Description: Grooved mechanical type, which engages grooved or shouldered pipe ends, encasing an elastomeric gasket which bridges pipe ends to create seal. Cast in two or more parts, secure together during assembly with nuts and bolts. Permit degree of contraction and expansion as specified in manufacturer's latest published literature.
- D. Gaskets: Mechanical grooved coupling design, pressure responsive so that internal pressure serves to increase seal's tightness, constructed of elastomers having properties as designated by ASTM D2000.
- E. Bolts and Nuts: Heat-treated carbon steel, ASTM A183, minimum tensile 110,000 psi.
- F. Branch Stub-Ins: Upper housing with full locating collar for rigid positioning engaging machine-cut hole in pipe, encasing elastomeric gasket conforming to pipe outside diameter around hole, and lower housing with positioning lugs, secured together during assembly with nuts and bolts.
- G. Fittings: Grooved or shouldered end design to accept grooved mechanical couplings.
- H. Malleable Iron: ASTM A47.
- I. Ductile Iron: ASTM A536.
- J. Fabricated Steel: ASTM A53, Type F for 3/4" to 1-1/2"; Type E or S, Grade B for 2" to 20".

- K. Steel: ASTM A234.
- L. Flanges: Conform to Class 125 cast iron and Class 150 steel bolt hole alignment.
- M. Malleable Iron: ASTM A47.
- N. Ductile Iron: ASTM A536.
- O. Grooves: Conform to the following:
 - 1. Standard Steel: Square cut.
- P. Manufacturer: Subject to compliance with requirements, provide grooved piping products of one of the following:
 - 1. ITT Grinnell Corp.
 - 2. Stockham Valves & Fittings, Inc.
 - 3. Victaulic Co. of America.

2.6 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

- A. Welding Materials: Except as otherwise indicated, provide welding materials as determined by Installer to comply with installation requirements.
- B. Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.
- C. Soldering Materials: Except as otherwise indicated, provide soldering materials as determined by Installer to comply with installation requirements.
- D. Tin-Antimony Solder: ASTM B32, Grade 95TA.
- E. Gaskets for Flanged Joints: ANSI B16.21; full-faces for cast-iron flanges; raised-face for steel flanges, unless otherwise indicated.
- F. Piping Connectors for Dissimilar Non-Pressure Pipe: Elastomeric annular ring insert, or elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends and subject to approval by plumbing code.
- G. Manufacturer: Subject to compliance with requirements, provide piping connectors of the following:
 - 1. Fernco, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance.
- B. Comply with ANSI B31 Code for Pressure Piping.
- C. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to 1/2" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation. Wherever possible in finished and occupied spaces, conceal piping from view, by locating in column enclosures, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- D. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures.

3.2 PIPING SYSTEM JOINTS:

- A. General: Provide joints of type indicated in each piping system.
- B. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.
- C. Solder copper tube-and fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
- D. Weld pipe joints in accordance with ASME Code for Pressure Piping, B31.
- E. Weld pipe joints only when ambient temperature is above 0oF (-18oC) where possible.

- F. Bevel pipe ends at a 37.5° angle where possible, smooth rough cuts, and clean to remove slag, metal particles and dirt.
 - G. Use pipe clamps or tack-weld joints with 1" long welds; 4 welds for pipe sizes to 10", 8 welds for pipe sizes 12" to 20".
 - H. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass. Eliminate valleys at center and edges of each weld. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes and non-metallic inclusions.
 - I. Do not weld-out piping system imperfections by tack-welding procedures; refabricate to comply with requirements.
 - J. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.
 - K. Plastic Pipe/Tube Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.
 - L. Making Solvent-Cemented Joints: ASTM D2235, and ASTM F402.
 - M. Grooved Pipe Joints: Comply with fitting manufacturer's instructions for making grooves in pipe ends. Remove burrs and ream pipe ends. Assemble joints in accordance with manufacturer's instructions.
- 3.3 CLEANING, FLUSHING, INSPECTING:
- A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.
 - B. Inspect pressure piping in accordance with procedures of ASME B31.
 - C. Disinfect water service piping in accordance with AWWA C601.
- 3.4 PIPING TESTS:
- A. Test pressure piping in accordance with ASME B31.
 - B. General: Provide temporary equipment for testing, including pump and gages. Test piping system before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.
 - C. Required test period is 2 hours.
 - D. Test each piping system at 150% of operating pressure indicated, but not less than 25 psi test pressure.
 - E. Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5% of test pressure.
 - F. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
 - G. Drain test water from piping systems after testing and repair work has been completed.

END OF SECTION 23 1060

SECTION 23 1119 - PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. This section is a Division-15 Basic Mechanical Materials and Methods section, and is part of each Division-15 section making reference to piping specialties specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of piping specialties work required by this section is indicated on drawings and schedules and by requirements of this section.
- B. Types of piping specialties specified in this section include the following:
 - 1. Pipe Escutcheons
 - 2. Pipeline Strainers
 - 3. Vandal-Proof Vent Caps
 - 4. Dielectric Unions
 - 5. Mechanical Sleeve Seals
 - 6. Fire Barrier Penetration Seals
 - 7. Water Hammer Arresters
 - 8. Drip Pans
 - 9. Pipe Sleeves
 - 10. Sleeve Seals
- C. Piping specialties furnished as part of factory-fabricated equipment, are specified as part of equipment assembly in other Division-15 sections.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of piping specialties of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 Codes and Standards:

- A. FCI Compliance: Test and rate "Y" type strainers in accordance with FCI 73-1 "Pressure Rating Standard for "Y" Type Strainers". Test and rate other type strainers in accordance with FCI 78-1 "Pressure Rating Standard for Pipeline Strainers Other than "Y" Type".

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including installation instructions, and dimensioned drawings for each type of manufactured piping specialty. Include pressure drop curve or chart for each type and size of pipeline strainer. Submit schedule showing manufacturer's figure number, size, location, and features for each required piping specialty.
- B. Shop Drawings: Submit for fabricated specialties, indicating details of fabrication, materials, and method of support.
- C. Maintenance Data: Submit maintenance data and spare parts lists for each type of manufactured piping specialty. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

2.1 PIPING SPECIALTIES

- A. General: Provide factory-fabricated piping specialties recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes as indicated, and connections, which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.

2.2 PIPE ESCUTCHEONS

- A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside the pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.
- B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.
- C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

- D. Manufacturer: Subject to compliance with requirements, provide pipe escutcheons of one of the following:
1. Chicago Specialty Mfg. Co.
 2. Producers Specialty & Mfg. Corp.
 3. Sanitary-Dash Mfg. Co.

2.3 LOW PRESSURE Y-TYPE PIPELINE STRAINERS:

- A. General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 125 psi working pressure, with Type 304 stainless steel screens with 3/64" perforations @ 233 per sq.in.
1. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
 2. Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 3. Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 4. Butt Welded Ends, 2-1/2" and Larger: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 5. Grooved Ends, 2-1/2" and Larger: Tee pattern, ductile-iron or malleable-iron body and access end cap, access coupling with EDPM gasket.
- B. Manufacturer: Subject to compliance with requirements, provide low pressure Y-type strainers of one of the following:
1. Armstrong Machine Works.
 2. Hoffman Specialty ITT; Fluid Handling Div.
 3. Metraflex Co.
 4. R-P&C Valve; Div. White Consolidated Industries, Inc.
 5. Spirax Sarco.
 6. Trane Co.
 7. Victaulic Co. of America.
 8. Watts Regulator Co.

2.4 HIGH PRESSURE Y-TYPE PIPELINE STRAINERS

- A. General: Provide strainers full line size of connecting piping, with ends matching piping system materials. Select strainers for 250 psi working pressure, with Type 304 stainless steel screens, with 3/64" perforations @ 233 per sq.in.
1. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
 2. Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 3. Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted steel retainer with off-center blowdown fitted with pipe plug.
 4. Butt Welded Ends, 2-1/2" and Larger: Schedule 80 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
- B. Manufacturer: Subject to compliance with requirements, provide high pressure Y-type strainers of one of the following:
1. Armstrong Machine Works.
 2. Hoffman Specialty ITT; Fluid Handling Div.
 3. Metraflex Co.
 4. R-P&C Valve; Div. White Consolidated Industries, Inc.
 5. Spirax Sarco.
 6. Trane Co.
 7. Watts Regulator Co.

2.5 VANDAL-PROOF VENT CAPS:

- A. General: Provide cast-iron vandal-proof vent caps, full size of base for steel pipes.
- B. Manufacturer: Subject to compliance with requirements, provide vandal-proof vent caps of one of the following:
1. Josam Mfg. Co.
 2. Smith (Jay R.) Mfg. Co.
 3. Tyler Pipe; Sub. of Tyler Corp.
 4. Zurn Industries, Inc.; Hydromechanics Div.

2.6 DIELECTRIC UNIONS

- A. General: Provide standard products recommended by manufacturer for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion.
- B. Manufacturer: Subject to compliance with requirements, provide dielectric unions of one of the following:
 - 1. B & K Industries, Inc.
 - 2. Capital Mfg. Co.; Div. of Harsco Corp.
 - 3. Eclipse, Inc.
 - 4. Epco Sales, Inc.
 - 5. Perfection Corp.
 - 6. Rockford-Eclipse Div.

2.7 MECHANICAL SLEEVE SEALS

- A. General: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.
- B. Manufacturer: Subject to compliance with requirements, provide mechanical sleeve seals of one of the following:
 - 1. Thunderline Corp.

2.8 FIRE BARRIER PENETRATION SEALS

- A. Provide seals for any opening through fire-rated walls, floors, or ceilings used as passage for mechanical components such as piping or duct work. Refer to plumbing drawings for fire barrier penetration details.
- B. Cracks, Voids, or Holes Up to 4" Diameter: Use putty or caulking, one-piece intumescent elastomer, non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat, UL-listed.
- C. Openings 4" or Greater: Use sealing system capable of passing 3-hour fire test in accordance with ASTM E-814, consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350°F (121 to 177°C), UL-listed.
- D. Manufacturer: Subject to compliance with requirements, provide fire barrier penetration seals of one of the following:
 - 1. Electro Products Div./3M.
 - 2. Nelson; Unit of General Signal.

2.9 WATER HAMMER ARRESTERS:

- A. General: Provide bellows type water hammer arresters, stainless steel casing and bellows, pressure rated for 250 psi, tested and certified in accordance with PDI Standard WH-201.
- B. Manufacturer: Subject to compliance with requirements, provide water hammer arresters of one of the following:
 - 1. Amtrol, Inc.
 - 2. Smith (Jay R.) Mfg. Co.
 - 3. Tyler Pipe; Sub. of Tyler Corp.
 - 4. Zurn Industries, Inc.; Hydromechanics Div.

