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2. Miami-Dade County Department of Transportation and Public Works (DTPW) does not track or monitor downloads of Project documents from this website. Therefore, prospective bidders who choose to use this method of distribution shall also be responsible for monitoring the site and downloading any applicable addenda or supplemental information. DTPW will distribute hard copy addenda or supplemental information only to those persons or firms who we have purchased a hard copy of the original solicitation documents.
3. Miami-Dade County shall not be responsible for errors and omissions occurring in the transmission or downloading of any documents or specifications from this website. In the event of any discrepancy between information obtained from this website and the DTPW hard copy solicitation documents and specifications, the terms of the hard copy documents will prevail.
4. Miami-Dade County does not guarantee continuous, uninterrupted or secure access to this or other related websites. Operation of this website may be affected from time to time by numerous factors outside of our control. In the event that we are notified of any problems in a timely manner we will do our best to assist with those problems that fall within our control. For assistance, contact us at 305-375-2930. Solicitation documents are removed from this website as soon as possible after the due date.
5. DTPW does not accept facsimile or electronic bid responses of any kind. All bids must be submitted in writing, on the forms provided by the County, to the address designated in the bid package. It is the bidder's responsibility to ensure that their submittals are received at the designated location, complete and on time. Bids received after the due date will be rejected, even if the solicitation is still appearing on this site.
6. These documents shall not be altered in any manner. Utilization or viewing of these electronic documents shall constitute implicit acknowledgement and acceptance of these provisions. Failure to comply with these provisions may result in rejection of your bid.

CONTRACT SPECIFICATIONS

DEPARTMENT OF TRANSPORTATION &
PUBLIC WORKS

BID DOCUMENTS

UPGRADE CHILLER UNIT AT
CENTRAL ADMINISTRATION BUILDING
CONTRACT NO. CICC 7360 PLAN

RPQ NO.: TP-0000037594

PROJECT NO.: IRP374

VOLUME I OF II SOLICITATION DOCUMENTS

June 2026

RPQ NO.: TP-0000037594





MIAMI-DADE COUNTY, FLORIDA

(RPQ) TP-0000037594

TITLE:

UPGRADE CHILLER UNIT AT CENTRAL ADMINISTRATION BUILDING

IRP 374 (100% NO GRANT FUNDING)

OMB: 677200-75706

Fund: ET062 (New Code)

Dept: TPCP010000

Acct: 5942100000

Activity Code: 007011

Project ID #: CTP000003009707

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SECTION 1: INVITATION TO BID

INVITATION TO BID

**Department of Transportation and
Public Works**

**Capital Improvements Division
111 NW 1 St Suite 1410
Miami FL 33128**



**MIAMI-DADE COUNTY, FLORIDA
REQUEST FOR PRICE QUOTATION (RPQ)**

Contract No: MCC 7360 Plan

RPQ No: TP-0000037594

INVITATION TO BID

A RPQ has been issued for the work identified below. If you are interested in submitting a bid for this project, please submit your bid via Sealed Envelopes, attention to Clerk of the Board at 111 NW 1 St Suite 1710 no later than 7/15/2026 at 02:00 PM. If you have any questions, contact Alicia Arce at 305-375-4891.

This RPQ is issued under the terms and conditions of the Miscellaneous Construction Contracts (MCC) Program MCC 7360 Plan.

RPQ DETAILED BREAKDOWN

| | | | | | | | |
|--------------------------------------|--|--|----------------------------|-----------------------------------|------------------|-----------|----------|
| Bid Due Date: | 7/15/2026 | Time Due: | 02:00 PM | Submitted Via: | Sealed Envelopes | | |
| Estimated Value: | \$699,244 | (excluding Contingencies and Dedicated Allowances) | | | | | |
| Project Name: | Upgrade Chiller Unit Central Administration Building | | | | | | |
| Project Location: | 3300 N.W. 32 Ave. Miami FL 33142 | | | | | | |
| License Requirements: | Primary: | Air Conditioning Unlimited; General Engineering; General Building Contractor | | | | | |
| Scope of Work: | <p>(Contractor must obtain and submit all permits prior to performing any work). The scope of the project includes the installation of a new air-cooled chiller rated at 92.25 TON in the old cooling tower courtyard, with its corresponding supports (refer to structural drawings). New chilled water piping will be extended from the new chiller courtyard up to the old chiller room and at the point of connection as shown and depicted on the submitted drawings. A new air separator, expansion tank, and chemical pot feeder have been specified accordingly. Chiller system will remain stand-alone; no controls are part of this scope of work. Power connections are to be provided for the new chiller from existing panel "MDP2" as depicted on drawings.</p> <p>A new vertical floor mounted AHU has been specified. Existing ceiling mounted AHU-1 shall be removed. Scope of work includes the demolition, chilled water and ductwork modifications (inclusive of new added O/A supply in-line fan) and related ceiling work as depicted on drawings. New AHU-1 shall be powered from the existing AHU power feeder and new SF-1 shall be powered from existing panel "ILC" as depicted on drawings.</p> | | | | | | |
| Document Pickup: | Contact: | Capital Improvements Division | Phone No: | 305-375-4891 | Date: | 6/11/2026 | |
| | Location: | 111 NW 1 Street, Suite 1410 | | | | | |
| Pre-Bid Meeting:: | YES | Mandatory: | No | Date: | 6/25/2026 | Time: | 10:30 AM |
| | Location: | Capital Improvements Division, 14 Floor Front Conference room | | | | | |
| Site Meeting: | YES | Mandatory: | No | Date: | 6/25/2026 | Time: | 10:30 AM |
| | Location: | 3300 N.W. 32 Ave. Miami FL 33142 | | | | | |
| Bid shall be submitted to: | Contact: | Clerck of the Board | | | | | |
| | Address: | 111 NW 1 St Suite 1710 | | | | | |
| | Email: | clerckbcc@miamidade.gov | FAX # : | 305-375-4231 | | | |
| Type of Contract: | Single Trade | | Method of Award: | Lowest Responsible Bidder | | | |
| Method of Payment: | Scheduled Monthly Payments | | Insurance Required: | YES | | | |
| Additional Insurance Required: | YES | | If Yes - Minimum Coverage: | \$1,000,000.00 | | | |
| Performance & Payment Bond Required: | YES | | Bid Bond Required: | YES | | | |
| Davis Bacon: | NO | Maintenance Wages: | NO | AIPP: | NO | Amount: | |
| DBE Participation: | NO | Percentage: | 0.00% | DBE Subcontractor Forms Required: | NO | | |
| SBE-S Requirements | NO | Percentage: | 0.00% | | | | |
| SBE-Services Commodity Set-Aside | NO | If Yes, Service = | | | | | |
| SBE-G Requirements | NO | Percentage: | 0.00% | | | | |
| SBE-Goods Commodity Set-Aside | NO | If Yes, Goods = | | | | | |

| | | | | |
|---------------------|-----|---------------|------------|--|
| Liquidated Damages: | YES | \$\$ Per Day: | \$1,609.00 | |
|---------------------|-----|---------------|------------|--|

For RPQ's less than \$10,000, if no LD rate is specified, the County reserves the right to assess actual damages in lieu of LDs.

| | | | | | |
|--------------------------|-----|------------------------|----|--------------------------|-----|
| Design Drawing Included: | YES | Shop Drawing Included: | NO | Specifications Included: | YES |
|--------------------------|-----|------------------------|----|--------------------------|-----|

| | | | |
|-------------------------|-----------|---------------------------------------|-----|
| Anticipated Start Date: | 10/8/2026 | Calendar Days for Project Completion: | 240 |
|-------------------------|-----------|---------------------------------------|-----|

Comments:

Pursuant to Section 2-8.10 of the Code of Miami-Dade County, this Contract is subject to a user access fee under the County's User Access Program (UAP) in the amount of two percent (2%). All construction services provided under this contract are subject to the 2% UAP. This fee applies to all Contract usage whether by County Departments or by any other governmental, quasi-governmental or not-for-profit entity. From every payment made to the Contractor under this contract (including the payment of retainage), the County will deduct the two percent (2%) UAP fee provided in the ordinance and the Contractor will accept such reduced amount as full compensation for any and all deliverables under the contract. The County shall retain the 2% UAP for use by the County to help defray the cost of its procurement program. Contractor participation in this pay request reduction portion of the UAP is mandatory.

Provided, however, UAP shall not be applicable for total contract values, inclusive of contingency and allowance accounts, of less than five hundred thousand dollars (\$500,000.00).

On May 28, 2024, the Governor signed into law House Bill ("HB") 705. Prior to the adoption of HB 705, section 255.0992 of the Florida Statutes generally prohibited Miami-Dade County (the "County"), from requiring a contractor, subcontractor, or supplier to pay or provide a predetermined amount of wages or benefits to its employees or recruit or hire employees from a designated or restricted source in construction projects paid for with any state-appropriated funds. Additionally, under the same statute, the County could not apply small business measures or limit bidding among Small Business Enterprise-Construction ("SBE-Con") firms for construction projects paid for with any state funds. However, for contracts funded solely with County funds, prior to the adoption of HB 705, section 255.0992 did not limit the application of the County's SBE-Con program, responsible wages, or workforce requirements.

HB 705 revised the definition of the term "public works project" in Section 255.0992, Florida Statutes to include activities paid for with local County funds, making the various prohibitions found in section 255.0992 applicable to County funded construction contracts. HB 705 impacts construction projects that are in various phases of the procurement process whether pending advertisement or bid submittal, and in some cases pending contract award with bids having been received. Thus, considering the passing of HB 705, effective July 1, 2024, the following prohibitions exist:

- The County's Responsible Wages & Benefits, Community Workforce, Residence First Training and Employment, and Employ Miami-Dade Program requirements will not be applied to the County's capital construction projects, including design-build projects, awarded after July 1, 2024.
- The County's SBE-Con requirements cannot be applied on any capital construction projects, including design-build projects, if initial bids or proposals are received on or after July 1, 2024.

LICENSE REQUIREMENTS:

At the time of Bid and pursuant to the requirements of Section 10-3 of the Code of Miami-Dade County, Florida and these Solicitation and Contract Documents, the Bidder must hold a valid, current, and active:

1. Certificate of Competency from the County's Construction Trades Qualifying Board as General Mechanical or a General Engineering Contractor, Air Conditioning Unlimited, or.
2. Certification, as a General Contractor or Mechanical Contractor provided by the State of Florida Construction Industry Licensing Board, pursuant to the provisions of Section 489.115 of the Florida Statutes (F.S.), or.
3. Proof of such Certificate(s) must be submitted at the time of initial response and maintained current throughout the contract period. The County may request proof of continued certification at any time during the contract period. Failure to provide such proof within five (5) working days from notification by the County shall result in the removal from the contract and the rejection of any current or future RPQ bid submissions.

INDEMNIFICATION AND INSURANCE REQUIREMENTS

The Contractor shall furnish to Department of Transportation and Public Works, 111 NW 1 Street, Miami Florida 33128, Certificate(s) of Insurance which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

1. Worker's compensation insurance for all employees as required by Florida Statute 440.
2. Commercial General Liability in an amount not less than \$300,000 per occurrence, and \$600,000 in the aggregate not to exclude coverage for Products and Completed Operations Miami-Dade County must be shown as an additional insured with respect to this coverage.
3. Automobile Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the work, in an amount not less than \$300,000 combined single limit per occurrence for bodily injury and property damage
4. Installation Floater on an All-Risks or Special perils basis for 100% of the cost of the project on a replacement cost basis. Miami-Dade County must be included as a loss payee.

BID DOCUMENTS:

Bidding documents may be obtained from the Miami-Dade County Department of Transportation and Public Works, Capital Improvements Division, located at 111 NW 1st Street, 14th Floor, Miami, Florida 33128, for a non-refundable fee of fifteen dollars (\$15.00) per USB drive. Payment must be made by company check, cashier's check, or money order payable to "Miami-Dade County, Department of Transportation and Public Works."