2.10 FABRICATED PIPING SPECIALTIES:

- A. Drip Pans: Provide drip pans fabricated from stainless sheet metal with watertight joints, and with edges turned up 2-1/2". Reinforce top, either by structural angles or by rolling top over 1/4" steel rod. Provide hole, gasket, and flange at low point for watertight joint and 1" drain line connection.
- B. Pipe Sleeves: Provide pipe sleeves of one of the following:
 - 1. Sheet Metal: Fabricate from stainless steel sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricated from the following gages: 3" and smaller, 20 gage; 4" to 6" 16 gage; over 6", 14 gage.
 - 2. Steel-Pipe: Fabricate from Schedule 40 stainless steel pipe; remove burrs.
 - 3. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.
 - 4. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.
- C. Sleeve Seals: Provide sleeve seals for sleeves located in foundation walls below grade, or in exterior walls, of one of the following:
 - 1. Mechanical Sleeve Seals: Installed between sleeve and pipe.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING SPECIALTIES

- A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.
- B. Y-Type Strainers: Install Y-type strainers full size of pipeline, in accordance with manufacturer's installation instructions. Install pipe nipple and shutoff valve in strainer blow down connection, full size of connection, except for strainers 2" and smaller installed ahead of control valves feeding individual terminals. Where indicated, provide drain line from shutoff valve to plumbing drain, full size of blow down connection.
 - 1. Locate Y-type strainers in supply line ahead of the following equipment, and elsewhere as indicated, if integral strainer is not included in equipment:
 - a. Pumps
 - b. Steam traps serving steam main drips
 - c. Temperature control valves
 - d. Pressure reducing valves
 - e. Temperature or pressure regulating valves
- C. Vandal-Proof Vent Caps: Install vandal-proof vent caps on each vent pipe passing through roof, and elsewhere as indicated. Locate base of vent cap 6" above roof surface, or higher where required by Code.
- D. Dielectric Unions: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions.
- E. Mechanical Sleeve Seals: Loosely assemble rubber links around pipe with bolts and pressure plates located under each bolt head and nut. Push into sleeve and center. Tighten bolts until links have expanded to form watertight seal.
- F. Fire Barrier Penetration Seals: Fill entire opening with sealing compound. Adhere to manufacturer's installation instructions.
- G. Water Hammer Arresters: Install in upright position, in locations and of sizes in accordance with PDI Standard WH-201, and elsewhere as indicated.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES:

- A. Drip Pans: Locate drip pans under piping passing over or within 3' horizontally of electrical equipment, and elsewhere as indicated. Hang from structure with rods and building attachments, weld rods to sides of drip pan. Brace to prevent sagging or swaying. Connect 1" drain line to drain connection, and run to nearest plumbing drain or elsewhere as indicated.
- B. Pipe Sleeves: Install pipe sleeves of types indicated where piping passes through walls, floors, ceilings, and roofs. Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation (if any) will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Where insulation includes vapor-barrier jacket, provide sleeve with sufficient clearance for installation. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves. Extend floor sleeves 1/4" above level floor finish, and 3/4" above floor finish sloped to drain. Provide temporary support of sleeves during placement of concrete and other work around sleeves, and provide temporary closure to prevent concrete and other materials from entering sleeves.
 - 1. Install sheet-metal sleeves at interior partitions and ceilings other than suspended ceilings.
 - 2. Install iron-pipe sleeves at exterior penetrations; both above and below grade.
 - 3. Install steel-pipe or plastic-pipe sleeves except as otherwise indicated.
- C. Sleeve Seals: Install in accordance with the following:
 - 1. Link-Seal or equivalent: Fill and pack annular space between sleeve and pipe with Link-Seal Modular Seals, Model "C" or equivalent.

END OF SECTION 23 1119

SECTION 23 3300 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

- 1.1 RELATED DOCUMENTS:
- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
 - B. Division-15 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.2 DESCRIPTION OF WORK:
- A. Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.
 - B. Types of ductwork accessories required for project include the following:
 - 1. Dampers.
 - 2. Low pressure manual dampers.
 - 3. Control dampers.
 - 4. Counterbalanced relief dampers.
 - 5. Fire dampers.
 - 6. Turning vanes.
 - 7. Duct hardware.
 - 8. Duct access doors.
 - 9. Flexible connections.
 - C. Refer to other Division-15 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.
- 1.3 QUALITY ASSURANCE:
- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.
 - B. Codes and Standards:
 - 1. SMACNA Compliance: Comply with applicable portions of SMACNA "HVAC Duct Construction Standards, Metal and Flexible".
 - 2. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.
 - 3. UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers".
 - 4. NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems", pertaining to installation of ductwork accessories.
- 1.4 SUBMITTALS:
- A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.
 - B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of ductwork accessory showing interfacing requirements with ductwork, method of fastening or support, and methods of assembly of components.
 - C. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 1.

PART 2 - PRODUCTS

- 2.1 DAMPERS:
- A. Low Pressure Manual Dampers: Provide dampers of single blade type or multiblade type, constructed in accordance with SMACNA "HVAC Duct Construction Standards".
 - B. Control Dampers: Provide dampers with parallel blades for 2-position control, or opposed blades for modulating control. Construct blades of 16-ga. steel, provide heavy-duty molded self-lubricating nylon bearings, 1/2" diameter steel axles spaced on 9" centers. Construct frame of 2" x 1/2" x 1/8" steel channel for face areas 25 sq. ft. and under; 4" x 1-1/4" x 16-ga. channel for face areas over 25 sq. ft. Provide galvanized steel finish with aluminum touch-up. Provide locking quadrant damper operators.
 - C. Counterbalanced Relief Dampers: Provide dampers with parallel blades, counterbalanced and factory-set to relieve at indicated static pressure. Construct blades of 16-ga. aluminum, provide 1/2" diameter ball bearings, 1/2" diameter steel axles spaced on 9" centers. Construct frame of 2" x 1/2" x 1/8" steel channel

for face areas 25 sq. ft. and under; 4" x 1-1/4" x 16-ga. channel for face areas over 25 sq. ft. Provide galvanized steel finish on frame with aluminum touch-up.

- D. Manufacturer: Subject to compliance with requirements, provide dampers of one of the following:
1. Air Balance, Inc.
 2. Airguide Corp.
 3. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 4. Louvers & Dampers, Inc.
 5. Penn Ventilator Co.
 6. Ruskin Mfg. Co.

2.2 Fire dampers:

- A. Fire Dampers: Provide fire dampers, of types and sizes indicated. Construct casings of 11-ga. galvanized steel with bonded red acrylic enamel finish. Provide fusible link rated at 160 to 165°F (71 to 74°C) unless otherwise indicated. Dampers shall be installed out of the air stream so that there is no restriction imposed upon the flow of air. Provide damper with positive lock in closed position, and with the following additional features:
1. Damper Blade Assembly: Curtain type.
 2. Blade Material: Steel, match casing.
- B. Manufacturer: Subject to compliance with requirements, provide fire and smoke dampers of one of the following:
1. Air Balance, Inc.
 2. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 3. Louvers and Dampers, Inc.
 4. Penn Ventilator Co.
 5. Phillips-Aire.
 6. Ruskin Mfg. Co.

2.3 TURNING VANES:

- A. Manufactured Turning Vanes: Provide turning vanes constructed of 1-1/2" wide curved blades set at 3/4" o.c., supported with bars perpendicular to blades set at 2" o.c., and set into side strips suitable for mounting in ductwork.
- B. Acoustic Turning Vanes: Provide acoustic turning vanes constructed of airfoil shaped aluminum extrusions with perforated faces and fiberglass fill.
- C. Manufacturer: Subject to compliance with requirements, provide turning vanes of one of the following:
1. Aero Dyne Co.
 2. Airsan Corp.
 3. Anemostat Products Div.; Dynamics Corp. of America.
 4. Barber-Colman Co.
 5. Duro Dyne Corp.
 6. Environmental Elements Corp.; Subs. Koppers Co., Inc.
 7. Hart & Cooley Mfg. Co.
 8. Register & Grille Mfg. Co., Inc.
 9. Souther, Inc.

2.4 DUCT HARDWARE:

- A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:
1. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.
 2. Quadrant Locks: Provide for each damper (including dampers at spin-in duct take-offs), quadrant lock device on one end of shaft; and end bearing plate on other end. Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork. Provide extensions for all damper operators for volume control dampers located above hard ceilings with no access.
- B. Manufacturer: Subject to compliance with requirements, provide duct hardware of one of the following:
1. Ventfabrics, Inc.
 2. Young Regulator Co.

2.5 DUCT ACCESS DOORS:

- A. General: Provide where indicated, duct access doors of size indicated.
- B. Construction: Construct of same or greater gage as ductwork served, provide insulated doors for insulated ductwork. Provide flush frames for uninsulated ductwork, extended frames for externally insulated duct.

Provide one size hinged, other side with one handle-type latch for doors 12" high and smaller, 2 handle-type latches for larger doors.

- C. Manufacturer: Subject to compliance with requirements, provide duct access doors of one of the following:
1. Air Balance Inc.
 2. Duro Dyne Corp.
 3. Register & Grille Mfg. Co., Inc.
 4. Ruskin Mfg. Co.
 5. Ventfabrics, Inc.
 6. Zurn Industries, Inc.; Air Systems Div.

2.6 FLEXIBLE CONNECTIONS:

- A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.
- B. Manufacturer: Subject to compliance with requirements, provide flexible connections of one of the following:
1. American/Elgen Co.; Energy Div.
 2. Duro Dyne Corp.
 3. Flexaust (The) Co.
 4. Ventfabrics, Inc.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES:

- A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
- B. Install turning vanes in square or rectangular 90° elbows in supply and exhaust air systems, and elsewhere as indicated.
- C. Install access doors to open against system air pressure, with latches operable from either side, except outside only where duct is too small for person to enter. Install access doors adjacent to all fire dampers to allow maintenance and inspection of each fire damper. Minimum size of access doors shall be 12 inches square.
- D. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

3.3 ADJUSTING AND CLEANING:

- A. Adjusting: Adjust ductwork accessories for proper settings.
- B. Label access doors in accordance with Division-15 section "Mechanical Identification".
- C. Final positioning of manual dampers is specified in Division-15 section "Testing, Adjusting, and Balancing".
- D. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 23 3300

SECTION 26 0500 - ELECTRICAL METHODS AND REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to work of this section.
- B. Furnish and install all electrical wiring, systems, equipment and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, cable, panelboards, etc., and arrangement for specified items in general are shown on drawings.
- C. All ampacities herein specified or indicated on the drawings are based on copper conductors, with the conduit and raceways accordingly sized. Aluminum conductors are not permitted.

1.2 MINIMUM REQUIREMENTS

- A. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), Florida Building Code, and National Fire Protection Association (NFPA) are a minimum installation requirement standard. Design drawings and other specification sections shall govern in those instances where requirements are greater than those specified in NEC.
- B. The rules and regulations of the Federal, State, local, civil authorities and utility companies in force at the time of execution of the contract shall become a part of this specification. In addition, the following codes and standards shall apply:
 - 1. 5th Edition of the Florida Building Code, 2014
 - 2. National Electrical Code, 2011
 - 3. 5th Edition of The Florida Fire Prevention Code (FFPC): (This Code also includes the Florida versions of NFPA 1 And NFPA 101.) (Effective December 31, 2014)
- C. No work shall be done unless the Superintendent of the Contractor is on the job site. Work shall be properly protected, all rubbish removed promptly, and exposed work shall be carefully cleaned prior to final acceptance.
- D. The term "provide" shall include labor, materials, and equipment necessary to furnish and install, complete and operable, the item or system indicated.
- E. In decisions arising from discrepancies, interpretation of Drawings and Specifications, substitutes, and other pertinent matters, the decision of the Owner's representative's approval shall be final.

1.3 SPECIFICATIONS AND DRAWINGS

- A. Plans show location of fixtures and equipment and are intended to depict the general intent of the work in scope, layout and quality of workmanship. They are not intended to show in minute detail every or all accessories intended for the purpose of executing the work, but it is understood that such details are a part of this work.
- B. Where Drawings and Specifications conflict, it shall be the responsibility of this Contractor to bring such conflict to the attention of the Architect/Engineer for clarification. In general, the Architectural Drawings shall take precedence over the Mechanical Drawings with reference to building construction. All changes from the Drawings necessary to make the work conform with the building as constructed and to fit the work of other trades or to conform to the rules of authorities having jurisdiction, shall be made by the Contractor at his own expense.
- C. Keep a record of the locations of concealed work and of any field changes in Contract Drawings and Specifications for each trade and, upon completion of the job, supply "As-Built" Drawings and Specifications showing in pencil on sepia reproducibles, any deviations from the original Drawings, indicating in the Specifications each manufacturer's name underlined or inserted whose product was used on the job. These Drawings shall indicate dimensions of buried utility lines from building walls. One set of sepia reproducibles of the original tracings will be furnished upon request for this purpose.

1.4 STANDARDS

- A. All material and equipment shall be listed, labeled or certified by Underwriters Laboratories, Inc., where such standards have been established. Equipment and material which are not covered by UL Standards will be accepted provided equipment and material is listed, labeled, certified or otherwise determined to meet safety requirements of a nationally recognized testing laboratory. Equipment of a class which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, will be considered if inspected or tested in accordance with national industrial standards, such as NEMA, or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.
- B. Definitions:
 - 1. Listed: Equipment is "listed" if of a kind mentioned in a list which:

- a. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
- b. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
2. Labeled: Equipment is labeled if:
 - a. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.
 - b. The laboratory makes periodic inspections of the production of such equipment.
 - c. The labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner.
3. Certified: Equipment is "certified" if:
 - a. Equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
 - b. Production is periodically inspected by a nationally recognized testing laboratory.
 - c. It bears a label, tag, or other record of certification.
4. Nationally recognized Testing Laboratory: A testing laboratory which is approved, in accordance with OSHA regulations, by the Secretary of Labor.

1.5 QUALIFICATIONS (PRODUCTS AND SERVICES)

- A. Manufacturers Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and material specified for this project, and shall have manufactured the item for at least five years, unless otherwise noted elsewhere in the specifications or on the drawings.
- B. Product Qualification:
 1. Manufacturer's product shall have been in satisfactory operation on three installations of similar size and type, as this project, for approximately three years.
 2. The Owner reserves the right to require the contractor to submit a list of installations where the products have been in operation before approval of said products.
- C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.6 MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, for which replacement parts should be available. Items not meeting this requirement, but which otherwise meet technical specifications, and merits of which can be established through reliable test reports or physical examination of representative samples, will be considered.
- B. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 1. All components of an assembled unit need not be products of the same manufacturer, however, the assembled unit shall be the responsibility of a single manufacturer and warranted as such.
 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 3. Components shall be compatible with each other and with the total assembly for the intended service.
 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. All factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

1.7 EQUIPMENT REQUIREMENTS

- A. Equipment voltage ratings shall be in accordance with the requirements indicated on the drawings or as specified.
- B. Prior to bid, written approval shall be obtained by the Contractor for any equipment that differs from those specified on the drawings and specifications. The Contractor shall be prepared to submit samples of the equipment when requested at no cost to the Architect/Engineer.
 1. The Contractor shall furnish drawings showing all installation details, shop drawings, technical data and other pertinent information as required to determine that the equipment is equivalent in quality and function to the equipment specified.
 2. Approval by the Architect/Engineer of the equal equipment does not relieve the Contractor of the responsibility of furnishing and installing the equipment at no additional cost to the Owner.
 3. Any other items required for the satisfactory installation of the equal equipment shall be furnished and installed at no additional cost to the Owner. This includes but shall not be limited to additions or changes to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and correlation with other work, subject to the jurisdiction and approval of the Architect/Engineer.

- C. Catalogue numbers, where given, are intended to give a basis for design, quality and function. Any other incidental equipment needed for a complete and functional installation shall be provided at no additional cost.

1.8 EQUIPMENT PROTECTION

- A. Equipment and material shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain.
- B. During installation, equipment, controls, controllers, circuit protective devices, etc., shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing, operating and painting.
- C. Damaged equipment shall be, as determined by the Architect/Engineer, placed in first class operating condition or be returned to the source of supply for repair or replacement.
- D. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
- E. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

- A. Arrange, phase and perform work to assure electrical service for other buildings at all times.
- B. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions.
- C. Coordinate location of equipment and conduit with other trades to minimize interferences.
- D. Obtain and pay for all required installation inspections and deliver certificates approving installations to the Owner unless directed otherwise.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. Equipment location shall be as close as practical to locations shown on the drawings. Where architectural features govern location of work, refer to architectural drawings.
- B. Working spaces shall not be less than specified in the National Electrical Code for all voltages specified.
- C. Inaccessible Equipment:
 - 1. Where the Owner/Architect/Engineer determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled as directed at no additional cost to the Owner.
 - 2. "Conveniently accessibility" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, and duct work.
- D. Equipment and Material:
 - 1. New equipment and material shall be installed, unless otherwise specified.
 - 2. Equipment and material shall be designed to assure satisfactory operation and operating life for environmental conditions where being installed. NEC and other code requirements shall apply to the installation in areas requiring special protection such as explosion-proof, watertight and weatherproof construction.
- E. Utility Services:
 - 1. Determine utility connection requirements and include in the base bid all costs to the Owner for utility service.
 - 2. Include all costs for temporary service, temporary routing of service or any other requirements of a temporary nature associated with the utility service.
- F. Continuity of Service:
 - 1. No service shall be interrupted or changed without permission from the Architect and the Owner. Written permission shall be obtained before any work is started.
 - 2. When interruption of services is required, all persons concerned shall be notified and a prearranged time agreed upon.
- G. Concrete Work:
 - 1. Provide all cast-in-place concrete shown on the documents unless noted otherwise. Concrete work shall conform to all applicable Division 2 and 3 specification sections.
 - 2. Provide all anchor bolts, metal shapes and templates required to be cast in concrete or used to form concrete for support of electrical equipment.

1.11 EQUIPMENT IDENTIFICATION

- A. In addition to the requirements of the National Electrical Code, install an identification nameplate which will clearly indicate information required for use and maintenance of items such as switchboard, panelboards, cabinets, safety switches, separately enclosed circuit breakers, motor starters, communications systems cabinets, control devices and other significant equipment.

- B. Nameplates shall be laminated white phenolic resin with a black core with engraved lettering, a minimum of 3/16-inch high. Nameplates that are furnished by manufacturer as a standard catalog item, or where other method of identification is herein specified, are exceptions. Hand written marker is not acceptable.

1.12 SUBMITTALS

- A. The Architect/Engineer's approval shall be obtained for all equipment and material before delivery to the job site. Delivery, storage or installation of equipment or material which has not had prior approval will not be permitted at the job site. Submittals shall be made for all equipment and systems as indicated in the respective specification section.
- B. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings and other data necessary for the Architect/Engineer to ascertain that the proposed equipment and materials comply with specification and drawing requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
- C. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval. Submittals shall be submitted for all applicable products and materials specified in each individual section of these specifications.
- D. Make submittals for the equipment and materials in accordance with the following:
 - 1. Mark the submittals, "SUBMITTED UNDER SECTION _____".
 - 2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
 - 3. The submittals shall include the following:
 - a. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required. Provide any additional information specifically requested in the individual specification section or on the drawings.
- E. Operation and Maintenance Manuals:
 - 1. Maintenance manuals shall be complete and shall be furnished in a loose leaf binder or in the manufacturer's standard binder. Information shall be sufficient to enable a qualified technician to perform normal first line maintenance and repair. A parts list shall be included which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 - 2. Operation manuals shall be clear and concise and shall describe, in detail, the information required to properly operate the equipment specified. The manuals shall include complete catalog cuts and as-built wiring diagrams.
 - 3. Operation and maintenance manuals shall be submitted for approval prior to final close-out.
- F. In addition to the requirement of SUBMITTALS, the Owner reserves the right to request the manufacturer to arrange for the Owner's representative(s) to see typical active systems in operation, when there has been no prior experience with the manufacturer or the type of equipment being submitted.

1.13 CUTTING, PATCHING, EXCAVATION, BACKFILL, AND LAYOUT

- A. Provide openings and excavation required for the installation of the electrical work. Patch work and backfill as required. Finished work shall match the existing adjoining work.
- B. Verify all conditions affecting the work to be performed under this contract.
- C. Carefully verify measurements at the site, determine the exact location of chases and openings required. Provide sleeves, inserts, supports, concrete work, and hangers as required. No columns, beams, joists, building foundations nor any other structural building component shall be cut, drilled or disturbed in any way without prior approval. Conflicts shall immediately be brought to the attention of the Architect/Engineer.
- D. All excavation on sites containing existing buildings and existing services, shall be done with hand shovel to avoid damage to existing services. Where hand shovel is not practical extreme caution shall be taken when performing excavation. The contractor will be responsible for locating any existing utilities and adjusting manhole and handhole locations and conduit routing as necessary. Any damage incurred by the Contractor shall be repaired by the Contractor in a manner approved by the Architect/Engineer at no cost to the Owner and with no extension of time limitation.

1.14 EXPERIENCE

- A. The Contractor performing this work shall be a licensed, reputable firm, regularly performing the type of work incorporated in this project and who also maintains, as part of the firm, a service department with qualified personnel who regularly perform this type of work. The Contractor shall, upon request, show evidence of at least two jobs of similar character and size installed within the preceding two years.

1.15 ELECTRICAL WORK FOR MECHANICAL SYSTEMS

- A. Factory installed starters, controllers, and control equipment mounted in manufactured mechanical equipment necessary for mechanical equipment operation shall be furnished under Division 23 Mechanical.
- B. Power wiring for motors and installation of starters not provided integral with equipment shall be under Division 26 Electrical.
- C. Temperature, humidity, pressure and similar controls essential to the operation of mechanical systems, and wiring and conduit thereof, including interlock wiring, shall be under Division 23 of Specifications, installed in accordance with requirements of Division 26.
- D. Motors shall be furnished under Division 23 Mechanical of capacity required to operate equipment specified, but shall not be less than that specified.
- E. All low voltage (120V and under) temperature control wiring for Division 23 equipment shall be provided under by Division 23.
- F. Division 23 shall provide conduit when required for control wiring, installed in accordance with Division 26 requirements.

1.16 MOTORS

- A. All motors shall be furnished and installed under Division 23 Mechanical and shall be wired under Division 26 Electrical.

1.17 REMOVAL OF RUBBISH

- A. Contractor shall keep premises free from accumulations of waste material or rubbish caused by his employees or work. At completion of work, he shall remove all his tools, scaffolding, surplus materials, and rubbish from building and site. He shall leave premises and his work in a clean orderly condition acceptable to the Architect/Engineer.

1.18 QUIET OPERATION AND VIBRATION

- A. All equipment provided under this section shall operate under all conditions of load free of objectionable sound and vibration. Sound and vibration conditions considered objectionable shall be corrected in an approved manner.
- B. Vibration and sound control shall be by means of approved vibration eliminators or sound attenuators in a manner as specified and as recommended by the manufacturer.

1.19 CLEANING AND ADJUSTMENTS

- A. Upon completion of the work, Contractor shall clean and re-lamp all light fixtures, clean and identify all equipment, adjust and test all equipment and apparatus which he has installed and make certain such apparatus and mechanisms are in proper working order and ready to test.
- B. During construction protect all conduit and equipment from damage and dirt. Cap the open ends of all conduit and equipment.

1.20 STORAGE OF MATERIALS

- A. All materials stored on site shall be properly protected from injury or deterioration. Materials shall not be stored in contact with ground or floor.
- B. Do not remove manufacturer's packing materials until ready to install. Materials showing signs of corrosion, improper handling or storage shall be replaced at no cost to the Owner.
- C. Provide continuous protection for all equipment already installed.

1.21 WATERPROOFING

- A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Owner before the work is done.
- B. Provide all necessary sleeves, caulking and flashing required to make openings absolutely watertight. Waterproof flashing materials shall be compatible with base materials.

1.22 TESTS

- A. Contractor shall make all tests required to establish the adequacy, quality, safety, completed status and satisfactory operation of all systems to the satisfaction of the Architect/Engineer. Provide all instruments, labor and services necessary to conduct tests.
- B. All conductors for major feeders and services (400 amps and up) shall be megged to test insulation and connection integrity prior to permanent energization.

1.23 INSTRUCTIONS

- A. Fully instruct Owner's personnel in the care and operation of electrical systems, including all communications, sound and fire alarm systems and furnish a letter to the Architect/Engineer advising the particular person(s) who have received such instruction.

1.24 WARRANTY

- A. Equipment shall be started, tested, adjusted, and placed in satisfactory operating condition. Furnish a letter addressed to the Architect/Engineer advising that the completed systems have been installed in accordance with the Plans and Specifications and that they are in proper operating condition. The Owner shall receive a written warranty covering all defects in workmanship and material for a minimum period of one year from date of substantial completion. Any defects appearing within this year period shall be repaired or replaced without additional cost to the Owner. Refer to individual specification sections for additional warranty requirements. Longer, extended warranty periods shall apply where specified in any individual specification section.

1.25 ACCEPTANCE

- A. Before requesting final inspection:
 - 1. Complete all work required. If any items are held in abeyance as incomplete for final inspection, list such items together with explanation for delay.
 - 2. Submit statement that equipment is properly installed, adjusted, tested and operation is satisfactory.
 - 3. Submit copy of other data as may be outlined in these specifications.
- B. Copies of the above data shall be submitted to the Architect/Engineer prior to requesting final inspection.

1.26 SINGULAR NUMBER

- A. Where any device or part of equipment is referred to in these specifications in the singular number (such as "the switch"), such reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.27 EXISTING ELECTRICAL SYSTEMS

- A. Existing power, lighting and low voltage systems for other areas of the existing campus and buildings shall be protected during construction and shall remain in operation while the construction is underway. Any and all areas that are occupied during construction shall have operational systems, including TV, fire alarm, paging and voice/data cabling infrastructure system. Any damage to any existing systems shall be repaired or replaced as necessary to place it back into acceptable operational condition. All electrical systems are deemed to be operational and in satisfactory condition. At the contractors option, the following systems may be fully tested prior to any work in the building and any existing problems or trouble on these systems shall be reported to the Owner in writing. Any new problems discovered during or after construction that are not documented will be the responsibility of the Contractor to correct at no additional cost to the Owner.
 - 1. Any TV or AV systems
 - 2. Fire Alarm System
 - 3. Sound and paging systems
 - 4. Voice and Data Network system, including fiber backbone

1.28 PHASING OF POWER AND SYSTEMS

- A. Existing power, voice/data network system, fire alarm, and security systems may need to be phased. These systems shall be operational when the building is occupied. All costs for labor and materials necessary to accomplish any required phasing shall be included. Any downtime required for the transition from the old system to the new system shall be coordinated with the Owner and approved by the Owner. Costs for any necessary overtime and use of the Owner's custodial staff after hours shall be included in the bid.
- B. Provide all required temporary power, control and low voltage wiring as necessary to maintain operation of these systems during phasing of the construction.