Alternatively, bidding documents are available for free download at:
<https://www.miamidade.gov/apps/isd/StratProc/Home/CurrentSolicitations>

ADDENDUMS - RFI'S

The Department of Transportation and Public Works has made changes with regard to how addendums and requests for information (RFI) will be sent to document holders. Be advised that all Addendums, RFI's, and the document holders list (bidder's list) are now available to view online at the following web address:

<https://www.miamidade.gov/apps/isd/StratProc/Home/CurrentSolicitations>

Therefore, during the advertisement period, the Department will not be sending these documents via certified mail. All document holders must provide an e-mail address. The Department will only be sending addendums and RFIs by e-mail and posting online at the aforementioned link. The bidders list will be updated every Friday during the advertisement phase of the contract. Please be aware that acknowledgment of receipt of all addendums and RFI's remain a requirement when submitting bids. All RFI request should be emailed to Alicia.Arce@miamidade.gov while copying the Clerk of the Board (clerkbcc@miamidade.gov).

Vendor Registration:

Due to the new Vendor Registration procedures of the Internal Services Department, Procurement Management Division, updated definitions along with the "Affirmation of Vendor Affidavits" has been added to the Bid Submittal Package. The successful bidder must be registered under this new procedure prior to award.

PRE BID - BID SUBMITTAL DUE DATE:

Pre-Bid Conference date, time and location: Thursday, June 25, 2026, at 10:30 A.M. The Department of Transportation and Public Works (DTPW) has scheduled a non-mandatory Site Visit Meeting. The Site Visit Meeting will be held on Thursday, June 25, 2024, at the following location: DTPW Central Administration Building - 3300 N.W. 32 Ave. Miami FL 33142

If the bidder does not arrive on time for the Site Visit Meeting and Pre-Bid meeting, there is no guarantee that he/she will be allowed to attend. Contractors must RSVP in writing to Alicia.Arce@miamidade.gov and copy clerkbcc@miamidade.gov no later than Close of Business on June 19, 2026.

Additional Site Visit Meetings may be scheduled based on the number of RSVPs received. If additional site visit meetings are scheduled, DTPW will notify the Contractors in writing advising of which day and time they will be scheduled.

Bid Submittal Time and Location: Wednesday, 2:00 P.M., July 15, 2026, at 111 NW 1 Street, 17th Floor, Clerk of the Board Office.

Deadline to received questions (RFI) will be July 1, 2024.

Bid Opening immediately after Bid Submittal on the 18th floor.

SPD department will process it as a "No Measure" (no SBE Measure).

DISCLOSURE:

- Contractor shall indemnify and hold harmless the County and its officers, employees, agents and instrumentalities from any and all liability, losses or damages, including attorneys' fees and costs of defense, which the County or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this Agreement by the Contractor or its employees, agents, servants, partners principals or subcontractors. Contractor shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the County, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorney's fees which may issue thereon. Contractor expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by the Contractor shall in no way limit the responsibility to indemnify, keep and save harmless and defend the County or its officers, employees, agents and instrumentalities as herein provided.

The Contractor shall furnish to **Department of Transportation and Public Works, Capital Improvements Division, 111 NW 1 St Suite 1410, Miami FL 33128**, Certificate(s) of Insurance which indicate that insurance coverage has been obtained which meets the requirements as outlined below:

- A.** Worker's Compensation Insurance for all employees of the Contractor as required by Florida Statute 440.
 - a. If applicable should include coverage required under the U.S. Longshoremen and Harbor Workers' Act (USL&H) and/or Jones Act for any activities on or about navigable water.
- B.** Commercial General Liability in an amount not less than \$300,000 per occurrence, and \$600,000 in the aggregate. Miami-Dade County must be shown as an additional insured with respect to this coverage.
- C.** Automobile Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the work, in an amount not less than \$300,000 combined single limit per occurrence for bodily injury and property damage.

*Under no circumstances are Contractors permitted on the Aviation Department, Aircraft Operating Airside (A.O.A) at Miami International Airport without increasing automobile coverage to \$5 million. Only vehicles owned or leased by a company will be authorized. \$1 million limit applies at all other airports.

VERIFICATION OF EMPLOYMENT ELIGIBILITY (E-VERIFY):

By entering the Contract, the Awarded Bidder becomes obligated to comply with the provisions of Section 448.095, Florida Statute, titled "Verification of Employment Eligibility." This includes but is not limited to utilization of the U.S. Department of Homeland Security's E-Verify System to verify the employment eligibility of all newly hired employees by the Awarded Bidder effective, January 1, 2021, and requiring all Subcontractors to provide an affidavit attesting that the Subcontractor does not employ, contract with, or subcontract with, an unauthorized alien. Failure to comply may lead to termination of this Awarded Bidder, or if a Subcontractor knowingly violates the statute, the subcontract must be terminated immediately. Any challenge to termination under this provision must be filed in the Circuit Court no later than twenty (20) calendar days after the date of termination. If this Contract is terminated for a violation of the statute by the Awarded Bidder, the Awarded Bidder may not be awarded a public contract for a period of one year after the date of termination, and the Awarded Bidder may be liable for any additional costs incurred by the County resulting from the termination of the Contract. Public and private employers must enroll in the E-Verify System (<http://www.uscis.gov/e-verify>) and retain the I-9 Forms for inspection.

SECTION 2: SOLICITATION FORMS

All forms and documents contained in this Section shall be completed pursuant to these Contract Documents and submitted with the Bid Submittal for this Project.

BID FORM

DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

BID DOCUMENTS

UPGRADE CHILLER UNIT AT CENTRAL ADMINISTRATION BUILDING

RPQ NO.: TP-0000037594

PROJECT NO.: IRP374

To: Miami-Dade County
Board of County Commissioners
Miami, Florida

Bid Opening Date: _____

Bid Opening Time: _____

Local Time: _____

Gentlemen:

We _____

Bidder's Name

have received, have examined and are familiar with the Contract Documents bearing the title **Upgrade Chiller at Central Administration Building- RPQ NO. TP-0000037594**, the forms for the Submittal of Bids and have included the cost of their provisions, in our Bid. We have examined, are familiar with, and do accept the conditions of the Work site and other conditions affecting the Work.

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Failure to acknowledge receipt of all addenda may cause the bid to be considered not responsive to the invitation, which would require rejection of the bid.

RPQ No.: **TP-0000037594**

Upgrade Chiller Unit Central Administration Building
RPQ NO.: TP-0000037594
PROJECT NO.: IRP374

BID FORM

IF THIS CONTRACT IS ACCEPTED, THE BIDDER AGREES TO COMPLETE ALL WORK UNDER THIS CONTRACT WITHIN 240 CALENDAR DAYS AFTER THE EFFECTIVE DATE OF NOTICE TO PROCEED. **PRICING SHALL BE INCLUSIVE OF ALL REQUIREMENTS TO COMPLETE THE SCOPE OF WORK AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.**

***** TO BE COMPLETED BY BIDDER AT BID SUBMISSION *****

| <u>Item No.</u> | <u>DESCRIPTION</u> | <u>Quantity</u> | <u>Written Unit Amount</u> | <u>UNIT PRICE</u> | <u>TOTAL</u> |
|-----------------|--|-----------------|----------------------------|-------------------|--------------|
| 1 | Air Cooled Chillers, Installation | 1 | | | |
| 2 | Chilled Water Pumps & Installation | 1 | | | |
| 3 | Hydronic Piping, Valves, Accessories, etc. & Installation | 1 | | | |
| 4 | HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation | 1 | | | |
| 5 | Commissioning & Startup | 1 | | | |
| 6 | Demolition | 1 | | | |
| 7 | Electrical | 1 | | | |
| 8 | Mobilization | 1 | | | |
| 9 | General Conditions | 1 | | | |

TOTAL BASE BID \$ _____

(Instructions: The spaces provided in the Total Price Column(s) for the Bid Line Item(s) must be filled in and no spaces left blank. The sum of the Bid Line Items must represent your Base Bid Total. Failure to submit a complete and accurate Bid Form may result in your bid found non-responsive.)

A TEN PERCENT (10%) CONTINGENCY ALLOWANCE AND OTHER DEDICATED ALLOWANCES AS REQUIRED WILL BE ADDED TO THE BASE BID TOTAL AS STIPULATED IN THE SPECIAL PROVISIONS.

LICENSE NO. _____ BIDDER'S NAME _____

BIDDER'S TELEPHONE NUMBER _____ BIDDER'S ADDRESS _____

BIDDER'S FEIN NUMBER _____ BIDDER'S SIGNATURE _____

THE BIDDER UNDERSTANDS AND AGREES THAT THE BASE BID TOTAL AND ALL APPLICABLE ALLOWANCES ARE INCLUSIVE OF ALL WORK NECESSARY TO COMPLETE THE SCOPE OF WORK AS DESCRIBED IN THE CONTRACT DOCUMENTS, AND IF THIS PROPOSAL IS ACCEPTED, THE BIDDER AGREES TO ENTER INTO AND EXECUTE THE CONTRACT WITH THE NECESSARY BOND AND ACCEPT THE ABOVE BASE BID, INCLUSIVE OF ALL ALLOWANCES, AS FULL COMPENSATION FOR THE WORK PERFORMED UNDER THIS CONTRACT.

***YOU ARE REQUIRED TO TRANSFER TOTALS TO FORM APPENDIX 5A. FAILURE TO COMPLY WITH THIS REQUEST MAY RENDER THE PROPOSAL NON-RESPONSIVE.**

LOCAL CERTIFIED WARTIME VETERAN BUSINESS ENTERPRISE CERTIFICATION: A Local Certified Service-Warime Veteran Business Enterprise is a firm that is (a) a local business pursuant to Section 2-8.5 of the Code of Miami-Dade County and (b) prior to bid submission is certified by the State of Florida Department of Management Services as a service-warime veteran business enterprise pursuant to Section 295.187 of the Florida Statutes.

Place a check mark here only if affirming bidder is a Local Certified Service-Warime Veteran Business Enterprise. A copy of the certification must be submitted with this proposal.

A. WAIVER OF CONFIDENTIALITY AND TRADE SECRET TREATMENT OF BID:

The Bidder acknowledges and agrees that the submittal of the Bid is governed by Florida's Government in the Sunshine Laws and Public Records Laws, as set forth in Florida Statutes Section 286.011 and Florida Statutes Chapter 119. As such, all material submitted as part of, or in support of, the Bid will be available for public inspection after opening of bids and may be considered by the County in public.

By submitting a bid pursuant to this solicitation, Bidder agrees that all such materials may be considered to be public records. The Bidder shall not submit any information in response to this solicitation which the Bidder considers to be a trade secret, proprietary or confidential. In the event that the Bid contains a claim that all or a portion of the Bid submitted contains confidential, proprietary or trade secret information, the Bidder, **by signing below**, knowingly and expressly **waives** all claims made that the Bid, or any part thereof no matter how indicated, is confidential, proprietary or a trade secret and authorizes the County to release such information to the public for any reason.

B. CONVICTION DISCLOSURE:

Pursuant to Section 2-8.6 of the Code of Miami-Dade County, any individual, corporation, partnership, joint venture or other legal entity having an officer, director, or executive who has been convicted of a felony during the past ten (10) years shall disclose this information at the time of bid submittal.

Place a check mark here only if the Bidder has such conviction to disclose to comply with this requirement.

ATTACHMENT 5A

Department of
Transportation and Public
Works
Capital Improvements Division
111 NW 1 St Suite 1410
Miami, 33128



MIAMI-DADE COUNTY, FLORIDA
REQUEST FOR PRICE QUOTATION (RPQ)
Contract No: MCC 7360 Plan
RPQ No: TP-0000037594

RPQ BID FORM – ATTACHMENT 5A

RPQ Project Name: Upgrade Chiller Unit Central Administration Building

Price Proposal (Cost to Perform the work **must** be stated here. State 'No Bid' if not submitting a price proposal)

Bidder's Company Name: _____

Company Address: _____

City: _____ **State:** _____ **Zip:** _____

Telephone No: _____ **Fax No:** _____ **E-Mail:** _____

THE EXECUTION OF THIS FORM CONSTITUTES THE UNEQUIVOCAL OFFER OF PROPOSER TO BE BOUND BY THE TERMS OF ITS PROPOSAL. FAILURE TO SIGN THIS SOLICITATION WHERE INDICATED BELOW BY AN AUTHORIZED REPRESENTATIVE SHALL RENDER THE PROPOSAL NON-RESPONSIVE. THE COUNTY MAY, HOWEVER, IN ITS SOLE DISCRETION, ACCEPT ANY PROPOSAL THAT INCLUDES AN EXECUTED DOCUMENT WHICH UNEQUIVOCALLY BINDS THE PROPOSER TO THE TERMS OF ITS OFFER.