1.29 MULTIWIRE BRANCH CIRCUITS

- A. All multi-wire branch circuits shall comply with Article 210.4 of the National Electrical Code. Provide all required handle ties where applicable multi-wire branch circuits are indicated on the drawings.

END OF SECTION 26 0500

SECTION 26 0519 - WIRES AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division-23 and -26 section making reference to electrical wires and cables specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of electrical wire and cable work is indicated by drawings and schedules.
- B. Types of electrical wire, cable, and connectors specified in this section include the following:
 - 1. Copper conductors.
 - 2. Fixture wires.
 - 3. Flexible cords and cables.
 - 4. Wirenut connectors.
- C. Applications of electrical wire, cable, and connectors required for project are as follows:
 - 1. For motor-branch circuits.
 - 2. For power distribution circuits
 - 3. For lighting circuits
 - 4. For appliance and equipment circuits

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing electrical wiring and cabling work similar to that required for this project.
- C. NEC Compliance: Comply with NEC requirements as applicable to construction, installation and color coding of electrical wires and cables.
- D. UL Compliance: Comply with applicable requirements of UL Std 83, "Thermoplastic-Insulated Wires and Cables", and Std 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors".
- E. UL Compliance: Provide wiring/cabling and connector products which are UL-listed and labeled.
- F. NEMA/ICEA Compliance: Comply with NEMA/ICEA Std Pub/ No.'s WC 5, "Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy", and WC-30, "Color Coding of Wires and Cables", pertaining to electrical power type wires and cables.
- G. IEEE Compliance: Comply with applicable requirements of IEEE Stds 82, "Test Procedures for Impulse Voltage Tests on Insulated Conductors", and Std 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to wiring systems.
- H. ASTM Compliance: Comply with applicable requirements of ASTM B1, 2, 3, 8, and D-753. Provide copper conductors with conductivity of not less than 98% at 20oC (68oF).

PART 2 - PRODUCTS

2.1 AVAILABLE MANUFACTURERS

- A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Wire and Cable:
 - a. American Wire and Cable Co.
 - b. Anaconda-Ericsson Inc; Wire and Cable Div.
 - c. Belden Div; Cooper Industries
 - 2. Connectors:
 - a. AMP, Inc.
 - b. Appleton Electric Co.
 - c. Burndy Corporation
 - d. Thomas and Betts Corp.

2.2 WIRES, CABLES, AND CONNECTORS

- A. General: Provide electrical wires, cables, and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a

complete installation, and for application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98% at 20oC (68oF).

- B. Building Wires: Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Select from the following UL types, those wires with construction features which fulfill project requirements:
1. Type THHN, THWN, THHW, XHHW, THHN/THWN: Unless otherwise indicated, all conductors for dry locations requiring a conductor temperature rating 75oC (167oF) or less. Insulation shall be flame retardant, moisture and heat resistant, thermoplastic. Conductor shall be annealed copper.
 2. Type THWN, THHW, XHHW, THHN/THWN: Unless otherwise indicated, all conductors for wet or dry locations requiring a conductor temperature rating of 75oC (167oF) or less. Insulation shall be flame retardant, moisture and heat resistant thermoplastic. Conductor shall be annealed copper.
 3. Type THHN, THHW, XHHW: Unless otherwise indicated, all conductors for dry locations requiring a conductor temperature rating of 90oC (194oF) or less. Insulation shall be flame retardant, moisture and heat resistant thermoplastic. Conductor shall be annealed copper.
 4. Type XHHW-2: Unless otherwise indicated, all conductors for wet locations requiring a conductor temperature rating of 90oC (194oF) or less. Insulation shall be flame retardant, moisture and heat resistant thermoplastic. Conductor shall be annealed copper.
 5. Conductors for use at 600 volts or below shall be 600 volt rated. Wire No. 12 and smaller may be solid or stranded and wire No. 10 and larger shall be stranded only. Stranded conductors shall terminate in crimp type lugs.
 6. Motor circuit branch wiring and associated control wiring: Provide type THHN insulation in dry and damp locations. Provide type THHW insulation in wet locations. All motor wiring to be stranded copper.
 7. Wiring in fluorescent fixture channels: Provide conductors with a 90°C temperature rating, type THHN or TFFN insulation.
- C. Cables: Provide UL-type factory-fabricated cables of sizes, ampacity ratings, and materials and jacketing/sheathing as indicated for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements, NEC and NEMA standards.
- D. Connectors:
1. General: Provide UL-type factory-fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Select from the following, those types, classes, kinds, and styles of connectors to fulfill project requirements:
 - a. Type: Pressure.
 - b. Class: Insulated.
 - c. Kind: Copper (for Cu to Cu connection).
 - d. Style: Butt connection.
 - e. Style: Elbow connection.
 - f. Style: Combined "T" and straight connection.
 - g. Style: "T" connection.
 - h. Style: Split-bolt parallel connection.
 - i. Style: Tap connection.
 - j. Style: Pigtail connection.
 - k. Style: Wirenut connection.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRES AND CABLES

- A. General: Install electrical cables, wires, and wiring connectors as indicated, in compliance with applicable requirements of NEC, NEMA, UI, and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate wire/cable installation work including electrical raceway and equipment installation work, as necessary to properly interface installation of wires/cables with other work.
- C. Pull conductors simultaneously where more than one conductor is being installed in the same raceway.
- D. Use pulling compound or lubricant, where necessary; compound used must not deteriorate conductor or insulation.
- E. Use pulling means including, fish tape, cable, rope and basket weave or wire/cable grips which will not damage cables or raceway. Any cable damaged during installation shall be completely replaced.
- F. Keep conductor splices to minimum. No joints shall be made in conductor except at junction boxes, outlet boxes or splice boxes. Newly installed conductors shall not be spliced unless specifically noted on the drawings. Splices shall not be permitted underground.

- G. Install splices and tapes which possess equivalent-or-better mechanical strength and insulation ratings than conductors being spliced.
 - H. Use splice and tap connectors which are compatible with conductor material.
 - I. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A and B.
 - J. At least eight inches (8") of slack wire shall be left in every outlet box whether it be in use, or left for future use.
 - K. Color code wiring as follows:
 - 1. 120/208 volt, 3 phase, 4 wire: phase A-black, phase B-red, phase C-blue, neutral-white; ground conductor-green.
 - 2. 277/480 volt, 3 phase, 4 wire: phase A-brown, phase B-orange, phase C-yellow, neutral-gray; ground conductor-green.
 - L. Wire and cable boxes and reels shall bear the date of manufacture and must not bear dates by more than one year preceeding contract date.
 - M. Minimum conductor sizes, except as specifically identified on the drawings, shall be as follows:
 - 1. No. 12 - Branch circuits of any kind, except as specified otherwise below.
 - 2. No. 14 - Signal systems, fire alarm system, unless specifically noted otherwise.
 - 3. No. 10 - Exit light circuits, emergency circuits, security lighting, and exterior light circuits.
- 3.2 FIELD QUALITY CONTROL
- A. Prior to energization, test wires and cables for electrical continuity and for short-circuits.

END OF SECTION 26 0519

SECTION 26 0526 - GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods section apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of grounding work is indicated by drawings and schedules.
- B. Types of grounding specified in this section include the following:
 - 1. Solid grounding
- C. Applications of grounding work in this section including the following:
 - 1. Underground metal water piping
 - 2. Metal building frames
 - 3. Grounding electrodes
 - 4. Grounding rods
 - 5. Service equipment
 - 6. Enclosures
 - 7. Equipment
 - 8. Communications systems

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors, terminals and fittings, of types and ratings required, and ancillary grounding materials, including stranded cable, copper braid and bus, ground rods and plate electrodes, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer: Qualified with at least 3 years of successful installation experience on projects with electrical grounding work similar to that required for project.
- C. NEC Compliance: Comply with NEC requirements as applicable to materials and installation of electrical grounding systems, associated equipment and wiring. Provide grounding products which are UL-listed and labeled.
- D. UL Compliance: Comply with applicable requirements of UL Standards Nos. 467 and 869 pertaining to electrical grounding and bonding.
- E. IEEE Compliance: Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical grounding.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on grounding systems and accessories.
- B. Shop Drawings: Submit layout drawings of grounding systems and accessories including, but not limited to, ground wiring, copper braid and bus, ground rods, and plate electrodes.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering grounding products which may be incorporated in the work include, but not limited to, the following:
 - 1. Burndy Corp.
 - 2. Crouse-Hinds Co.
 - 3. Electrical Components Div.; Gould Inc.
 - 4. Thomas and Betts Corp.

2.2 GROUNDING SYSTEMS

- A. Materials and Components:
 - 1. General: Except as otherwise indicated, provide electrical grounding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for complete installation. Where more than one type unit meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products complying with NEC, UL, IEEE, and established industry standards for applications indicated.
- B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC.

- C. Ground Rods: Solid copper or copper clad, minimum 3/4" dia. x 10'. Provide longer rods if necessary for required resistivity.
- D. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Installer must examine areas and conditions under which electrical grounding connections are to be made and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL GROUNDING

- A. General: Install electrical grounding systems where shown, in accordance with applicable portions of NEC, with NECA's "Standard of Installation", and in accordance with recognized industry practices, to ensure that products comply with requirements and serve intended functions.
- B. Coordinate with other electrical work as necessary to interface installation of electrical grounding system work with other work.
- C. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.
- D. All ground connections to water service entrance shall be installed to be exposed and visible for inspection at all times. Insulation shall not be installed over ground connections.
- E. A water pipe, by itself, is not an adequate grounding electrode and must be supplemented by dual grounding electrodes, a minimum of 8 feet apart, and effectively bonded together. The supplemental ground shall be per Code with the "Footing type electrode" installed as required by current National Electrical Code. Provide a new service entrance grounding electrode system including bonding to metallic cold water pipe, structural steel and building re-bar, if available.
- F. All ground connections shall be made on surfaces which have been cleaned of all paint, dirt, oil, etc., so that connections are bare metal to bare metal contact. All ground connections shall be tight and shall be made with U.L. listed grounding devices, fittings, bushings, etc.
- G. Duplex receptacles of any amperage shall be grounding type and shall have a separate grounding contact. A separate jumper shall be installed between the grounding terminal on the device and the metallic box. The Contractor may provide U.L. listed self-grounding receptacles in lieu of providing the separate jumper.
- H. Single and duplex receptacles shall have all grounded metal mechanically bonded together. Pressure bonding only is not acceptable.
- I. In all cases where flexible metallic conduit, nonmetallic rigid conduit or liquid tight flexible conduit is used, a green wire ground conductor shall be used to provide ground continuity between the equipment of device and the conduit raceway system.
- J. Provide a separate green wire ground conductor for each branch circuit originating from each panelboard. This ground shall be used to ground the device or load fed, and shall be bonded to components of the raceway system, such as junction boxes, starter or disconnect switch enclosures, equipment cases, etc. The green wire ground conductor shall terminate in the panelboard at the green wire ground bus. Ground conductors for branch circuits shall be of size indicated in NEC, except minimum size ground conductor shall be No. 12 AWG.
- K. Each branch feeder originating at the switchboard(s) shall have a green wire ground conductor originating at the ground bus in the switchboard and terminating at the green wire ground bus in the panelboard. This green wire ground conductor shall be of size indicated in NEC except in no instance smaller than No. 8 AWG.
- L. The green wire ground conductor is in addition to the neutral conductor and in no case shall the neutral conductor serve as the grounding means.
- M. Multiple conductors in a single lug not permitted. Each grounding conductor shall terminate in its own terminal lug.
- N. Grounding connections shall be tested and certified by the installer. The service entrance ground and each building ground shall have a maximum of 5 ohms resistance to ground. Supplemental grounding shall be provided if necessary.