Name of Person Submitting Quote (Print): _____

Number of Addendums received: _____ (if none' write "None")

Signature: _____

Date: _____

Note: Quotes must be submitted on this form. Quote envelope must state RPQ Number, date and time due and the Bidder's Name. Use of any other form for submission of the price quotation shall result in the rejection of the price quotation. Late bids will not be opened. *Low bidder will be notified, in the Recommendation of Award, of the requirements to submit current copies of insurance certificates in accordance with the Contract Documents. By signature, the CONTRACTOR agrees to be bound by the terms set forth in the MCC 7360 Plan.*

ACKNOWLEDGEMENT OF ADDENDA

MIAMI-DADE COUNTY
Department of Transportation and Public Works (DTPW)

PROJECT: Upgrade Chiller Unit Central Administration Building
Project No. TP-0000037594

ACKNOWLEDGEMENT OF ADDENDA

(Must be completed and submitted with required solicitation documents)

Instructions: Complete Part I or Part II, as applicable.

PART I: Listed below are the dates of issue for each Addendum received in connection with this solicitation.

| | |
|----------------------------|-------|
| Addendum #1, Dated _____, | 202__ |
| Addendum #2, Dated _____, | 202__ |
| Addendum #3, Dated _____, | 202__ |
| Addendum #4, Dated _____, | 202__ |
| Addendum #5, Dated _____, | 202__ |
| Addendum #6, Dated _____, | 202__ |
| Addendum #7, Dated _____, | 202__ |
| Addendum #8, Dated _____, | 202__ |
| Addendum #9, Dated _____, | 202__ |
| Addendum #10, Dated _____, | 202__ |

PART II:

____ No Addendum was received in connection with this solicitation.

Authorized Signature: _____ Date: _____

Print Name: _____ Title: _____

Firm Name: _____

SURETY BID BOND FORM

| | | |
|--|--|--------------------------------------|
| PRINCIPAL (Full legal name and business address) | TYPE OF ORGANIZATION ("X" one) | |
| | <input type="checkbox"/> Individual | <input type="checkbox"/> Partnership |
| | <input type="checkbox"/> Joint Venture | <input type="checkbox"/> Corporation |

SURETY (Name and business address)

| | | | | |
|--------------------|--|---|-------------------|--|
| PENAL SUM OF BOND | *****Five Percent of the Total amount Bid***** | | | |
| BID IDENTIFICATION | Project No: | TP-0000037594 | Bid Opening Date: | |
| | County Project Name: | Upgrade Chiller Unit Central Adminstration Building | | |

OBLIGATION

Principal and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Miami-Dade County, Florida (herein after County) upon default of Principal the penal sum set forth on the face of this Bond.

Principal and Surety agree that the Penal Sum of the Bond is a liquidated damage reasonably estimated to compensate the County for damages suffered as a result of the Principal's default including but not limited to any resulting from delay, reprocurement costs and incremental costs of contracting.

Default of Principal shall occur in the event that the Principal withdraws Bid within 180 days after bid opening (or any extension thereof agreed to in writing by the Bidder and County); or, after proper notification of intent to Contract from the County, fails to comply with all pre-award requirements including, but not limited to providing Payment and Performance Bonds with good and sufficient surety and the necessary Insurance Certificates pursuant to the Contract Documents, and enter into a written Contract with the County, as may be required; all within 10 days after the prescribed forms are presented to Principal for signature or as otherwise required by the Bidding Documents.

Payment under this Bond will be due and payable upon default of Principal and within 30 calendar days after receipt by Principal and Surety of written notice of default from County, which notice will be given with reasonable promptness, identifying this Bond and the Project.

Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

CONDITIONS

The Principal has submitted the Bid identified above.

THEREFORE

By executing this instrument Surety agrees that its obligation is not impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the County. Notice to the Surety of extensions is waived. However, waiver of the notice applies only to extensions aggregating not more than 60 calendar days in addition to the period originally allowed for acceptance of the bid. Any changes in or under the Contract Documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect Surety's obligation under this Bond.

WITNESS

The Principal and Surety executed this Bond and affixed their seals on the above date. Copy of Authorized Agent's current Identification Card as issued by State of Florida Insurance Commissioner must be attached.

| | | |
|------------------------|--|----------------------------|
| PRINCIPAL | | |
| SIGNATURE | | Principal's Corporate Seal |
| NAME AND TITLE (Typed) | | |

| | | |
|--|--|-------------------------|
| SURETY | | |
| SIGNATURE OF ATTORNEY-IN-FACT | | Surety's Corporate Seal |
| PRINTED NAME OF ATTORNEY-IN-FACT (Typed) | | |
| SIGNATURE OF AUTHORIZED FLORIDA AGENT | | |
| PRINTED NAME OF AUTHORIZED FLORIDA AGENT (Typed) | | |

NON-COLLUSION AFFIDAVIT



NON-COLLUSION AFFIDAVIT

(In accordance with Sections 2-8.1.1 and 10-33.02.1 of the Code of Miami-Dade County)

I, the undersigned, am over 18 years of age, have personal knowledge of the facts stated in the Non-Collusion Affidavit (*this Affidavit*) and I am an owner, officer, director, principal shareholder and/or otherwise authorized to bind the Bidder/Proposer of this solicitation.

A. I have reviewed the list of respondents attached to this Affidavit. I state that the Bidder/Proposer of this competitive solicitation (check one):

is **not related** to any of the other respondents submitting a Bid/Proposal in the competitive solicitation.

is **related** to the following respondents who submitted a Bid/Proposal in the competitive solicitation, which are identified and listed below:

B. I state that the Bidder/Proposer of this competitive solicitation:

1. has prepared this Bid/Proposal independently without consultation, communication, agreement or arrangement with any other Bidder/Proposer or competitor for the purpose of restricting competition;
2. has submitted the Bid/Proposal in its own behalf, and not in the interest or on behalf of any person not therein named;
3. has not, directly or indirectly, induced or solicited any other Bidder/Proposer to put in a sham proposal, or any other person, firm, or corporation to refrain from proposing;
4. has not in any manner sought by collusion to secure an advantage over any other Bidder/Proposer.

Note: Any person or entity that fails to submit this executed Affidavit shall be ineligible for contract award. In accordance with Section 2-8.1.1 of the Code of Miami-Dade County, where two or more related parties, as defined herein, each submit a Bid for any contract, such Bids shall be presumed to be collusive. The foregoing presumption may be rebutted by the presentation of evidence as to the extent of ownership, control and management of such related parties in preparation and submittal of such Bids. **Related parties** shall mean the Bidder/Proposer; the principals, corporate officers, and managers of a Bidder/Proposer; or the spouse, domestic partner, parents, stepparents, siblings, children or stepchildren of a Bidder/Proposer or the principals, corporate officers and managers thereof which have a direct or indirect ownership interest in another Bidder/Proposer for the same contract or in which a parent company or the principals thereof of one Bidder/Proposer have a direct or indirect ownership interest in another Bidder/Proposer for the same contract. Bid/Proposal found to be collusive shall be rejected. Bidder/Proposer who has been found to have engaged in collusion may be considered non-responsible, and may be suspended or debarred, and any contract resulting from collusive bidding may be terminated for default.

Written Declaration: Pursuant to §92.525, Florida Statutes, under penalties of perjury, I declare that I have read the foregoing Affidavit and that the facts stated in it are true, accurate, and complete.

Solicitation No.: _____ Solicitation Title: _____

By: _____
Signature of Affiant

Date: _____ 20 ____

Printed Name of Affiant and Title

_____/_____/_____/_____/_____/_____
Federal Employer Identification Number

Printed Name of Bidder/Proposer

Address of Bidder/Proposer

AFFIRMATION OF VENDOR AFFIDAVITS



New Vendor Registration and Bid/Proposal Contract Language

1.1. DEFINITIONS FOR VENDOR REGISTRATION

Bid – shall refer to any offer(s) submitted in response to this solicitation.

Bidder – shall refer to anyone submitting a Bid in response to this solicitation.

Bid Solicitation – shall mean this solicitation documentation, including any and all addenda.

Bid Submittal Form – defines the requirement of items to be purchased, and must be completed and submitted with Bid. The Bidder should indicate its name in the appropriate space on each page.

County – shall refer to Miami-Dade County, Florida

DPM – shall refer to Miami-Dade County's Department of Procurement Management.

Enrolled Vendor – shall refer to a firm that has completed the necessary documentation in order to receive Bid notifications from the County.

Registered Vendor – shall refer to a firm that has completed the Miami-Dade County Business Entity Registration Application and has satisfied all requirements to enter into business agreements with the County.

The Vendor Registration Package – shall refer to the Business Entity Registration Application.

For additional information about on-line vendor enrollment or vendor registration contact the Vendor Assistance Unit at 111 N.W. 1st Street, 13th Floor, Miami, FL 33128, Phone 305-375-5773. Vendors can enroll online and obtain forms to register by visiting our web site at www.miamidade.gov/dpm

1.2. INSTRUCTIONS TO BIDDERS

A. Bidder Qualification

It is the policy of the County to encourage full and open competition among all available qualified vendors. All vendors regularly engaged in the type of work specified in the Bid Solicitation are encouraged to submit Bids. Vendors may enroll with the County to be included on a notification list for selected categories of goods and services. To be eligible for award of a contract (including small purchase orders), Bidders must become a Registered Vendor. Only Registered Vendors can be awarded County contracts. Vendors are required to register with the County by contacting the Vendor Assistance Unit. The County endeavors to obtain the participation of all qualified small business enterprises. For information and to apply for certification, contact the Department of Small Business Development at 111 N.W. 1st Street, 19th Floor, Miami, FL 33128-1900, or telephone at 305-375-3111. County employees and board members wishing to do business with the County are referred to Section 2-11.1 of the Miami-Dade County Code relating to Conflict of Interest and Code of Ethics.

B. Vendor Registration

To be recommended for award the County requires that vendors complete a Miami-Dade County Vendor Registration Package. Effective June 1, 2008, a new Vendor Registration Package, including a Uniform Affidavit Packet (Affidavit form), must be completed by vendors and returned to the Department of Procurement Management (DPM), Vendor Assistance Unit, within fourteen (14) days of notification of the intent to recommend for award. In the event the Vendor Registration Package is not properly completed and returned within the specified time, the County may in its sole discretion, award to the next lowest responsive, responsible Bidder. The Bidder is responsible for obtaining the Vendor Registration Package, including all affidavits by downloading from the DPM website at www.miamidade.gov or from the Vendor Assistance Unit at 111 N.W. 1st Street, 13th Floor, Miami, FL 33128.

Bidders are required to affirm that all information submitted with the Vendor Registration Package is current, complete and accurate, at the time they submit a response to a Bid Solicitation, by completing the provided Affirmation of Vendor Affidavit form.

In becoming a Registered Vendor with Miami-Dade County, the vendor confirms its knowledge of and commitment to comply with the following:

1. **Miami-Dade County Ownership Disclosure Affidavit**
(Sec. 2-8.1 of the County Code)
2. **Miami-Dade County Employment Disclosure Affidavit**
(County Ordinance No. 90-133, amending Section 2-8.1(d)(2) of the County Code)
3. **Miami-Dade County Employment Drug-free Workplace Certification**
(Section 2-8.1.2(b) of the County Code)
4. **Miami-Dade Disability and Nondiscrimination Affidavit**
(Article 1, Section 2-8.1.5 Resolution R182-00 Amending R-385-95)
5. **Miami-Dade County Debarment Disclosure Affidavit**
(Section 10.38 of the County Code)
6. **Miami-Dade County Vendor Obligation to County Affidavit**
(Section 2-8.1 of the County Code)
7. **Miami-Dade County Code of Business Ethics Affidavit**
(Article 1, Section 2-8.1(j) and 2-11(b)(1) of the County Code through (6) and (9) of the County Code and County Ordinance No 00-1 amending Section 2-11.1(c) of the County Code)
8. **Miami-Dade County Family Leave Affidavit**
(Article V of Chapter 11 of the County Code)

9. **Miami-Dade County Living Wage Affidavit**
(Section 2-8.9 of the County Code)

10. **Miami-Dade County Domestic Leave and Reporting Affidavit**
(Article 8, Section 11A-60 11A-67 of the County Code)

11. **Subcontracting Practices**
(Ordinance 97-35)

12. **Subcontractor /Supplier Listing**
(Ordinance 97-104)

13. **Environmentally Acceptable Packaging**
Resolution (R-738-92)

14. **W-9 and 8109 Forms**

The vendor must furnish these forms as required by the Internal Revenue Service.

15. **Social Security Number**

In order to establish a file for your firm, you must provide your firm's Federal Employer Identification Number (FEIN). If no FEIN exists, the Social Security Number of the owner or individual must be provided. This number becomes your "County Vendor Number". To comply with Section 119.071(5) of the Florida Statutes relating to the collection of an individual's Social Security Number, be aware that DPM requests the Social Security Number for the following purposes:

- Identification of individual account records
- To make payments to individual/vendor for goods and services provided to Miami-Dade County
- Tax reporting purposes
- To provide a unique identifier in the vendor database that may be used for searching and sorting departmental records

16. **Office of the Inspector General**

Pursuant to Section 2-1076 of the County Code.

17. **Small Business Enterprises**

The County endeavors to obtain the participation of all small business enterprises pursuant to Sections 2-8.2, 2-8.2.3 and 2-8.2.4 of the County Code and Title 49 of the Code of Federal Regulations.

18. **Antitrust Laws**

By acceptance of any contract, the vendor agrees to comply with all antitrust laws of the United States and the State of Florida.

C. PUBLIC ENTITY CRIMES

To be eligible for award of a contract, firms wishing to do business with the County must comply with the following:

Pursuant to Section 287.133(2)(a) of the Florida Statutes, 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 of the Florida Statutes, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

CONTRACTOR DUE DILIGENCE AFFIDAVIT

Miami-Dade County

Contractor Due Diligence Affidavit

Per Miami-Dade County Board of County Commissioners (Board) Resolution No. R-63-14, County Vendors and Contractors shall disclose the following as a condition of award for any contract that exceeds one million dollars (\$1,000,000) or that otherwise must be presented to the Board for approval:

- (1) Provide a list of all lawsuits in the five (5) years prior to bid or proposal submittal that have been filed against the firm, its directors, partners, principals and/or board members based on a breach of contract by the firm; include the case name, number and disposition;
- (2) Provide a list of any instances in the five (5) years prior to bid or proposal submittal where the firm has defaulted; include a brief description of the circumstances;
- (3) Provide a list of any instances in the five (5) years prior to bid or proposal submittal where the firm has been debarred or received a formal notice of non-compliance or non-performance, such as a notice to cure or a suspension from participating or bidding for contracts, whether related to Miami-Dade County or not.

All of the above information shall be attached to the executed affidavit and submitted to the Procurement Contracting Officer (PCO)/ AE Selection Coordinator overseeing this solicitation. The Vendor/Contractor attests to providing all of the above information, if applicable, to the PCO.

Contract No. : _____ Federal Employer
Identification Number (FEIN): _____

Contract Title: _____

Printed Name of Affiant Printed Title of Affiant Signature of Affiant

Name of Firm Date

Address of Firm State Zip Code

Notary Public Information

Notary Public - State of _____ County of _____

Subscribed and sworn to (or affirmed) before me this _____ day of, _____ 20

by _____ He or she is personally known to me or has produced identification

Type of identification produced _____

Signature of Notary Public Serial Number

Print or Stamp of Notary Public Expiration Date Notary Public Seal

SECTION 3: INSTRUCTIONS TO BIDDERS

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

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1. SUPPLEMENTAL BIDDING REQUIREMENTS

1.01 BID FORMS

A. Estimated Quantities.

1. The Bid Form contains estimated quantities that are provided for bidding purposes only. The actual quantities required to construct the Work may vary from those shown. The County reserves the right to increase, or decrease the quantities, or to delete any of the items for which there is no need throughout the length of the Contract.
2. Bid Items which are estimated with a unit quantity of one are anticipated to be use in minimal quantities, if any, as approved by the Engineer. Any Contract provisions pertaining to adjustments in item prices shall not apply. Therefore, no adjustment shall be made to the unit prices awarded as a result of changes to the estimated quantities provided in the Bid Form. Final quantities shall be as approved by the Engineer.

B. Preparation of Proposal.

1. All blank spaces on the Bid Form for bid prices must be filled in ink, in both words and figures. In the event of any discrepancy in the entries for the price of any item, the unit price as shown in words shall govern unless both the extension and the unit prices shown in figures are in agreement with each other, in which case they shall govern over the unit price shown in words.
2. If the Bid is made by an individual, a sole proprietorship or an individual operating under a trade name, the name and post office address of the individual or owner must be shown in each instance. If made by a partnership, the Bid must be signed by one of the partners, and the names and addresses of the partners must be listed. If made by a corporation, the Bid must be signed by an authorized officer or agent of the corporation, the corporation must be clearly identified and the corporate seal must be affixed. In addition, a Bid made by a corporation must also list the name of the state wherein the corporation was chartered and the business address of the corporation.
3. Bids must be submitted only on the hardcopy Bid form provided with these Contract Documents unless a revised Bid Form is provided by the County via Addendum, in which case the latest Bid Form provided by Addendum shall be used.
4. All required forms must be completed and submitted and, all blanks must be filled in.

C. Rejection of Irregular Proposals.

1. Bids will be considered irregular, and may be rejected, if they show omissions, alterations of form, additions not called for, conditions or unauthorized alternate bids, or irregularities of any kind; or if the unit prices are obviously unbalanced either in excess of or below a reasonable cost analysis value.

D. Pay Items.

1. Any work not specifically mentioned in the pay items listed in the Proposal, but indicate¹ on the plans and/or specifications, shall be considered as incidental to one or more of the pay items, and no claim for additional compensation will be allowed, and it shall be assumed that the cost therefore is included in the prices for the various items in the Contract.

1.02 BID SECURITY

- A. Simultaneously with the delivery of the Bid to the County, on or before the bid due date, the Bidder must deliver to the County a bid security in the form of a Bid Bond on the form provided in the Bidding Documents or in Cash, in the form of a Certified Check, Cashier's Check or Irrevocable Letter of Credit made payable to the Department, for an amount equal to no less than five percent of the Total amount Bid. Failure to furnish a bid security in the proper form and amount, with the delivery of the Bid to the County, shall result in the Bid being declared "non-responsive."
- B. A Bid Bond shall have as the surety thereon only such surety company or companies that are acceptable to the County and are authorized to write bonds of such character and amount in accordance with the qualifications established for Payment and Performance Bonds.
- C. The bid security submitted with the Bid becomes payable to the County upon default of the Bidder. Default of Bidder shall occur in the event that the Bidder withdraws Bid within 180 days after bid opening (or any extension thereof agreed to in writing by the Bidder and County); or, after proper notification of intent to Contract from the County, fails to comply with all pre-award requirements including, but not limited to providing Payment and Performance Bonds with good and sufficient surety and the necessary Insurance Certificates pursuant to the Contract Documents, and enter into a written Contract with the County, as may be required; all within 10 days after the prescribed forms are presented to Principal for signature or as otherwise required by these Bidding Documents.

1.03 CERTIFICATION PURSUANT TO ACT RELATING TO SCRUTINIZED COMPANIES

- A. This section shall apply only to the extent permitted under applicable regulations of the United States Department of State and the United States Department of Treasury.
- B. By submitting a bid executed through a duly authorized representative, the bidder certifies that the bidder is not on the Scrutinized Companies with Activities in Sudan List, Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, Scrutinized Companies that boycott Israel List or engaged in a boycott of Israel as those terms are used and defined in sections 287.135 and 215.473 of the Florida Statutes. In the event that the bidder is unable to provide such certification but still seeks to be considered for award of this solicitation, the bidder shall, on a separate piece of paper, clearly state that it is on one or both of the Scrutinized Companies lists and shall furnish together with its bid a duly executed written explanation of the facts supporting any exception to the requirement for certification that it claims under Section 287.135 of the Florida Statutes. The bidder agrees to cooperate fully with the County in any investigation undertaken by the County to determine whether the claimed exception would be applicable. The County shall have the right to terminate any contract resulting from this solicitation for default if the bidder is found to have submitted a false certification or to have been placed on the Scrutinized Companies for Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, Scrutinized Companies that boycott Israel List or engaged in a boycott of Israel.

1.04 SMALL BUSINESS ENTERPRISE-CONSTRUCTION PROGRAM

- A. Miami-Dade County web-based Business Management Workforce System (BMWS)
 - 1. Bidders must register under Miami-Dade County web-based Business Management Workforce System (BMWS). BMWS is managed by the Small Business Development (SBD) Division of the Internal Services Department. BMWS is utilize to apply online for Small Business

Enterprise (SBE) certification, manage County contracts, and track compliance with SBE Program measures, Workforce Program requirements, and subcontractor payments.

2. The use of this web-based system is mandatory for firms contracting with Miami-Dade County for the submission and verification of payment information and certified payrolls. Training for BMWS can be offered at the following web address: <https://mdcsbd.gob2g.com/>
1. BMWS is accessible, at no charge, to all vendors doing – or interested in doing – business with Miami-Dade County. Key features include:
 - a. Online application for Small Business Enterprise (SBE), Disadvantaged Business Enterprise (DBE) and Local Developing Business (LDB) certification
 - b. Online registration for the Equitable Distribution Program (EDP)
 - c. Enhanced online SBE, DBE, and LDB Directory, with key-word search capabilities
 - d. Electronic submission of subcontractors for fulfillment of SBE requirements
 - e. Electronic submission of contractors' utilization payments and verification of SBE payments via the web or a mobile device
 - f. Automated tracking of progress towards meeting SBE goals
 - g. Electronic submission of certified payrolls
 - h. Electronic submission of workforce compliance data
 - i. Automated notifications regarding compliance requirements
 - j. Elimination of/ or limited paper-based reporting

B. SBE-CONST Make-up Plan

1. A contractor that failed to meet an established Small Business Enterprise-Construction (SBE-CONST) goal on any contract must submit a SBE-CONST Make-up Plan for approval by the Miami-Dade County Internal Services Department, Small Business Division (SBD).
2. The SBE-CONST Make-up Plan along with a corresponding Certificate of Assurance (COA), located under Section 2 of these Solicitation and Contract Documents must be included with the Bid submittal at the time of bid. The corresponding COA must identify all SBE-CONST firms to be utilized to meet the first tier subcontractor goal and the trade designation of work that each firm will perform in satisfaction of a make-up, in addition to any other goals that may be applicable.
3. The Department will forward the Make-up Plan and COA(s) to SBD for compliance review. Bidders who fail to submit the SBE-CONST Make-up Plan and corresponding COA by the Bid due date and time will be considered "non-compliant."
4. Before the award, bidder must submit via County's web-based system Business Management Workforce System (BMWS) its commitment, that if awarded, the contractor, will fulfill all or a portion of any pending Small Business Enterprise Construction Services makeup requirements and identify the certified CSBE firm(s) to be utilized to fulfill the make-up requirements that is excess of any SBE goal(s) required on the project and the percentage dollar value and description of the work that needs to be made up within the time frame specified by SBD.

C. Small Business Enterprise-Construction Program Measures

1. In accordance with Miami-Dade County Ordinances No. 97-52, 14-98, and 97-158; A.O. 3-22, **no** SBE-CONST measures have been established for this Project.

1.05 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

- A. Disadvantaged Business Enterprise (DBE) Program does not apply for this Contract.