END OF SECTION 26 1526

SECTION 26 0529 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is a part of each Division-26 section making reference to electrical supporting devices specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of supports, anchors, sleeves, and seals is indicated by drawings and schedules and/or specified in other Division-26 sections.
- B. Types of supports, anchors, sleeves, and seals specified in this section include the following:
 - 1. Clevis hangers
 - 2. C-clamps
 - 3. I-beam clamps
 - 4. One-hole conduit straps
 - 5. Round steel rods
 - 6. Lead expansion anchors
 - 7. Toggle bolts
 - 8. Wall and floor seals
- C. Supports, anchors, sleeves, and seals furnished as part of factory-fabricated equipment, are specified as part of that equipment assembly in other Division-26 sections.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of supporting devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of electrical supporting devices.

PART 2 - PRODUCTS

2.1 MANUFACTURED SUPPORTING DEVICES

- A. General: Provide supporting devices which comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one type of supporting device meets indicated requirements, selection is Installer's option.
- B. Supports: Provide supporting devices of types, sizes, and materials indicated; and having the following construction features:
 - 1. Clevis Hangers: For supporting 2" rigid metal conduit; galvanized steel; with 1/2" dia. hole for round steel rod; approximately 54 pounds per 100 units.
 - 2. Reducing Couplings: Steel rod reducing coupling, 1/2" x 5/8"; black steel; approximately 16 pounds per 100 units.
 - 3. C-Clamps: Black malleable iron; 1/2" rod size; approximately 70 pounds per 100 units.
 - 4. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange width 2"; approximately 52 pounds per 100 units.
 - 5. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.
 - 6. Hexagon Nuts: For 1/2" rod size; galvanized steel; approximately 4 pounds per 100 units.
 - 7. Round Steel Rod: Black steel; 1/2" dia.; approximately 67 pounds per 100 feet.
 - 8. Offset Conduit Clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.
- C. Anchors: Provide anchors of types, sizes, and materials indicated, with the following construction features:
 - 1. Lead Expansion Anchors: 1/2", approximately 38 pounds per 100 units.
 - 2. Toggle Bolts: Springhead; 3/16" x 4", approximately 5 pounds per 100 units.
- D. Available Manufacturers: Subject to compliance with requirements, manufacturers offering anchors which may be incorporated in the work include, but are not limited to, the following:
 - 1. Abbeon Cal Inc.
 - 2. Ackerman Johnson Fastening Systems, Inc.
 - 3. Elcen Metal Products Co.
 - 4. Ideal Industries, Inc.

5. Joslyn Mfg. and Supply Co.
 6. McGraw Edison Co.
 7. Rawlplug Co., Inc.
 8. Star Expansion Co.
 9. Expansion Bolt Co.
- E. Sleeves and Seals: Provide sleeves and seals, of types, sizes, and materials indicated, with the following construction features:
1. Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals, of types and sizes indicated; suitable for sealing around conduit, pipe, or buting passing through concrete floors and walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
- F. U-Channel Strut Systems: Provide U-channel strut system for supporting electrical equipment, 12-gage hot-dip galvanized steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with standard finish, and with the following fittings which mate and match U-channel.
1. Fixture hangers
 2. Channel hangers
 3. Thinwall conduit clamps
 4. Rigid conduit clamps
 5. Conduit hangers
 6. U-bolts
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering channel systems which may be incorporated in the work include, but are not limited to, the following:
1. Greenfield Mfg. Co.; Inc.
 2. Midland-Ross Corp.
 3. OZ/Gedney Div.; General Signal Corp.
 4. Power-Strut Div.; Van Huffel Tube Corp.
 5. Unistrut Div.; GTE Products Corp.
- H. Pipe Sleeves: Provide pipe sleeves of one of the following:
1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal: 3" and smaller, 20-gage; 4" to 6", 16-gage; over 6", 14-gage.
 2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
 3. Iron Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.
 4. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.
- I. Sleeve Seals: Provide sleeves for piping which penetrates foundation walls below grade, or exterior walls. Calk between sleeve and pipe with non-toxic, UL-classified calking material to ensure watertight seal.

PART 3 - EXECUTION

3.1 INSTALLATION OF SUPPORTING DEVICES

- A. Install hangers, anchors, sleeves, and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices.
- B. Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work. Coordinate support locations with other structural and mechanical trades. Supports shall not be attached to mechanical or electrical piping, conduit, ductwork, ceiling grid system or any other non-structural member.
- C. Install hangers, supports, clamps, and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with spacings indicated and in compliance with NEC requirements.

END OF SECTION 26 0529

SECTION 26 0530 - ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division-23 and 26 section making reference to electrical connections for equipment specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.
- B. Applications of electrical power connections specified in this section include the following:
 - 1. From electrical source to motor starters.
 - 2. From motor starters to motors.
 - 3. To lighting fixtures.
 - 4. To grounds including earthing connections.
 - 5. To equipment of communication, CCTV and alarm systems.
- C. Electrical connections for equipment, not furnished as integral part of equipment, are specified in Division-23 and other Division-26 sections, and are work of this section.
- D. Motor starters and controllers, not furnished as integral part of equipment, are specified in applicable Division-26 sections, and are work of this section.
- E. Refer to Division-23 specification sections and drawings for motor starters and controllers furnished integrally with equipment; not work of this section. Connections to this equipment is work of this section.
- F. Junction boxes and disconnect switches required for connecting motors and other electrical units of equipment are specified in applicable Division-26 sections, and are work of this section.
- G. Raceways and wires/cables required for connecting motors and other electrical units of equipment are specified in applicable Division-26 sections, and are work of this section.
- H. Refer to other Division-26 and Division-23 sections for low voltage control system wiring; not work of this section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors and terminals, of types and ratings required, and ancillary connection materials, including electrical insulating tape, soldering fluxes, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 2 years of successful installation experience with projects utilizing electrical connections for equipment similar to that required for this project.
- C. NEC Compliance: Comply with applicable requirements of NEC as to type products used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters, and disconnect switches.
- D. IEEE Compliance: Comply with Std 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to connections and terminations.
- E. ANSI Compliance: Comply with applicable requirements of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.
- F. UL Compliance: Comply with UL Std 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors", including, but not limited to, tightening of electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL-listed and labeled.
- G. ETL Compliance: Provide electrical connection products and materials which are ETL-listed and labeled.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. AMP Incorporated
 - 2. Appleton Electric Co.
 - 3. Arrow-Hart Div., Crouse-Hinds Co.
 - 4. Burndy Corporation
 - 5. General Electric Co.
 - 6. Gould, Inc.
 - 7. Harvey Hubbell Inc.

8. Square D Company
9. Thomas and Betts Corp.

2.2 MATERIALS AND COMPONENTS

- A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wirenuts, and other items and accessories as needed to complete splices and terminations of types indicated.
- B. Metal Conduit, Tubing, and Fittings:
 1. General: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thicknesses) indicated for each type service. Where types and grades are not indicated, provide proper selection as determined by Installer to fulfill wiring requirements and comply with NEC requirements for raceways. Provide products complying with Division-26 basic electrical materials and methods section "Raceways", and in accordance with the following listing of metal conduit, tubing, and fittings:
 - a. Rigid steel conduit.
 - b. Rigid metal conduit fittings.
 - c. Electrical metallic tubing.
 - e. Liquid-tight flexible metal conduit.
 - f. Liquid-tight flexible metal conduit fittings.
 - g. Flexible metal conduit.
 - h. Flexible metal conduit fittings.
- C. Wires, Cables, and Connectors:
 1. General: Provide wires, cables, and connectors complying with Division-26 basic electrical materials and methods section "Wires and Cables".
 2. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20oC (68oF).
 3. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL CONNECTIONS

- A. Install electrical connections as indicated; in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC, and NECA's "Standard of Installation", to ensure that products fulfill requirements.
- B. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.
- C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.
- D. Provide the following electrical work as work of this section, complying with requirements of Division 23 sections:
 1. Power supply wiring from power source to power connection on chiller, fans, air handling units, pumps, duct heaters, water heaters, air compressor, air dryer, and unit control panels. Include starters, disconnects, time clocks, receptacles and required electrical devices, except where specified as furnished, or factory-installed, by manufacturer. Make all final electrical connections.
- E. Maintain existing electrical service and feeders to occupied areas and operational facilities, unless otherwise indicated, or when authorized otherwise in writing by Owner, or Architect/Engineer. Provide temporary service during interruptions to existing facilities. When necessary, schedule momentary outages for replacing existing wiring systems with new wiring systems. When that "cutting-over" has been successfully accomplished, remove, relocate, or abandon existing wiring as indicated.
- F. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced. No new conductors shall be spliced unless specifically noted on the drawings.

- G. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.
 - H. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing, and maintenance.
 - I. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.
 - J. Provide flexible conduit for motor connections, and other electrical equipment connections, where subject to movement and vibration.
 - K. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:
 - 1. Exterior location.
 - 2. Moist or humid atmosphere where condensate can be expected to accumulate.
 - 3. Corrosive atmosphere.
 - 4. Water spray.
 - 5. Dripping oil, grease, or water, including kitchen areas.
- 3.3 FIELD QUALITY CONTROL
- A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION 26 0530

SECTION 26 0533 - RACEWAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division-26 section making reference to electrical raceways specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of raceway work is indicated by drawings and schedules. Types of raceways specified in this section include the following:
 - 1. Electrical metallic tubing (EMT).
 - 2. Liquid tight flexible metal conduit.
 - 3. Rigid metal conduit.
 - 4. Flexible metal conduit.
 - 5. Rigid non-metallic conduit.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with electrical raceway work similar to that required for this project.
- C. Codes and Standards:
 - 1. NEMA Compliance: Comply with applicable requirements of NEMA Standards Publications pertaining to raceways.
 - 2. UL Compliance and Labeling: Comply with applicable requirements of UL safety standards pertaining to electrical raceway systems. Provide raceway products and components which have been UL-listed and labeled.
 - 3. NEC Compliance: Comply with applicable requirements of NEC pertaining to construction and installation of raceway systems.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of raceway system required. Include data substantiating that materials comply with requirements.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. General: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thicknesses) for each service indicated. Die-cast fittings are not acceptable.
- B. Rigid Steel Conduit: Provide rigid steel, zinc-coated, threaded type conforming to FS WW-C-581, ANSI C80.1 and UL 6.
- C. Rigid Metal Conduit Fittings: Cast malleable iron, galvanized or cadmium plated, conforming to FS W-F-408, ANSI C80.4.
 - 1. Use compression type fittings for raintight connections.
 - 2. Use compression type fittings for other miscellaneous connections.
- D. Electrical Metallic Tubing (EMT): FS WW-C-563, ANSI C80.3 and UL 797.
- E. EMT Fittings: FS W-F-408, ANSI C80.4. Die cast or malleable iron.
 - 1. Use compression fittings for raintight connections.
 - 2. Use compression type for concrete type connections.
 - 3. Use compression type fittings for miscellaneous connections.
 - 4. Set screw fitting may be used only where conduits and associated fittings are concealed from view.
- F. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked, and double-wrapped steel; galvanized inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC). Shall be Sealtite or equal.
- G. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated, or non-insulated throat.

- H. Flexible Metal Conduit: FS WW-C-566 and UL 1. Formed from continuous length of spiral wound, interlocked zinc-coated strip steel.
 - I. Flexible Metal Conduit Fittings: Provide conduit fittings for use with flexible steel conduit of threadless hinged clamp type.
 - 1. Straight Terminal Connectors: One piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
 - 2. 45o or 90o Terminal Angle Connectors: Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
- 2.2 NONMETALLIC CONDUIT
- A. General: Provide nonmetallic conduit, ducts, and fittings of types, sizes, and weights for each service indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements which comply with provisions of NEC for raceways.
 - B. Electrical Plastic Conduit:
 - 1. Heavy Wall Conduit: Schedule 40, 90 C, UL-rated, construct of polyvinyl chloride and conforming to NEMA TC-2, for direct burial, or normal above ground use, UL-listed and in conformity with NEC Article 352, ANSI C33.91.
 - C. PVC Conduit and Tubing Fittings: NEMA TC 3, mate and match to conduit or tubing type and material.
- 2.3 MANUFACTURERS
- A. Subject to compliance with requirements, provide conduit bodies of one of the following:
 - 1. Appleton Electric; Div of Emerson Electric Co.
 - 2. Arrow-Hart Div; Crouse-Hinds Co.
 - 3. Bell Electric Div; Square D Co.
 - 4. Gould, Inc.
 - 5. Killark Electric Mfg. Co.
 - 6. O-Z/Gedney Div; General Signal Co.
 - 7. Spring City Electrical Mfg. Co., or equivalent.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF RACEWAYS

- A. General: Install raceways as indicated; in accordance with manufacturer's written installation instructions, and in compliance with NEC, and NECA's "Standards of Installation". Install units plumb and level, and maintain manufacturer's recommended clearances.
- B. Coordinate with other work including wires/cables, boxes, and panel work, as necessary to interface installation of electrical raceways and components with other work.

3.3 INSTALLATION OF CONDUITS

- A. General: Install concealed conduits in new construction work, either in walls, slabs, or above hung ceilings. Run conduits concealed in existing work where practical or specifically indicated on the drawings.
 - 1. Mechanically fasten together metal conduits, enclosures, and raceways for conductors to form continuous electrical conductor. Connect to electrical boxes, fittings, and cabinets to provide electrical continuity and firm mechanical assembly.
 - 2. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.
 - 3. Install miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Install expansion fittings in raceways every 200' of linear run or wherever structural expansion joints are crossed.
- B. Conduit Installation: Follow minimum requirements in all areas as follows:
 - 1. Use rigid steel galvanized conduit where exposed in the central plant, where exposed to weather or subject to saturation with liquids, and where exposed to potential mechanical damage. Also use rigid steel galvanized conduit for all risers from underground, except as allowed for conduits used for communications systems. All rigid elbows and rigid risers to cabinets shall be applied with bitumastic paint where below grade.
 - 2. Use steel EMT above hung ceilings in offices, corridors, toilets, and other areas with hung ceilings. EMT may be used in mechanical and electrical rooms, except for the central plant and other areas requiring rigid steel galvanized conduit as in (1.) above.

3. Use PVC heavy wall direct buried rated (Schedule 40) when raceways run below grade, under floors on grade or in concrete. All bends and elbows greater than 45 degrees shall be galvanized rigid steel conduit. All risers from underground to cabinets and boxes when conduit is to be exposed shall be rigid steel conduit.
 4. Underground telecommunications conduits for voice/data, fire alarm, intercom, and TV may be all direct buried rated Schedule 40 PVC.
 5. Conduit in walls to recessed panels and boxes shall be in accordance with NEC. PVC up to first point of termination with 4'-0" maximum in wall and EMT above 4'-0".
 6. Use flexible conduit in movable partitions and from outlet boxes to lighting fixtures, and final 24" of connection to motors, control items or any equipment subject to movement or vibration, and in cells of precast concrete panels. Flexible conduit shall not exceed 6 feet long.
 7. Use liquid-tight flexible conduit where subjected to one or more of the following conditions:
 - a. Exterior location.
 - b. Moist or humid atmosphere where condensate can be expected to accumulate. Mechanical rooms.
 - c. Corrosive atmosphere.
 - d. Subjected to water spray or dripping oil, water, or grease, including kitchen equipment connections.
 8. Use hot-dipped galvanized conduit where conduit is routed outdoors or in anyway exposed to weather.
 9. Surface mounted raceways in finished areas are not permitted.
 10. Electrical contractor will be responsible for the following for all underground conduits:
 - a. Trenching and Excavation
 - b. Backfill
 - c. Compaction
 - d. Entrances into and exits from buildings shall be underground, concealed. See Specification Sections 01731 and 01732.
 11. MC cable shall not be permitted.
- C. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
- D. Field bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
- E. Minimum conduit size shall be 1/2" unless noted otherwise. Homeruns shall be a minimum 3/4".
- F. Fasten conduit terminations in sheet metal enclosures by two (2) locknuts, and terminate with bushings and grounded. Install locknuts inside and out side enclosure.
- G. Conduits are not to cross pipe shafts, or ventilating duct openings.
- H. Keep conduits a minimum distance of 6" from parallel runs of flues, hot water pipes or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
- I. Use of running threads at conduit joints and terminations is prohibited. Where required, use 3-piece union or split coupling.
- J. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
- K. Install conduits so as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.
- L. Exposed Conduits in Unfinished Areas:
 1. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.
 2. Install exposed conduit work as not to interfere with ceiling inserts, lights or ventilation ducts or outlets.
 3. Support all conduits by use of hangers, clamps, or clips. Support conduits on each side of bends and on spacing not to exceed following: up to 1": 6'-0"; 1-1/4" and over: 8'-0". All conduits shall be adequately supported to prevent any noticeable deflection, vibration or rattle.
 4. Run conduits for outlets on waterproof walls exposed. Set anchors for supporting conduit on waterproof wall in waterproof cement.
 5. Exposed conduits on the outside of buildings is not permitted.
- M. Conduit Fittings:
 1. Construct locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening.
 2. Bushings for terminating conduits smaller than 1- 1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.
 3. Install insulated type bushings for terminating conduits 1-1/4" and larger. Bushings are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.
 4. All bushings of standard or insulated type to have screw type grounding terminal.
 5. Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, split couplings, and plugs to be specifically designed for their particular application.
- N. Concealed Conduits:
 1. Metallic raceways installed underground or in floors below grade, or outside are to have conduit threads painted with corrosion inhibiting compound before couplings are assembled. Draw up coupling and conduit sufficiently tight to ensure watertightness.

2. Conduit in concrete slabs: Separate conduits by not less than diameter of largest conduit to ensure proper concrete bond. Conduits must have a minimum of three-quarter inch (3/4") concrete cover.
 3. Embedded conduit diameter is not to exceed one-third (1/3) of slab thickness. Conduit shall not be run in slabs less than 3 inches thick.
- O. Painting of Conduit & Boxes:
1. Fire Alarm: All new fire alarm conduit, including underground conduit, shall be spot painted red at a minimum of every 4 feet, nominally. Underground conduit shall be spot painted red after it is laid in trench and made up tight. All fire alarm junction boxes shall be painted red.
 2. Intercom System: All new junction boxes above ceiling shall be painted blue.
 3. Instructional TV System: All new junction boxes above ceiling shall be painted green.
 4. Security System: All new junction boxes above ceiling shall be painted yellow.
 5. 208Y/120 volt Power: All new junction boxes above ceiling shall be painted brown.
 6. 480Y/277 volt Power: All new junction boxes above ceiling shall be painted orange.
 7. Emergency Power (if applicable): All new junction boxes above ceiling shall be painted pink.
- P. Provide a continuous yellow marker tape with metallic tracer 6 inches above all new underground conduit.
- Q. Underground Duct Banks and Underground Conduits: All underground conduits shall be installed per the National Electrical Code, in accordance with standard industry practices and in accordance with other sections of these specifications. Conduits in duct banks shall be neatly and securely installed in straight lines with manufactured elbows used for all turns and bends. Provide all required trenching, excavation, backfill, compaction, supports, manholes, etc. for a complete installation. Trenching, excavation, backfill and compaction shall be performed in accordance with applicable Division 2 and Division 3 sections of these specifications.
1. Coordinate routing of site raceways with all site piping including new chilled water piping and fire protection piping, plus existing sanitary, storm, and other site utilities. Hand dig in congested areas.
- R. Low Voltage Control:
1. Mechanical contractor (Division 23) to provide and install all necessary wire and raceway (EMT conduit) for low voltage control such as thermostats, timers etc., unless specifically shown otherwise on the drawings. Raceways shall be installed in accordance with Division 26 sections. Final wire connections shall be by mechanical contractor.
- 3.4 INSTALLATION OF RACEWAYS AND WIREWAYS
- A. General: Mechanically assemble metal enclosures, and raceways for conductors to form continuous electrical conductor, and connect to electrical boxes, fittings and cabinets as to provide effective electrical continuity and rigid mechanical assembly.
1. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.
 2. Install expansion fittings in all raceways wherever structural expansion joints are crossed.
 3. Make changes in direction of raceway run with proper fittings, supplied by raceway manufacturer. No field bends of raceway sections will be permitted.
 4. Properly support and anchor raceways for their entire length by structural materials. Raceways are not to span any space unsupported. Supporting conduits from ceiling grid, other conduits, ductwork or other non-structural members will not be permitted.
 5. Use boxes as supplied by raceway manufacturer wherever junction, pull or devices boxes are required. Standard electrical "handy" boxes, etc. shall not be permitted for use with surface raceway installations.
 6. Provide watertight seals in all conduits which cross from one temperature to another temperature extreme, such as coolers and freezers.
 7. All fire wall and smoke wall penetrations shall be sealed using a UL Listed fire stopping method. Method shall be submitted and approved by the Architect/Engineer.
 8. All empty conduits shall have a 1/8" nylon pull rope installed, including all underground conduits.
- 3.5 COMMUNICATIONS SYSTEMS RACEWAY
- A. Communications systems raceways shall be provided for each voice/data, fire alarm, or other system outlet or device indicated on the drawings.

END OF SECTION 26 0533

SECTION 26 0535 - ELECTRICAL BOXES AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is a part of each Division-26 section making reference to electrical wiring boxes and fittings specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of electrical box and associated fitting work is indicated by drawings and schedules.
- B. Types of electrical boxes and fittings specified in this section include the following:
 - 1. Outlet boxes
 - 2. Junction boxes
 - 3. Pull boxes
 - 4. Floor boxes
 - 5. Bushings
 - 6. Locknuts
 - 7. Knockout closures
 - 8. Manholes and handholes

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of electrical boxes and fittings, of types, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects utilizing electrical boxes and fittings similar to those required for this project.
- C. NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes and fittings.
- D. UL Compliance: Comply with applicable requirements UL 50, UL 514-Series, and UL 886 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings which are UL-listed and labeled.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Stds/Pub No.'s OS1, OS2, and Pub 250 pertaining to outlet and device boxes, covers, and box supports.

PART 2 - PRODUCTS

2.1 FABRICATED MATERIALS

- A. Outlet Boxes: Provide galvanized coated flat rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.
 - 1. Recessed outlet boxes shall be a minimum 4" square by 2-1/2" deep with reducer ring for a standard outlet coverplate. Where surface mounted devices are necessary provide 2-1/2" x 4" x 2-1/2" deep box to fit a standard coverplate. Shallow boxes shall not be permitted for communications outlet boxes.
 - 2. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliance option.
- B. Device Boxes: Provide galvanized coated flat rolled sheet-steel non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable-size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps and corrosion-resistant screws for fastening cable clamps, and for equipment type grounding.
 - 1. Recessed outlet boxes shall be a minimum 4" square by 2-1/2" deep with reducer ring for a standard outlet coverplate. Where surface mounted devices are necessary provide 2-1/2" x 4" x 2-1/2" deep box to fit a standard coverplate. Shallow boxes shall not be permitted for communications outlet boxes.
 - 2. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board

- expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code-compliance option.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering outlet boxes which may be incorporated in the work include, but are not limited to, the following:
1. Appleton Electric;
 2. Bell Electric;
 3. Eagle Electric Mfg. Co.; Inc.
 4. Midland-Ross Corp.
 5. OZ/Gedney; General Signal Co.
 6. Pass and Seymour, Inc.
 7. RACO Div.; Harvey Hubbell Inc.
 8. Thomas & Betts Co.
- D. Raintight Outlet Boxes: Provide corrosion-resistant cast-metal raintight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, cast-metal face plates with spring hinged watertight caps suitably configured for each application, including face plate gaskets and corrosion-resistant plugs and fasteners.
- E. Available Manufacturers: Subject to compliance with requirements, manufacturers offering raintight outlet boxes which may be incorporated in the work include, but are not limited to, the following:
1. Appleton Electric;
 2. Crouse-Hinds Co.
 3. Bell Electric;
 4. Harvey Hubbell, Inc.
 5. OZ/Gedney; General Signal Co.
 6. RACO Div.
- F. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes; with screw-on covers; of types, shapes and sizes, to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws, and washers.
- G. Available Manufacturers: Subject to compliance with requirements, manufacturers offering junction and pull boxes which may be incorporated in the work include, but are not limited to, the following:
1. Appleton Electric; Emerson Electric Co.
 2. Arrow-Hart Div.; Crouse-Hinds Co.
 3. Electric; Square D Company
 4. OZ/Gedney; General Signal Co.
 5. Spring City Electrical Mfg. Co.
- H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering floor boxes which may be incorporated in the work include, but are not limited to, the following:
1. Arrow-Hart Div.; Crouse-Hinds Co.
 2. Harvey Hubbell, Inc.
 3. Midland-Ross Corp.
 4. Spring City Electrical Mfg. Co.
- I. Bushings, Knockout Closures, and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and malleable iron conduit bushings, offset connections, of types and sizes, to suit respective installation requirements and applications.
- J. Available Manufacturers: Subject to compliance with requirements, manufacturers offering bushings, knockout closures, locknuts, and connectors which may be incorporated in the work include, but are not limited to, the following:
1. Arrow-Hart Div.; Crouse-Hinds Co.
 2. Appleton Electric Co.; Emerson Electric Co.
 3. Bell Electric; Square D Co.
 4. Midland-Ross Corp.
 5. OZ/Gedney Co.; General Signal Co.
- K. Manholes and Handholes: Manholes and handholes for exterior use shall be pre-cast concrete with steel traffic rated covers, as manufactured by Brooks or equal. Pre-manufactured composite type boxes (Quazite or approved equal) are permitted where suitable and rated for the use indicated. Manholes and handholes shall be the size necessary for the number of conduits and conductors indicated on the drawings which will enter the enclosure, plus the necessary capacity for the spare conduits and the associated estimated conductor fill. Provide manholes with the appropriate drainage and knockouts for conduits and other necessary access. Traffic covers shall be engraved with the appropriate identification, such as "ELECTRIC" or "COMMUNICATIONS". Provide plastic protective grommet on all conduit ends for all communications systems conduit inside manholes. Fire alarm conduits shall be marked.