1.06 SITE INVESTIGATION

- A. Examine the Contract Documents and the site of the proposed work, when applicable, carefully before submitting a proposal for the work contemplated. Investigate the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished and as to the requirements of all Contract Documents.
- B. The Department does not guarantee the details pertaining to borings, as shown on the plans, to be more than a general indication of the materials likely to be found adjacent to holes bored at the site of the work, approximately at the locations indicated. The Contractor shall examine boring data, where available, and make his own interpretation of the subsoil investigations and other preliminary data, and shall base his bid on his own opinion of the conditions likely to be encountered.
- C. The bidder's submission of a proposal is sufficient evidence that the bidder has made an examination as described in this Article. Therefore:
 1. The bidder, by virtue of submitting their bid, acknowledges that they and all their subcontractors have satisfied themselves as to the nature and location of the Work or requirements of similar Work to be performed within Miami-Dade County Public Right-of-Ways. The general and local conditions include, but are not restricted to those bearing upon transportation and traffic maintenance; the disposal, handling and storage of materials; access roads to the site; site constraints, restrictions and limitations; the conformation and conditions of the work area; and the character of equipment and facilities needed prior to and during the performance of the Work.
 2. Failure on the part of the bidder to completely or properly evaluate any factors of costs prior to bidding shall not form a basis for additional compensation if awarded the Contract.

1.07 CONTRACTOR QUALIFICATION REQUIREMENTS

- A. Certificate of Competency Requirement:

At the time of Bid and pursuant to the requirements of Section 10-3 of the Code of Miami-Dade County, Florida and these Solicitation and Contract Documents, the Bidder must hold a valid, current, and active:

1. Certificate of Competency from the County's Construction Trades Qualifying Board as General Mechanical or a General Engineering Contractor, Air Conditioning Unlimited, or.
2. Certification, as a General Contractor or Mechanical Contractor provided by the State of Florida Construction Industry Licensing Board, pursuant to the provisions of Section 489.115 of the Florida Statutes (F.S.), or

3. Proof of such Certificate(s) must be submitted at the time of initial response and maintained current throughout the contract period. The County may request proof of continued certification at any time during the contract period. Failure to provide such proof within five (5) working days from notification by the County shall result in the removal from the contract and the rejection of any current or future RPQ bid submissions.

B. Experience Requirement:

1. The Bidder, through full-time personnel employed by the Bidder, must demonstrate their experience as the prime contractor or subcontractor in at least three successfully completed projects performed whose bulk work is similar in detail to the Project's Scope of Work described in the Solicitation Documents. Demonstrate the experience requirement by:
 - a. Providing a detailed description of all projects similar in detail to the Project's Scope of Work described in these Solicitation Documents and in which the Bidder's identified personnel is currently engaged or has completed within the past five years. List and describe the aforementioned projects and state whether the work was performed for the County, other government clients, or private entities. The description must identify for each project:
 - 1) The identified personnel and their assigned role and responsibilities for the listed project
 - 2) The client name and address including a contact person and phone number for reference
 - 3) Description of work
 - 4) Total dollar value of the contract
 - 5) Contract duration
 - 6) Statement or notation of whether Bidder's referenced personnel is/was employed by the prime contractor or subcontractor, and
 - 7) For completed projects, provide letters of certification of final acceptance or similar project closure documentation issued by the client and available Contractor's performance evaluations; or
 - b. The County reserves the right to request additional information and/or contact listed persons pertaining to bidder's experience.

1.08 JOB ORDER CONTRACTING

- A. Job Order Contracting under CICC 7360-0/08 does not apply for this contract.

1.09 AWARD OF CONTRACT

- A. The award of the Contract, if it be made in the County's sole discretion, shall be to the lowest responsive and responsible bidder whose bid complies with all of the material terms of this solicitation and is determined to be in the best interest of the County.
- B. A fully executed Notice to Proceed (NTP) Letter constitutes a contract with Miami-Dade County. The County may issue to the Contractor a NTP Letter only when, in the discretion of Miami-Dade County, all conditions for award have been satisfied including, but not limited to, compliance with

all of the requirements set forth in the Recommendation for Award letter and the expiration of any applicable protest period. The Contractor must provide the County with the completed and fully executed NTP Letter prior to the date stated in the letter for commencement of the Work. The award is final only upon the County's receipt of a fully executed NTP Letter from the Contractor.

- C. Without limiting the generality of the foregoing, the County may determine that it is in the County's best interest to award the Contract to the next low bidder when the low bidder's existing contractual commitments with the County, in the sole discretion of the County (a) could prevent the timely prosecution of the work requiring competing commitments of site, supervisory or home office personnel, or (b) could present potential conflicts with billing of similar items under existing contracts for similar or related work, or (c) could disfavor competition in the contracting industry in pricing or in the use of personnel or subcontractors.
- D. By submitting a bid, the bidder acknowledges that the County shall have the right to investigate the existence of these factors in determining whether to award the bid, and to evaluate, without limitation, the bidder's outstanding commitments on other awarded contracts, its resources to perform the Work under the Contract, and its past performance.
- E. The County reserves the right to waive any informality in, or to reject any or all bids. Bids from any person, firm or corporation in default upon any agreement with the County will be rejected.
- F. The Bidders should be qualified by experience, financing, and equipment to do the work described in the Contract Documents. The County may require from the apparent lowest responsive and responsible Bidder, as a condition for Award, a list of the major construction equipment that is available to perform all the work required by the Contract. The list shall include all equipment required and available including: quantity; condition; make and model; whether owned or leased; and their present location. Actual proof of ownership (bills of sale or certified proof of a valid lease in the name of the firm submitting the Bid) of the equipment or the ability to secure the equipment prior to Contract Award is required. A visual inspection by the County of the equipment listed shall be facilitated within 10 days of submittal of the aforementioned list. Failure to meet the timeframes and conditions stipulated herein or in the Recommendation for Award may result in the disqualification of the Bidder.

1.10 PAYMENT AND PERFORMANCE BONDS

- A. Unless otherwise exempted herein, the successful bidder must submit, within the timeframe stipulated in the Recommendation for Award, duly executed Payment and Performance Bonds, meeting the requirements of Section 255.05, F.S., on the forms prescribed by the Department or in Cash, each in the amount of the total contract price (i.e. the accepted total amount bid plus any contingency and dedicated allowances attributable to the Contract), as security for the faithful performance of this Contract and for the payment of all persons performing labor or furnishing materials in connection therewith. If Cash is used in lieu of the bonds, all terms and conditions stipulated in the bonds shall be just as applicable.
- B. Exemption. For contracts of \$200,000.00 or less for Community Small Business Enterprise (CSBE) work as either the (i) prime contractor directly contracting with a County department, or (ii) subcontractor of a prime contractor, there shall be no requirement for the CSBE firm entering into said contract or subcontract to execute and deliver a payment and performance bond as a condition of executing such contract or subcontract, or performing the work, unless pre-approved by Small Business Development.
 - A. The Performance and Payment Bonds shall have as the surety thereon only such surety company or companies as are acceptable to the County and are authorized to write bonds of such character and amount in accordance with the following qualifications:

1. All bonds shall be written through surety insurers authorized to do business in the State of Florida as surety, with the following qualifications as to management and financial strength according to the latest edition of Best's Insurance Guide, published by A.M. Best Company, Oldwick, New Jersey:

| <u>Bond Amount (\$)</u> | <u>Best Rating</u> |
|-------------------------|--------------------|
| 500,001 to 1,500,000 | B V |
| 1,500,001 to 2,500,000 | A VI |
| 2,500,001 to 5,000,000 | A VII |
| 5,000,000 to 10,000,000 | A VIII |
| Over 10,000,000 | A IX |

2. On contract amounts of \$500,000 or less, the bond provisions of Section 287.0935, F.S. shall be in effect and surety companies not otherwise qualifying with this paragraph may optionally qualify by:
 - a. Providing evidence that the Surety has twice the minimum surplus and capital required by the Florida Insurance Code at the time the invitation to bid is issued.
 - b. Certifying that the Surety is otherwise in compliance with the Florida Insurance Code, and;
 - c. Providing a copy of the currently valid Certificate of Authority issued by the United States Department of the Treasury under ss. 31 U.S.C. 9304-9308.
 3. Surety insurers shall be listed in the latest Circular 570 of the U.S. Department of the Treasury entitled "Surety Companies Acceptable on Federal Bonds", published annually. The bond amount shall not exceed the underwriting limitations as shown in this circular.
 4. For contracts in excess of \$500,000 the provision of Subarticle 2 above will be adhered to plus the company must have been listed for at least three consecutive years, or holding a valid Certificate of Authority of at least 1.5 million dollars and on the Treasury List.
 5. Surety Bonds guaranteed through U.S. Government Small Business Administration or Contractors Training and Development Inc. will also be acceptable.
 6. The attorney-in-fact or other officer who signs performance and payment bonds for a surety company must file with such bond a certified copy of his power of attorney authorizing him to do so. The performance and payment bonds must be counter signed by the surety's resident Florida agent.
- B. The Payment and Performance Bonds must be executed on the forms provided by the Department after the recommendation of award has been made. Failure to do so shall result in the rescission of the contract award recommendation.
 - C. Provide the County with three executed originals of the Payment and Performance Bonds and a letter from the bonding agent granting Miami-Dade County authorization to date the Bonds.
 - D. The Performance Bond or Cash used in lieu of the Performance Bond shall remain in force for five (5) years from the date of final acceptance of the work to protect the County against losses resulting from defects in materials or improper performance of work under the Contract; provided however, that this limitation does not apply to suits seeking damages for latent defects in materials or

workmanship, such actions being subject to the limitations found in Section 95.11(3)(c), Florida Statutes.

- E. The cost of the bond(s) shall be included in the Total Amount Bid. No separate payment for the cost of said bond(s) shall be made by the County.
- F. The required bond(s) shall be written by or through and countersigned by a licensed Florida agent of the surety insurer pursuant to Section 624.425, F.S.
- G. In the event the Surety on the bond(s) given by the Contractor becomes insolvent, or is placed in the hands of a receiver, or has its right to do business in its State of domicile or the State of Florida suspended or revoked as provided by law, or in the event of cancellation of the required hands by the Surety, the County shall withhold all payments until the Contractor shall give good and sufficient bond(s) in lieu of the bond(s) executed by such Surety.

1.11 ADDITIONAL INSURANCE TO BE CARRIED BY CONTRACTOR

Subparagraphs 2.9A through 2.9C and 2.9E through 2.9G of the Special Conditions to the CICC 7360-0/08 Contract are deleted and replaced with the following:

- A. Contractor shall indemnify and hold harmless the County and its officers, employees, agents and instrumentalities from any and all liability, losses or damages, including attorneys' fees and costs of defense, which the County or its officers, employees, agents or instrumentalities may incur as a result of claims, demands, suits, causes of actions or proceedings of any kind or nature arising out of, relating to or resulting from the performance of this Agreement by the Contractor or its employees, agents, servants, partners principals or subcontractors. Contractor shall pay all claims and losses in connection therewith and shall investigate and defend all claims, suits or actions of any kind or nature in the name of the County, where applicable, including appellate proceedings, and shall pay all costs, judgments, and attorney's fees which may issue thereon. Contractor expressly understands and agrees that any insurance protection required by this Agreement or otherwise provided by Contractor shall in no way limit the responsibility to indemnify, keep and save harmless and defend the County or its officers, employees, agents and instrumentalities as herein provided.
- B. Contractor shall furnish to the Department of Transportation and Public Works, 111 NW 1 Street, Miami Florida 33128-1987, Certificate(s) of Insurance which indicate that insurance coverage has been obtained which meets the requirements as outlined below:
 - 1. Worker's compensation insurance for all employees as required by Florida Statute 440.
 - 2. Commercial General Liability Insurance in an amount not less than \$1,000,000 per occurrence, and \$2,000,000 in the aggregate. Miami-Dade County must be shown as an additional insured with respect to this coverage.
 - 3. Automobile Liability Insurance covering all owned, non-owned and hired vehicles used in connection with the work, in an amount not less than \$1,000,000 combined single limit
 - 4. Installation Floater on an All-Risks or Special perils basis for 100% of the cost of the project on a replacement cost basis. Miami-Dade County must be included as a loss payee.

All insurance policies required above shall be issued by companies authorized to do business under the laws of the State of Florida, with the following qualifications:

The company must be rated no less than "A-" as to management, and no less than "Class VII" as to financial strength, by Best's Insurance Guide, published by A.M. Best Company, Oldwick, New Jersey, or its equivalent, subject to the approval of the County Risk Management Division or the company must hold a valid Florida Certificate of Authority as shown in the latest "List of All Insurance Companies Authorized or Approved to Do Business in Florida" issued by the State of Florida Department of Financial Services..