PART 3 - EXECUTION

3.1 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

- A. General: Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.
- C. Provide weathertight boxes and fittings for interior and exterior locations exposed to weather or moisture. Provide weatherproof boxes for all exterior outlet boxes for power and systems, including fire alarm and intercom system boxes.
- D. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- E. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.
- F. Avoid installing boxes back-to-back in walls. Provide not less than 24" (600 mm) separation.
- G. Position recessed outlet boxes accurately to allow for surface finish thickness. All outlet boxes shall be provided with bracket support behind the box for additional structural support. Mounting boxes directly to the metal framing on one side only is not acceptable. Boxes shall be additionally supported on the back side.
- H. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.
- I. Outlet boxes shall be structurally supported to the metal studs using a back bracket or other additional means of support. Side mounted attachment only to the metal studs is not acceptable.
- J. Each circuit in pull box shall be marked with a tag guide denoting panels which they connect to.
- K. Manholes and handholes shall be installed for all underground conduit installations. The minimum number of manholes and handholes shall be as indicated on the drawings. The contractor shall provide any additional handholes or manholes necessary for ease of installation, code compliance or due to voluntary or required re-routing of the underground conduits at no additional cost to the Owner.

END OF SECTION 26 0535

SECTION 26 0553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods section apply to work specified in this section.

1.2 DESCRIPTION OF WORK

- A. Extent of electrical identification work is indicated by drawings and schedules.
- B. Types of electrical identification work specified in this section include the following:
 - 1. Electrical power, control, and communication conductors.
 - 2. Operational instructions and warnings.
 - 3. Equipment/system identification signs.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of electrical identification products of types required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. NEC Compliance: Comply with NEC as applicable to installation of identifying labels and markers for wiring and equipment.
- C. UL Compliance: Comply with applicable requirements of UL Std 969, "Marking and Labeling Systems", pertaining to electrical identification systems.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering electrical identification products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Brady, W.H. Co.

2.2 ELECTRICAL IDENTIFICATION MATERIALS

- A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each application.

2.3 ENGRAVED PLASTIC-LAMINATE SIGNS

- A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, white face and black core plies (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
 - 1. Thickness: 1/8", except as otherwise indicated.
 - 2. Fasteners: Self-tapping stainless steel screws or permanent rivets. Contact-type permanent adhesive will not be acceptable.

2.4 LETTERING AND GRAPHICS

- A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering, and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

- A. General Installation Requirements:
 - 1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions and requirements of NEC.
 - 2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.
 - 3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.

3.2 OPERATIONAL IDENTIFICATION AND WARNINGS

- A. General: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical systems, and electrically connected mechanical systems and general systems and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and doors of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purposes.

3.3 EQUIPMENT/SYSTEM IDENTIFICATION

- A. General: Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/ control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, 1/2" high lettering, on 1-1/2" high sign (2" high where 2 lines are required), black lettering in white field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
1. Switchboard (including all individual circuit breakers and main breaker), panelboards (including all individual circuit breakers and main breaker on distribution panels), electrical cabinets, disconnect switches and enclosures.
 2. Access panel/doors to electrical facilities. Provide building disconnect signage as indicated on the drawings.
 3. Transformers
 4. Equipment disconnects and starters.
 5. Timeclocks, contactors and lighting controls.
 6. Other control stations, such as purge fans, etc.
- B. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate.

END OF SECTION 26 0553

SECTION 26 2616 - CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods section, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of circuit and motor disconnect switch work is indicated by drawings and schedules.
- B. Types of circuit and motor disconnect switches in this section include the following:
 - 1. Equipment disconnects.
 - 2. Appliance disconnects.
 - 3. Motor-circuit disconnects.
- C. Wires/cables, raceways, and electrical boxes and fittings required in connection with circuit and motor disconnect work are specified in other Division-26 Basic Electrical Materials and Methods sections.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of circuit and motor disconnect switches of types and capacities required whose products have been in satisfactory use in similar service for not less than 3 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing circuit and motor disconnect work similar to that required for this project.
- C. NEC Compliance: Comply with NEC requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.
- D. UL Compliance: Comply with requirements of UL 98, "Enclosed and Dead-Front Switches". Provide circuit and motor disconnect switches which have been UL-listed and labeled.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Stds Pub No. KS 1, "Enclosed Switches" and 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)".

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on circuit and motor disconnect switches.
- B. Wiring Diagrams: Submit power and control wiring diagrams for circuit and motor disconnects including connections to power and control panels, and feeders.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering circuit and motor disconnects which may be incorporated in the work include the following:
 - 1. General Electric Co.
 - 2. Square D Company
 - 3. ITE/Seimens

2.2 FABRICATED SWITCHES

- A. Heavy-Duty Safety Switches: Provide surface-mounted, heavy-duty type, sheet-steel enclosed safety switches, of types, sizes and electrical characteristics indicated; fusible or non-fusible type as indicated, amperes as indicated, 60 Hz, 3-blades, 4-poles, solid neutral; and incorporating quick-make, quick-break type switches; construct so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable, and is padlockable in OFF position; construct current carrying parts of high-conductivity copper, with silver-tungsten type switch contacts, and positive pressure type reinforced fuse clips. Provide NEMA Type 3R enclosures, where applicable. Provide grounding kit. Provide 240 volt rated switches for 208Y/120 volt systems and 600 volt rated switches for 277Y/480 volt systems.
 - 1. Fuses: Provide fuses for safety switches, sized as recommended by the manufacturer of the equipment to be protected, of classes, types, and ratings needed to fulfill electrical requirements for service indicated. Provide R-clips for all fuse holders.

PART 3 - EXECUTION

3.1 INSTALLATION OF CIRCUIT AND MOTOR DISCONNECT SWITCHES

- A. Install circuit and motor disconnect switches as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate circuit and motor disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.
- C. Install disconnect switches for use with motor-driven appliances, and motors and controllers within sight of controller position unless otherwise indicated.
- D. Provide a nameplate indicating the equipment served and protected.

3.2 GROUNDING

- A. Provide equipment grounding connections, sufficiently tight to assure a permanent and effective ground, for electrical disconnect switches where indicated.

3.3 FIELD QUALITY CONTROL

- A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.
- B. Painting: repair all scratches to factory painted and primed finish with factory supplied touch-up paint.

END OF SECTION 26 2616

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division-26 section making reference to wiring devices specified herein.

1.2 DESCRIPTION OF WORK

- A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.
- B. Types of electrical wiring devices in this section include the following:
 - 1. Receptacles, including surge suppression type if applicable.
 - 2. Ground-fault circuit interrupters

1.3 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm with at least 2 years of successful installation experience on projects utilizing wiring devices similar to those required for this project.
- B. NEC Compliance: Comply with NEC as applicable to installation and wiring of electrical wiring devices.
- C. UL Compliance: Comply with applicable requirements of UL 20, 486A, 498, and 943 pertaining to installation of wiring devices. Provide wiring devices which are UL-listed and labeled.
- D. IEEE Compliance: Comply with applicable requirements of IEEE Std 241, "Recommended Practice for Electric Power Systems in Commercial Buildings", pertaining to electrical wiring systems.
- E. NEMA Compliance: Comply with applicable portions of NEMA Stds Pub/No. WD 1, "General-Purpose Wiring Devices", WD 2, "Semiconductor Dimmers for Incandescent Lamps", and WD 5, "Specific,-Purpose Wiring Devices".
- F. FS Compliance: Comply FS W-C-596 (Series) and FS W-S-896 (Series) pertaining to electrical power connectors and toggle switches.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on electrical wiring devices.
 - 1. Receptacles, including surge suppression type if applicable.
 - 2. Ground-fault circuit interrupters

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide wiring devices of one of the following (for each type and rating of wiring device):
 - 1. Hubbell
 - 2. Arrow-Hart Div.
 - 3. Eagle Electric Co.
 - 4. Leviton
 - 5. Pass - Seymour

2.2 FABRICATED WIRING DEVICES

- A. General: Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and which comply with NEMA Stds Pub/No. WD 1. Provide color devices to match existing and stainless steel coverplates, except as otherwise indicated; all color selections to be verified by Contractor with Architect/Engineer prior to ordering. Match existing colors in adjacent spaces.
- B. Receptacles:
 - 1. Heavy-Duty Duplex: Provide specification grade duplex receptacles, 2-pole, 3-wire, grounding, 20-amperes, 125-volts, with metal plaster ears, design for side and back wiring with spring loaded, screw activated pressure plate, with NEMA configuration 5-20R unless otherwise indicated. Hubbell or equal.
 - 2. Ground-Fault Interrupters: Provide "feed-thru" type ground-fault circuit interrupters, with heavy-duty duplex receptacles, capable of protecting connecting downstream receptacles on single circuit, and of being installed in a 2-3/4" deep outlet box without adapter, grounding type UL-rated Class A, Group 1, rated 20 amperes, 120-volts, 60 Hz; with solid-state ground-fault sensing and indication; with 5 milliamperes ground-fault trip level; equip with NEMA configuration 5-20R. Device must have a positive trip identification and reset. Provide device to match the existing color of devices in adjacent areas.

3. Special Receptacles: Special configuration receptacles shall be standard NEMA plug configuration as specified on the drawings or as required. Provide heavy duty, specification grade receptacles, with black nylon face and brushed satin stainless steel cover plate.
- C. Switches:
1. Snap: Provide specification grade, general-duty flush single-pole, quiet type toggle switches, 20-amperes, 120-277 volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, switch handle, and side-wired screw terminals.
 2. 2-way: Provide specification grade, general-duty flush double-pole AC quiet switches, 20-amperes, 120-277 volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, switch handles, side-wired screw terminals, with break-off tab features, which allows wiring with separate or common feed.
 3. Three-way: Provide specification grade, general-duty flush 3-way AC quiet type switches, 20-amperes, 120-277 volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, lock type switch handles, sidewired screw terminals, with break-off tab features, which allows wiring with separate or common feed.
 4. Four-way: Provide specification grade, general-duty flush 4-way AC quiet switches, 20-amperes, 120-277 volts AC, with mounting yoke insulated from mechanism, equip with plaster ears, switch handles, side-wired screw terminals, with break-off tab features, which allows wiring with separate or common feed.
 5. Touch Snap: Provide soft-touch snap switches, cap able of effortless-fingertip operation; single-pole AC quiet, with lighted rocker switch handles; sidewired screw terminals for connecting copper-clad aluminum wire, 20-amperes, 120-277 volts rating. Equip with plaster ears.
 6. Provide low voltage type manual on – auto off switches where indicated with occupancy (vacancy) sensor control.
 7. Switches to be color to match existing, and shall be provided with a stainless steel coverplate.

2.3 WIRING DEVICE ACCESSORIES

- A. Wallplates: Provide wallplates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as required. Select plates which mate and match wiring devices to which attached. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Provide plates possessing the following additional construction features:
 1. Material and Finish: Stainless Steel.
- B. Outdoor receptacles that are in locations without protection from the weather shall be provide with a UL listed and approved "in-use" weatherproof cover, and shall be GFI protected. DO NOT use "in-use" type cover in damp locations.