Miami-Dade County reserves the right, upon reasonable notice, to request and examine the policies of insurance (including but not limited to policies, binders, amendments, exclusions or riders, etc).

NOTE: MIAMI DADE COUNTY CONTRACT NUMBER AND TITLE OF CONTRACT MUST APPEAR ON EACH CERTIFICATE.

CERTIFICATE HOLDER MUST READ:

MIAMI-DADE COUNTY
111 NW 1st STREET, SUITE 2340, MIAMI, FL 33128

Compliance with the foregoing requirements shall not relieve the Contractor of his liability and obligation under this section or under any other section of this agreement.

SECTION 4: SUPPLEMENTAL INFORMATION

SAMPLE SURETY PERFORMANCE AND PAYMENT BOND

SURETY PERFORMANCE AND PAYMENT BOND

By this Bond, We _____, as Principal, whose principal business address is _____, as Contractor under the contract dated _____, 20 __, between Principal and Miami-Dade County for the construction of _____ Project No. _____ (herein after referred to as "Contract") the terms of which Contract are incorporated by reference in its entirety into this Bond and _____, a corporation, whose principal business address is _____ as Surety, are bound to Miami-Dade County (hereinafter referred to as "County") in the sum of _____ (U.S. dollars) \$ _____, for payment of which we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs all the work under the Contract, including but not limited to guarantees, warranties and the curing of latent defects, said Contract being made a part of this bond by reference, and in the times and in the manner prescribed in the Contract, including any and all damages for delay; and
2. Promptly makes payments to all claimants, as defined in Section 255.05(1), 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 County all losses, damages, including damages for delay, expenses, costs and attorney's fees, including appellate proceedings, that County sustains because of a default by Principal under the Contract, including but not limited to a failure to honor all guarantees and warranties or to cure latent defects in its work or materials within 5 years after completion of the work under the Contract; and
4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the Contract, including all warranties and curing all latent defects within 5 years after completion of the work under the Contract;

then this bond is void; otherwise it remains in full force.

If no specific periods of warranty are stated in the Contract for any particular item or work, material or equipment, the warranty shall be deemed to be a period of one (1) year from the date of final acceptance by the County. This Bond does not limit the County's ability to pursue suits directly with the Principal seeking damages for latent defects in materials or workmanship, such actions being subject to the limitations found in Section 95.11(3) (c), Florida Statutes.

Any changes in or under the Contract Documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect Surety's obligation under this Bond.

SURETY PERFORMANCE BOND (Cont'd)

IN WITNESS WHEREOF, the above bounden parties have caused this Bond to be executed by their appropriate officials as of the _____ day of _____, 20 __.

SAMPLE ONLY

CONTRACTOR

(Contractor Name)

BY:

(President) (Managing Partner or Joint Venture)

(SEAL)

COUNTERSIGNED BY RESIDENT
FLORIDA AGENT OF SURETY:

SURETY:

(Copy of Agent's current
Identification Card as issued by
State of Florida Insurance Commissioner must be attached) By:

Attorney-in-Fact

(CORPORATE SEAL)

(Power of Attorney must be attached)

SECTION 5: SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS

SUPPLEMENTARY CONDITIONS

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1. SUPPLEMENTARY CONDITIONS

1.01 MISCELLANEOUS CONSTRUCTION CONTRACT (7360 PLAN)

- A. These Supplementary Conditions amend or supplement the Miscellaneous Construction Contract (MCC) CICC 7360-0/08 the MCC, 7360 Plan, and other provisions of the Contract Documents as indicated below. All provisions that are not so amended or supplemented remain in full force and effect. All requirements of the Contract Documents, or portions thereof, which are not specifically modified, deleted, or superseded hereby, remain in full effect. The MCC Contract and Plan may also be supplemented elsewhere in the Contract Documents by provisions located in, but not necessarily limited to, Division 1 (General Requirements) of the Contract Specifications.

1.02 APPLICABLE WAGE RATES

- A. Amend Paragraph 2.17 of the CICC 7360-0/08 Miscellaneous Construction Contract by adding the following:

On May 28, 2024, the Governor signed into law House Bill (“HB”) 705. Prior to the adoption of HB 705, section 255.0992 of the Florida Statutes generally prohibited Miami-Dade County (the “County”), from requiring a contractor, subcontractor, or supplier to pay or provide a predetermined amount of wages or benefits to its employees or recruit or hire employees from a designated or restricted source in construction projects paid for with any state-appropriated funds. Additionally, under the same statute, the County could not apply small business measures or limit bidding among Small Business Enterprise-Construction (“SBE-Con”) firms for construction projects paid for with any state funds. However, for contracts funded solely with County funds, prior to the adoption of HB 705, section 255.0992 did not limit the application of the County’s SBE-Con program, responsible wages, or workforce requirements.

No RESPONSIBLE WAGES AND BENEFITS apply for this project.

1.03 CONTINGENCY ALLOWANCE FOR TIME

- A. Paragraph 2.58 of the CICC 7360-0/08 Miscellaneous Construction Contract is hereby amended to provide a Contingency Allowance for time extension not to exceed ten percent of the original Contract Duration pursuant to a written request by Contractor for a time extension for an Excusable Delay, as described in Paragraph 2.58 of the 7360 Miscellaneous Construction Contract, that affects the critical path schedule of the Contract or any previously approved changes. The request must be accompanied by written documentation that supports the justification of a time extension and is subject to review and concurrence by the department Engineer, or designee. If approved, a Contract Contingency Allowance Expenditure Authorization will be created for execution by all parties. Once executed the time extension will adjust the scheduled completion date. The cumulative total of all Contingency Allowance time extensions shall not exceed ten percent of the original Contract Duration rounded off to the next whole number.

1.04 WEATHER DELAYS

- A. Schedule of Anticipated Weather Delay Days

1. The following schedule of average climatic range, based on National Oceanic and Atmospheric Administration (NOAA) normal data (1981-2010 Monthly Normals; GHCN Daily ID:

USW00012839; MIAMI INTL AP, FL), will be used as the standard baseline for monthly evaluations of weather delays for this Contract.

| Schedule of Anticipated Weather Delay Days | | | | | | | | | | | | |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| Days | 3 | 4 | 4 | 4 | 7 | 12 | 11 | 13 | 13 | 8 | 4 | 4 |

2. The above schedule provides the anticipated number of days each month during which construction activity exposed to weather conditions is expected to be prevented and suspended by cause of adverse weather. Suspension of construction activity for the number of days listed in the schedule, for each month, is included in the Work and is not eligible for extension of Contract Time. The Work Progress Schedule submitted by Contractor must reflect these anticipated adverse weather delays in all weather dependent activities.

B. Extension of Contract Time for Adverse Weather Days In Excess of the Standard Baseline

1. If the basis exists, in accordance with the Conditions of the Contract, for a claim for extension of time, an extension of time on the basis of weather may be granted only for the number of Weather Delay Days in a month that are in excess of the number of days listed above for that month in the Schedule of Anticipated Adverse Weather Delay Days.
2. Adverse Weather Day is defined, for the purpose of this Article, as the occurrence of one or more of the following weather conditions within a twenty-four (24) hour day that prevents scheduled critical path construction activity exposed to weather conditions:
 - a. Precipitation in excess of one-tenth inch (0.10").
 - b. Temperatures that do not rise above that required for the day's construction activity, if such temperature requirement is specified or accepted as standard industry practice.
 - c. Sustained wind in excess of twenty-five (25) miles per hour.
3. Adverse Weather Day may include "dry-out" days, resulting from precipitation that occurs beyond the Anticipated Weather Delay Days for the month, only if there is a hindrance to site access or sitework and Contractor has taken all reasonable accommodations to avoid such hindrance; and, at a rate no greater than 1 make-up day for each precipitation day (or consecutive days) that total 1.0 inch or more of precipitation.
4. A Weather Delay Day may be counted by the Engineer, if adverse weather prevents work on the Project for fifty percent (50%) or more of the Contractor's normal scheduled work day and critical path construction activities were included in the day's schedule, including a weekend day or holiday approved by the Engineer with construction activity scheduled that day.
5. No additional compensation will be made for weather delays.

C. Contractor Documentation and Submittals

1. Organize claim to facilitate evaluation by calendar month and submit in accordance with the claims submittal requirements of the Contract Documents. Documentation is required for each Adverse Weather Day that results in a Weather Delay. Identify the number of days claimed for the month that exceeds the Schedule of Anticipated Adverse Weather Delays. Documentation must include:

- a. Daily jobsite work logs showing which and to what extent critical path construction activities have been affected by adverse weather.
 - b. Daily weather data, obtained from the nearest NOAA weather station or other independently verified source approved by Engineer at beginning of the Project, to support claim for time extension. NOAA Global Historical Climatology Network (GHCN) Daily data may be obtained from the NOAA website at <http://www.ncdc.noaa.gov/cdo-web/search>.
2. If an extension of Contract Time is appropriate and approved by the Department, such extension will be made in accordance with the requirements of the Contract Documents.

1.05 ADDITIONAL FUNDING SOURCE PROVISIONS

A. People's Transportation Plan (PTP)

1. Since proceeds from the Charter County Transportation System Sales Surtax levied pursuant to Section 29.121 of the Code of Miami-Dade County may be used to pay for all or some part of the cost of this Contract, no award of this Contract shall be effective and thereby give rise to a contractual relationship with the County unless and until the Citizens' Independent Transportation Trust (CITT) and County Commission have approved the award of the Contract, and such award becomes final either by expiration of 10 days after such award without veto by the Mayor, or by Commission override of a veto.

1.06 ADDITIONAL SBE-CONST CONTRACT MEASURE REQUIREMENTS

- A. Because this project is estimated at \$790,840.00 above the 700K threshold for the application of SBE – Goods and Services goal and with the passing of House Bill (HB) 705 it will be processed as a “No Measure” (no SBE Measure) and with no responsible wages.

1.07 COMMUNITY WORKFORCE PROGRAM

- A. Considering the passing of HB 705, effective July 1, 2024, the following prohibitions exist:

The County's Community Workforce Program requirements will not be applied to the County's capital construction projects, including design-build projects, awarded after July 1, 2024.

1.08 CLEARINGHOUSE FOR POSTING NOTICE OF JOB OPPORTUNITIES

- A. Pursuant to Miami-Dade County Resolution R-1145-99, Contractor must post a notice of job opportunities with the Miami-Dade County Job Clearinghouse (JCH) within ten (10) business days of the contract award or no later than five (5) business days after start of construction. If job opportunities are available, complete all portions of the Notice of Construction Clearinghouse Job Opportunity form (Form B). If no job opportunities are available, complete a JCH Affidavit- No Notice(s) of Construction Job Opportunities form (Form C). Submit the completed Form B or C (with copies to the Engineer) to:

Miami-Dade County Internal Service Department
Small Business Development Division
Project Review and Analysis Section
Attention: Job Clearinghouse
111 NW 1st Street, 19th floor

Miami, Florida 33128
Telephone: (305) 375-3111 Fax (305) 375-3160

- B. Job applicants interested in posting an application for employment to be considered by contractors with job openings may complete a JCH Construction Clearinghouse Job Application (Form A) and submit it to the address provided in the Form.
- C. The necessary forms are provided as Appendix "C" to these Supplementary Conditions. Additional information pertaining to the Miami-Dade County Job Clearinghouse is available in the County's website at <http://www.miamidade.gov/sba/about-us-job-clearinghouse.asp>.

1.09 RESIDENTS FIRST TRAINING AND EMPLOYMENT PROGRAM COMPLIANCE

- A. Considering the passing of HB 705, effective July 1, 2024, the following prohibitions exist:

The County's Residence First Training and Employment Program requirements will not be applied to the County's capital construction projects, including design-build projects, awarded after July 1, 2024.

1.10 EMPLOY MIAMI-DADE PROGRAM

- A. Considering the passing of HB 705, effective July 1, 2024, the following prohibitions exist:

The County's Employ Miami-Dade Program requirements will not be applied to the County's capital construction projects, including design-build projects, awarded after July 1, 2024.

1.11 ACCEPTANCE TESTS

- A. Replace Article 2.89 of the CICC 7360-0/08 Miscellaneous Construction Contract with the following:
- B. When Contractor informs Engineer that the Work is ready for inspection, Engineer may request the tests necessary to confirm that the required material, or work specifications are met. If the results of the tests reveal that the applicable specifications have not been met, Contractor, without additional compensation, must perform, to the satisfaction of Engineer, all work necessary to meet the applicable specifications and is responsible for the costs of all re-testing required by Engineer and the Contract Documents.

1.12 CHANGE ORDER PROCEDURES AND BASIS FOR PAYMENT

- A. Extra Work shall result in an equitable adjustment (increase or decrease) to the applicable RPQ representing the reasonable cost or the reasonable financial savings related to the change in Work. Extra Work may also result in an equitable adjustment in the RPQ schedule for performance for both the Extra Work and any other Work affected by the Extra Work.
- B. The County shall initiate the Extra Work procedure by a notice to Contractor outlining the proposed Extra Work. Upon receipt of the notice to proceed with the Extra Work, the Contractor is required to immediately start the Extra Work. The Contractor is required to obtain permission for an extension to start the Extra Work if it is beyond the Contractor's ability to start within the allotted timeframe.

- C. The Contractor is required to provide the Project Manager with a detailed Change Order Proposal, if an Owner's Representative has been identified, which shall include requested revisions to the Contract, including but not limited to adjustments in the RPQ price and schedules for performance for the applicable RPQ. The change to the RPQ shall not exceed \$100,000 or 10% of original RPQ, whichever is less. The Contractor is required to provide sufficient data in support of the cost proposal demonstrating reasonableness. In furtherance of this obligation, the County may require that the Contractor submit any or all of the following: a cost breakdown of material costs, labor costs, labor rates by trade, and Work classification and overhead rates in support of Contractors Change Order Proposal. The Contractor's Change Order Proposal must include any schedule revisions and an explanation of the cost and schedule impact of the extra Work on the project. If the Contractor fails to notify the Project Manager of the schedule changes associated with a Notice of Proposed Change Order by submitting a revised schedule document, it will be deemed to be an acknowledgment by Contractor that the proposed Extra Work will not have any scheduling consequences. The Contractor agrees the Change Order Proposal will in no event include a combined profit and home office overhead rate in excess of fifteen (15%) percent of the direct labor and material costs, unless the Project Manager determines that the complexity and risk of the Extra Work is such that an additional factor is appropriate. The Change Order Proposal may be accepted or modified by negotiations between the Contractor and the County. If an agreement on the Extra Work is reached, both parties shall execute the Extra Work order in writing. The execution by the Contractor of the Extra Work order shall serve as a release of the County from all claims and liability to the Contractor relating to, or in connection with, the Extra Work, including any impact, and any prior acts, neglect or default of the County relating to the Extra Work.

1.13 MIAMI-DADE COUNTY'S USER ACCESS PROGRAM (UAP).

- A. On November 5, 2013 the Board of County Commissioners adopted Ordinance No. 13-103 eliminating the construction contract exemption to the User Access Program set forth in Section 2-8.10 of the Code of Miami-Dade County with the exception of Miscellaneous Construction Contract Program contracts with a total contract value of less than \$500,000. Ordinance No. 13-103 retained the other exemptions listed in Section 2-8.10 of the Code including an exemption for contracts "funded with any funding source, including federal, which prohibits or restricts the application of the credit to the County effected in the UAP." As bond funding would be a funding source "which prohibits or restricts the application" of the UAP, construction contracts funded by bond proceeds (e.g., General Obligation Bond (GOB), People's Transportation Plan (PTP)) remain exempt from the application of the County's User Access Program.
- B. UAP does apply for this project, Therefore:

This Contract is subject to a user access fee under the County's User Access Program (UAP) in the amount of two percent (2%) pursuant to Miami-Dade County Budget Ordinance No. 03-192. All construction services provided under this contract are subject to the 2% UAP. This fee applies to all Contract usage whether by County Departments or by any other governmental, quasi-governmental or not-for-profit entity. From every payment made to the Contractor under this contract (including the payment of retainage), the County will deduct the two percent (2%) UAP fee provided in the ordinance and the Contractor will accept such reduced amount as full compensation for any and all deliverables under the contract. The County shall retain the 2% UAP for use by the County to help defray the cost of its procurement program. Contractor participation in this pay request reduction portion of the UAP is mandatory.

1.14 PUBLIC RECORDS AND CONTRACTS FOR SERVICES PERFORMED ON BEHALF OF MIAMI-DADE COUNTY.

- A. The Contractor shall comply with the Public Records Laws of the State of Florida, including but not limited to:
 - 1. Keeping and maintaining all public records that ordinarily and necessarily would be required by Miami-Dade County (County) in order to perform the service
 - 2. Providing the public with access to public records on the same terms and conditions that the County would provide the records and at a cost that does not exceed the cost provided in Chapter 119, F.S., or as otherwise provided by law
 - 3. Ensuring that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law; and
 - 4. Meeting all requirements for retaining public records and transferring, at no cost, to the County all public records in possession of the Contractor upon termination of the contract and destroying any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements upon such transfer.
- B. In addition, all records stored electronically must be provided to the County in a format that is compatible with the information technology systems of the County. Failure to meet any of these provisions or to comply with Florida's Public Records Laws as applicable shall be a material breach of the agreement and shall be enforced in accordance with the terms of the agreement.
- C. For questions regarding the application of chapter 119, Florida Statutes, to The Contractor's Duty to Provide Public Records relating to this contract, contact the Custodian of Public Records at (305) 375-4735; isd-vss@miamidade.gov; 111 NW 1 Street, suite 1300, Miami, Florida 33128.

1.15 NONDISCRIMINATION

- A. During the performance of this Contract, Contractor agrees to not discriminate against any employee or applicant for employment because of race, color, religion, ancestry, national origin, sex, pregnancy, age, disability, marital status, familial status, sexual orientation, gender identity or gender expression, status as victim of domestic violence, dating violence or stalking, or veteran status, and on housing related contracts the source of income, and will take affirmative action to ensure that employees and applicants are afforded equal employment opportunities without discrimination. Such action shall be taken with reference to, but not limited to: recruitment, employment, termination, rates of pay or other forms of compensation, and selection for training or retraining, including apprenticeship and on the job training.
- B. By entering into this Contract, the Contractor attests that it is not in violation of the Americans with Disabilities Act of 1990 (and related Acts) or Miami-Dade County Resolution No. R-385-95. If the Contractor or any owner, subsidiary or other firm affiliated with or related to the Contractor is found by the responsible enforcement agency or the County to be in violation of the Act or the Resolution, such violation shall render this Contract void. This Contract shall be void if the Contractor submits a false affidavit pursuant to this Resolution or the Contractor violates the Act or the Resolution during the term of this Contract, even if the Contractor was not in violation at the time it submitted its affidavit.

1.16 CONTRACTOR DUE DILIGENCE AFFIDAVIT

- A. In accordance with Board of County Commissioners Resolution 63-14, Contractor, as a condition of award, must submit Contractor Due Diligence Affidavit Form on any contract that exceeds \$1 million, or that is otherwise subject to Board approval.
1. Affidavit is attached in Section 2 of these Solicitation Documents and must be included in the solicitation package. Form requires that Contractors attest to the following under oath:
 - a. All of the lawsuits that have been filed against that entity, its directors, partners, principals, and/or board members, based on breach of contract by that entity in the five years prior to bid or proposal submittal, including the case name and number and the disposition of the case;
 - b. Any instances in the five years prior to bid or proposal submittal where that entity has been defaulted and a brief description of the circumstances; and
 - c. All of the instances in the five years prior to bid or proposal submission where that entity has been debarred or received a formal notice of non-compliance or non-performance, such as a notice to cure or a suspension from participating or bidding for contracts, whether related to Miami-Dade County or not.
- B. It is the responsibility of the Contractor to return the fully executed Affidavit at the time of bid or proposal submittal. This affidavit will be used as an additional measure of due diligence prior to award of a contract.

1.17 CLAIMS

- A. Amend Paragraph 2.78 of the CICC 7360-0/08 Miscellaneous Construction Contract by adding the following:
- B. Notice of Claims
1. The Contractor will not be entitled to additional time or compensation otherwise payable for any act or failure to act by the Department, the happening of any event or occurrence, or any other cause, unless he shall have given the Project manager a written notice of claim therefore as specified in this article.
 2. The Contractor shall provide immediate verbal notification with written confirmation within forty-eight (48) hours of any potential claims and of the anticipated time and/or cost impacts resulting thereof. The written notice of claim shall set forth the reasons for which the Contractor believes additional compensation and/or time will or may be due, the nature of the costs involved and the approximate amount of the potential claim.
 3. It is the intention of this article, that differences between the parties arising under and by virtue of the Contract shall be brought to the attention of the Project Manager at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken.
 4. The notice requirements of this article are in addition to those required in other articles of these Contract Documents, inclusive of the conditions listed under the MCC Plan.
 5. The Contractor shall segregate all costs associated with each individual claim including but not limited to labor, equipment, material, subcontractor and supplier costs, and all other costs

related to the claim. In the event that the Contractor has multiple claims, the Contractor will segregate each claim individually including the respective costs associated with each claim. Failure to segregate claims and their respective costs will be grounds for the Department's rejection of the claim. No "total cost claims" shall be allowed under this Contract.

6. The Contractor must maintain a cost accounting system as a condition for making a claim against the Department. The cost accounting system must segregate the costs of the work under the Contract (non-claims-related) from claims-related and other Contractor costs through the use of a job cost ledger and be otherwise in compliance with general accounting principles.
7. If the Department decides to pay all or part of a claim for which notice was not timely made, the Department does not waive the right to enforce the notice requirements in connection with any other claim.
8. Inasmuch as the notice of claim requirements of this article are intended to enable the Project Manager to investigate while facts are fresh and to take action to minimize or avoid a claim which might be filed thereafter, the Contractor's failure to make the required notice on time is likely to disadvantage the Department. Therefore, a claim that does not comply with the notice requirements above shall not be considered unless the Contractor submits with his claim proof showing that the Department has not been prejudiced by the Contractor's failure to so comply and, in the event the Department has been prejudiced by the Contractor's failure to submit a timely notice of claim, the Department will reduce any equitable adjustment claimed by the Contractor to reflect the damage.