2.4 OCCUPANCY SENSORS AND DAYLIGHT SENSORS (Where applicable)

- A. Occupancy sensors shall be dual technology type. Provide occupancy sensors in all spaces indicated on the drawings, and provide ceiling or switch type mounted where indicated. Sensors shall be the type suited for the location. Adjust locations and sensor type (long range where required) for proper performance and as needed to correct any nuisance on or off actions. Sensors shall have adjustable sensitivity, adjustable time periods for on/off, and a test mode. Sensor shall be set at 15 minutes. Sensorswitch or equal by Wattstopper, Hubbell.
 1. Coordinate sensor type with the lighting control for manual on – auto off where required.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING DEVICES

- A. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.
- C. Install wiring devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris.
- D. Install galvanized steel wallplates on any exposed surface mounted devices.
- E. Install wallplates after painting work is completed.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B. Use properly scaled torque indicating hand tool.

- G. Contractor to provide ground fault protective type receptacles for any location within 2'-0" of sinks or other source of water. Feed through protection from one ground fault protected receptacle on a circuit is not acceptable.
- H. Mounting height of boxes for devices as shown on legend, unless otherwise noted on the plan. Refer to architectural drawings to avoid interferences with millwork. Where two or more devices are shown at the same location, use gang box and one face plate. Verify all device locations with Owner prior to rough-in. Exact device locations may be adjusted by the Owner to avoid interferences or for general convenience at no additional cost to the Owner.

3.2 PROTECTION OF WALLPLATES AND RECEPTACLES

- A. Upon installation of wallplates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.3 GROUNDING

- A. Provide equipment grounding connections for wiring devices, unless otherwise indicated. Tighten connections to comply with tightening torques specified in UL Std 486 A to assure permanent and effective grounds.

3.4 TESTING

- A. Prior to circuitry, test wiring for electrical continuity, for short-circuits and for grounding. Ensure proper polarity of connections is maintained. Prior to energization, test wiring devices to demonstrate compliance with requirements.

3.5 Warranty

- A. All wiring devices shall have a minimum one year parts and labor warranty.

END OF SECTION 26 2726

SECTION 26 2813 - OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. This section is a Division-26 Basic Electrical Materials and Methods section, and is part of each Division-26 section making reference to overcurrent protective devices specified herein.

1.2 DESCRIPTION OF WORK

- A. Extent of overcurrent protective device work is indicated by drawings and schedules.
- B. Types of overcurrent protective devices in this section include the following:
 - 1. Circuit Breakers:
 - a. Air, molded-case, for installation in panels.
 - b. Air, molded-case, for individual, separately enclosed mounting.
 - c. For installation in existing panels.
 - 2. Fuses:
 - a. Class RK1 and RK5, dual-element time-delay.
- C. Refer to other Division-26 sections for cable/wire and connector work required in conjunction with overcurrent protective devices; not work of this section.

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of overcurrent protective devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for project.
- C. NEC Compliance: Comply with NEC requirements as applicable to construction and installation of overcurrent protective devices.
- D. UL Compliance: Comply with applicable requirements of UL 489, "Molded-Case Circuit Breakers and Circuit-Breaker Enclosures", and UL 198D, "High-Interrupting-Capacity Class K Fuses". Provide overcurrent protective devices which have been UL-listed and labeled.
- E. NEMA Compliance: Comply with applicable requirements of NEMA Std Pub Nos. AB 1, AB 2, and SG 3 pertaining to molded-case and low-voltage power type circuit breakers.
- F. FS Compliance: Comply with Federal Specification W-C-375B/GEN pertaining to molded-case circuit breakers.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on overcurrent protective devices, including: amperes, voltages and current ratings, interrupting ratings, current limitations, internal inductive and non-inductive loads, time-current trip characteristics curves, and mounting requirements.
- B. Maintenance Stock, Fuses: For types and ratings required, furnish additional fuses, amounting to one unit for every 5 installed units, but not less than one unit of each.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include the following:
 - 1. Circuit Breakers:
 - a. General Electric Co.
 - b. Square D Co.
 - c. ITE/Seimens
 - 2. Fuses:
 - a. Bussmann Div.; McGraw-Edison Co.
 - b. Gould, Inc.
 - c. Cefco

2.2 CIRCUIT BREAKERS

- A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings, and electrical characteristics indicated, which comply with manufacturer's standard design,

materials, components, and construction in accordance with published product information, and as required for a complete installation.

- B. Molded-Case Circuit Breakers: Provide factory assembled, molded-case circuit breakers of frame size indicated; rated 600 volts or 240 volts as required, 60 Hz, 3-poles with interrupting ratings as shown on drawings. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole, and with fault-current limiting protection, ampere ratings as indicated. Construct with overcenter, trip-free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Handle ties are not permitted. Provide push-to-trip button on cover for mechanical tripping circuit breakers. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40oC. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated. Circuit breakers shall have the short circuit interrupting rated indicated on the drawings or as required for the short circuit current available.
- C. Molded-Case Circuit Breakers for Installation in Existing Panelboards or Switchboards: Shall meet the same specifications as in Part B above. Shall be manufactured by the same manufacturer as the panelboard or switchboard. When the existing panel or switchboard style is obsolete and the existing circuit breaker type is not available the contractor shall provide a circuit breaker of similar type as existing. The breaker shall be provided with all the required mounting hardware to mount the breaker in the existing space. The breaker shall meet or exceed the ratings of the existing breakers.
- D. Provide all accessories indicated on the drawings, including accessories indicated on the panel schedules, such as shunt trips, ground fault protection, undervoltage trips, etc. Accessories shall be manufactured by the same manufacturer as the circuit breaker.

2.3 FUSES

- A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time/current and peak let-through current characteristics indicated, which comply with manufacturer's standard design, materials, and construction in accordance with published product information, and with industry standards and configurations.
- B. Class RK5 Dual-Element Time-Delay Fuses: Provide UL Class RK-5 dual element time-delay fuses rated 600 V, 60 Hz, amperes as required by the manufacturer of the equipment being protected, with 200,000 RMS symmetrical interrupting current rating for protecting motors.
- C. Class RK1 Dual-Element Time-Delay Fuses: Provide UL Class RK-1 dual element time-delay fuses rated 600 V, 60 Hz, amperes as required by the manufacturer of the equipment being protected, with 200,000 RMS symmetrical interrupting current rating for protecting service entrance or as otherwise noted.

2.4 EXISTING EQUIPMENT

- A. Circuit breakers to be installed in existing equipment shall be manufactured by the existing equipment manufacturer and shall have short circuit interrupting ratings equal to or greater than the existing breakers.

PART 3 - EXECUTION

3.1 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

- A. Install overcurrent protective devices as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and NEMA standards for installation of overcurrent protective devices.
- B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.
- C. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.
- D. Set field-adjustable circuit breakers for trip settings as indicated, subsequent to installation of units.
- E. Install fuses, if any, in fused circuit breakers.

3.2 ADJUST AND CLEAN

- A. Inspect circuit-breaker operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.3 FIELD QUALITY CONTROL

- A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short-circuits. Correct malfunctioning units, and then demonstrate compliance with requirements.

END OF SECTION 26 2813

SECTION 26 5100 - INTERIOR BUILDING LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification sections, apply to work of this section.
- B. Division-26 Basic Electrical Materials and Methods section apply to work specified in this section.

1.2 DESCRIPTION OF WORK

- A. Extent of interior lighting fixture, also known as luminaire, work is indicated by drawings and schedules.
- B. Types of interior lighting fixtures in this section include the following:
 - 1. Fluorescent
- C. Applications of interior lighting fixtures required for project including the following:
 - 1. General lighting
 - 2. Emergency lighting

1.3 QUALITY ASSURANCE

- A. Manufacturers: Firms regularly engaged in manufacture of interior lighting fixtures of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer: Qualified with at least 3 years of successful installation experience on projects with interior lighting fixture work similar to that required for project.
- C. NEC Compliance: Comply with NEC as applicable to installation and construction of interior building lighting fixtures.
- D. NEMA Compliance: Comply with applicable requirements of NEMA Std Pub Nos. LE 1 and LE 2 pertaining to lighting equipment.
- E. ANSI/IES Compliance: Comply with ANSI 132.1 pertaining to interior lighting fixtures.
- F. ANSI/UL Compliance: Comply with ANSI/UL standards pertaining to interior lighting fixtures for hazardous locations.
- G. UL Compliance: Provide interior lighting fixtures which have been UL-listed and labeled.
- H. CBM Labels: Provide fluorescent-lamp ballasts which comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's data on interior building lighting fixtures, lamps and ballasts.
- B. Shop Drawings: Submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in luminaire "type" alphabetical order, with proposed fixture and accessories clearly indicated on each sheet. If requested by the Engineer, samples shall be submitted to determine compliance and equivalence, at no cost to the owner or architect/engineer. If requested by the Engineer, point-by-point footcandle calculations shall be submitted to determine compliance and equivalence. Criteria for calculations (max/min, reflectances, dirt depreciation, etc., shall be obtained from the Engineer.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers/Catalog Numbers: Subject to compliance with requirements, provide fixtures manufactured by manufacturers as indicated on the fixture schedule. Catalog numbers given on the fixture schedule are intended to provide the general description of the required fixture and its quality. Additional accessories, mounting hardware, options, etc., not specifically described by the catalog number but required for a properly operating and installed fixture or as described by additional notation on the drawings or in the specifications, shall be provided.
 - 1. Substitutions shall be prior approved by an official addendum. Complete shop drawings shall be submitted for review for consideration of substitutions.

2.2 INTERIOR LIGHTING FIXTURES

- A. General: Provide luminaires, of sizes, types, and ratings indicated; complete with, but not necessarily limited to, housings, lamps, lamp holders, reflectors, ballasts, starters and wiring.
 - 1. LED light fixtures shall be rated/tested to LM-79 standards.
- B. Drivers shall be supplied with automatically resetting thermal overloads.
- C. LED Lamp Drivers: Provide drivers, capable of operating lamp types indicated and that are compatible with the LED lamps. Drivers shall be capable of dimming the LED lamps where indicated on the drawings.

- D. Lamps: Provide lamps of the wattage and types specified on the drawings. Coordinate lamp type with driver for a complete operational, energy saving lighting system which will operate for the expected lamp and driver life.
 - 1. Lamp and driver/ballast combinations shall have no noticeable flicker or delayed starting, including dimming ballast combinations. Lamps shall start instantaneously and illuminate immediately. Any delay in starting will not be acceptable and the lamp and/or ballast shall be replaced.
 - 2. LED lamps shall produce the minimum lumens indicated at the color temperature specified and shall be tested/listed/rated in accordance with LM-80 as a minimum.
- E. Ballast/Lamp Assembly Warranty: Provide a minimum five year ballast guarantee, along with a five year lamp guarantee. This warranty shall be provided as an assembly with the ballast and lamp manufacturer agreeing to provide the required warranty with the associated ballast or lamp.

PART 3 - EXECUTION

3.1 INSTALLATION OF INTERIOR LIGHTING FIXTURES

- A. Install interior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.
- B. Coordinate with other electrical work as appropriate to properly interface installation of interior lighting fixtures with other work.
- C. Fasten fixtures securely to building structural support; and ensure that pendant fixtures are plumb and level. Provide all required mounting hardware and steel channel to supplement structural support where necessary. Fixtures shall not be supported from ductwork, piping, conduits, ceiling grid or any other non-structural building member.
- D. Coordinate fixture installation with mechanical duct work, diffusers, return grilles, communication systems devices, etc., to avoid any interferences.

3.2 ADJUST AND CLEAN

- A. Clean interior lighting fixtures of dirt and debris upon completion of installation
- B. Protect installed fixtures from damage during remainder of construction period.

3.3 FIELD QUALITY CONTROL

- A. Upon completion of installation of interior lighting fixtures, and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
- B. At the time of Substantial Completion, replace lamps in interior lighting fixtures which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect/Engineer.
- C. Refer to Division-1 sections for the replacement/restoration of lamps in interior lighting fixtures, where used for temporary lighting prior to time of Substantial Completion.

3.4 GROUNDING

- A. Provide tight equipment grounding connections for each interior lighting fixture installation.

END OF SECTION 26 5100