C. Claim Submittals

1. Claims or requests for equitable adjustments filed by the Contractor shall be filed in full accordance with this article no later than 30 calendar days after the act giving rise to the claim and in sufficient detail to enable the Department to ascertain the basis and amount of said claims. In the case of continuing or on-going claim events, the Contractor shall be allowed to periodically amend his claim to more accurately reflect the impact of said claim, until the end of the claim event. No claims for additional compensation, time extension or for any other relief under the Contract shall be recognized, processed, or treated in any manner unless the same is presented in accordance with this Article. Failure to present and process any claim in accordance with this Article shall be conclusively deemed a waiver, abandonment or relinquishment of any such claim, it being expressly understood and agreed that the timely presentation of claims, in sufficient detail to allow proper investigation and prompt resolution thereof, is essential to the administration of this Contract.
2. The Department will review and evaluate the Contractor's claims. It will be the responsibility of the Contractor to furnish, when requested by the Project manager, such further information and details as may be required to determine the facts or contentions involved in his claims. The cost of claims preparation or Change Order negotiations shall not be reimbursable under this Contract.
3. Any work performed by the Contractor prior to Notice-to-Proceed (NTP) shall not be the basis for a claim from the Contractor of any kind.
4. Each claim must be certified by the Contractor as required by the Miami-Dade Code, False Claims Act (see Code Section 21-255, et seq.), and accompanied by all materials required by Miami-Dade County Code Section 21-257. A "certified claim" shall be made under oath by a person duly authorized by the claimant, and shall contain a statement that:
 - a. The claim is made in good faith;

- b. The claim's supporting data is accurate and complete to the best of the person's knowledge and belief;
 - c. The amount of the claim accurately reflects the amount that the claimant believes is due from the Department; and
 - d. The certifying person is duly authorized by the claimant to certify the claim.
5. In order to substantiate time-related claims (delays, disruptions, impacts, etc.), the Contractor shall, if applicable and as determined by the Department, submit, in triplicate, the following information:
- a. Copy of Contractor's notice of claim in accordance with this article. Failure to submit the notice is sufficient grounds to deny the claim.
 - b. The approved, as-planned Schedule in accordance with the applicable section of the Contract Documents and computer storage media, if applicable.
 - c. The as-built Schedule reflecting changes to the approved schedule up to the time of the impact in question and computer storage media if applicable.
 - d. The basis for the duration of the start and finish dates of each impact activity and the reason for choosing the successor and predecessor events affected in the schedule shall be explained. Also, the basis for the duration of any lead/lags inserted into the schedule and the duration in related activity duration shall be explained.
 - e. A marked-up as-built Schedule indicating the causes responsible for changes between the as-planned and as-built schedule and establishing the required cause and effect relationships.
 - f. After indicating specific time related changes on the as-built schedule, the documentation must be segregated into separate packages with each package documenting a specific duration change identified previously. This documentation package shall include Change Orders, Change Notices, Work Orders, written directions, meeting minutes, etc., related to the change in duration.
 - g. Any loss of efficiency, acceleration, disruption and loss of productivity claims shall be compensated as part of the Liquidated Indirect Costs paid for compensable, excusable delays and mark-up on Direct Cost of changes as allowed by the Contract. Total cost and modified total cost claims will not be accepted and the Contractor agrees to waive the right to seek recovery by these methods. The claimed delay shall not result from a cause specified in the Contract Documents as a non-excusable delay.
 - h. The Contractor assumes all risk for the following items, none of which shall be the subject of any claim and none of which shall be compensated for except as they may have been included in the compensation described under Liquidated Indirect Costs:
 - 1) Home office expenses or any Direct Costs incurred allocated from the headquarters of the Contractor;
 - 2) Loss of anticipated profits on this or any other project;
 - 3) Loss of bonding capacity or capability;
 - 4) Losses due to other projects not bid upon;
 - 5) Loss of business opportunities;
 - 6) Loss of productivity on this or any other project;
 - 7) Loss of interest income on funds not paid;
 - 8) Costs to prepare, negotiate or prosecute claims and

- 9) Costs spent to achieve compliance with applicable laws and ordinances (excepting only sales taxes paid shall be reimbursable expense subject to the provisions of the Contract Documents).
 - i. All non-time-related claim items for additional compensation for Direct Costs shall be properly documented and supported with copies of invoices, time sheets, rental agreements, crew sheets and the like.
 - j. Cost information shall be submitted in sufficient detail to allow for review. The basis for the budgeted or actual costs shall include man-hours by trade, labor rates, material and equipment costs etc. These costs shall be broken down by pay.
 - k. The documentation for budgeted cost shall, as a minimum, include:
 - 1) Copies of all the Contractor's bid documents, bid quotes, faxed quotes, etc.
 - 2) Copies of all executed subcontracts.
 - 3) Other related budget documents as requested by the Project Manager.
 - l. The documentation for actual cost shall, as a minimum, include:
 - 1) Time Sheets.
 - 2) Materials invoices
 - 3) Equipment invoices
 - 4) Subcontractors' payments
 - 5) Other related documents as required by the Project Manager.
 - m. The Contractor shall make all his books, employees, work sites and records available to the Department or its representatives for inspection and audit.
6. No payment shall be made to the Contractor by the Department for loss of anticipated profit(s) from any deleted work.
7. As indicated above, the Project Manager and the Field Representative shall be allowed full and complete access to all personnel, documents, work sites or other information reasonably necessary to investigate any claim. Within sixty (60) days after a claim has been received, the claim shall either be rejected with an explanation as to why it was rejected or acknowledged. Once the claim is acknowledged, the parties shall attempt to negotiate a satisfactory settlement of the claim, which settlement shall be included in a subsequent Work Order or Change Order. If the parties fail to reach an agreement on a recognized claim, the Department shall pay to the Contractor the amount of money it deems reasonable, less any appropriate retention, to compensate the Contractor for the recognized claim.
8. Failure of the Contractor to make a specific reservation of rights regarding any such disputed amounts in the body of the Change Order which contains the payment shall be construed as a waiver, abandonment, or relinquishment of all claims for additional monies resulting from the claims embodied in said Change Order. However, once the Contractor has properly reserved rights to any claim, no further reservations of rights shall be required and the Contractor shall not be required to repeat the reservation in any subsequent change order. Prior reservation of rights may however be modified, by express reference, in subsequent change orders. Notwithstanding the aforementioned, at the time of final payment under the Contract, the Contractor shall specify all claims which have been denied and all claims for which rights have been reserved in accordance with this section. Failure to so specify any particular claim shall be constructed as a waiver, abandonment, or relinquishment of such claim.

1.18 DISPUTES

- A. Amend Paragraph 2.81 of the CICC 7360-0/08 Miscellaneous Construction Contract by adding the following:
- B. Disputes
 - 1. The following provisions shall govern disputes under this Contract unless the Special Provisions to this Contract contain the requirement for the use of an alternate dispute resolution method. For example, for large projects of great complexity, a Dispute Review Board (DRB) may be employed by the Department to settle disputes in lieu of the Department Director or Office of the Mayor (OOM) designee as specified below. In this case, the DRB alternative shall be specified by the Department in the Special Provisions and, if utilized, shall supersede this dispute provision.
 - a. In the event the Contractor and the Department are unable to resolve their differences concerning any determination made by the Project Manager or Department on any dispute or claim arising under or relating to the Contract (referred to in this Section as a "Dispute"), either the Contractor or the Department may initiate a dispute in accordance with the procedure set forth in this article. Exhaustion of these procedures shall be a precondition to any lawsuit permitted hereunder.
 - b. For contracts with a value of \$5 million or less, all Disputes under this Contract shall be decided by the Department Director or his designee. For contracts valued at more than \$5 million, Disputes shall be decided by a designee appointed by the OOM. Decisions rendered by the Department Director or OOM designee shall not be binding but shall be admissible in a court of competent jurisdiction.
 - c. As soon as practicable, the Department Director or OOM designee shall adopt a schedule for the Contractor and the Department to file written submissions stating their respective positions and the bases therefore. The written submissions shall include copies of all documents and sworn statements in affidavit form from all witnesses relied on by each party in support of its position. Within 20 working days of the date on which such written submissions are filed, the Department Director or OOM designee shall afford each party an opportunity to present a maximum of one hour of argument. The Department Director or OOM designee may decide the Dispute on the basis of the affidavits and other written submissions if, in his opinion, there is no issue of material fact and the party is entitled to a favorable resolution pursuant to the terms of this Contract. As part of such decision, the Department Director or OOM designee shall determine the timeliness and sufficiency of each notice of claim and claim at issue as provided in this article. The Department Director or OOM designee shall have the authority to rule on questions of law, including disputes over contract interpretation, and to resolve claims, or portions of claims, via summary judgment where there are no disputed issues of material fact. Furthermore, the Department Director or OOM designee is authorized by both parties to strike elements of claims seeking relief or damages not available under the contract (such as, but not limited to, claims for lost profits, off-site overhead, loss of efficiency or productivity claims or claim's preparation costs) by summary disposition.
 - d. In the event that the Department Director or OOM designee determines that the affidavits or other written submissions present issues of material fact, he shall allow the presentation of evidence in the form of lay or expert testimony directed solely to the issues which he may specifically identify to require factual resolution. The testimonial portion of the process shall not exceed one day in duration per side, including opening statements and closing arguments, if allowed by the Department Director or OOM designee at his reasonable discretion.

- e. No formal discovery shall be allowed in connection with any proceeding under this article. Notwithstanding the foregoing, both parties agree that all of the audit, document inspection, information and documentation requirements set forth elsewhere in this contract shall remain in force and effect throughout the proceeding. The Department Director or OOM designee shall not schedule the hearing until both parties have made all their respective records available for inspection and reproduction and the parties have been afforded reasonable time to analyze the records. The continued failure of a party to comply with the document inspection, examination, or submission requirements set forth in this contract shall constitute a waiver of that party's claims and/or defenses, as applicable. Hearsay evidence shall be admissible but shall not form the sole basis for any finding of fact. Failure of any party to participate on a timely basis, to cooperate in the proceedings, or to furnish evidence in support or defense of a claim shall be a criteria in determining the sufficiency and validity of a claim.
- f. The Department Director or OOM designee shall issue a written decision within 15 working days after conclusion of any testimonial proceeding and, if no testimonial proceeding is conducted, within 45 days of the filing of the last written submission. This written decision shall set forth the reasons for the disposition of the claim and a breakdown of any specific issues or subcontractor claims. As indicated previously, the decision of the Department Director or OOM designee is not binding on the parties, but will be admissible in a court of competent jurisdiction.
- g. If either party wishes to protest the decision of the Department Director or OOM designee, such party may commence an action in a court of competent jurisdiction, within the periods prescribed by law, it being understood that the review of the court shall be limited to the question of whether or not the Department Director or OOM designee's determination was arbitrary and capricious, unsupported by any competent evidence, or so grossly erroneous to evidence bad faith.
- h. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the Department's interpretation. Any presentation or request by the Contractor under this article will be subject to the same requirements for Submittal of Claims in this article.

1.19 EXTRA WORK

- A. The following Subarticle replaces the following items: Article 2.83, Extra Work and Payment Therefore, of the Special Conditions of the MCC 7360 Plan.
 - 1. Contractor may be asked to perform extra work, for which there is no price included in the Proposal, wherever it is deemed necessary or desirable by the Engineer to satisfactorily complete the Project as contemplated, and such extra work must be performed promptly in accordance with the Specifications and as directed by the Engineer, provided, however, that before any extra work is begun, a written order from the Engineer to do the work shall be given to the Contractor. No extra work will be paid for unless ordered in writing.
 - 2. All changed or added work so authorized shall be performed by the Contractor at the time and in the manner specified.
 - 3. The Change Order shall include, as a minimum:
 - a. Scope of work to be added, deleted or modified;
 - b. Cost of work to be added, deleted or modified;

- c. The Contract time extension or reduction in contract time in the case of deleted work required to perform the work to be added, deleted or modified;
 - d. Full release of claims associated with the Contract through the date of the change order, or a reservation of claims identified as to each claim reserved, the scope of the work, the maximum cost of the work, and the maximum number of days of Contract time requested, shall be specified.
4. The Work Order shall include, at a minimum:
- a. Scope of work to be added, deleted or modified;
 - b. Cost of work to be added, deleted or modified;
 - c. The Contract time extension required to perform the work to be added, deleted or modified;
 - d. Full release of claims associated with the work order work, or a reservation of claims identified as to each claim reserved, the scope of the work, the maximum cost of the work, and the maximum number of days of Contract time requested, shall be specified.
- B. Extra Work Payment
1. The following Subarticle replaces the following items: Article 2.83, Extra Work and Payment Therefore, of the Special Conditions of the MCC 7360 Plan.
 2. If Work is ordered, changed, or deleted which is not covered by Unit Prices, then, a NAM must be executed.
 3. Extra work, for a complete job, will be paid for in a lump sum or at unit prices agreed to in writing by the Engineer and the Contractor before the extra work is ordered for performing the work. Payment for lump sum work will be based on the following:
 - a. Contractor shall submit to the Engineer an estimated proposal containing a complete breakdown of costs to perform the work to which shall be added an amount equal to fifteen (15) percent of such sum for labor and the total thereof will be full compensation to the Contractor for performing the work which includes overhead and profit, home office expenses for general supervision and for furnishing and repairing small tools and ordinary equipment used in doing the extra work. In addition, the Contractor shall include their labor burden costs of social security taxes, unemployment insurance, worker's compensation, fringe benefits, inclusive of life and health insurance, union dues, pension, pension plans, vacations and insurance and Contractor's public liability and property damage insurance involved in such extra work, based on the wages paid to such labor. Contractor's documentation of the labor burden costs must be provided upon demand by the Engineer.
 - b. For all materials used, Contractor will include the estimate total cost of such materials, including taxes and freight charges, to which cost will be, added an amount equal to ten (10) percent thereof; for full compensation that includes overhead, profit and home office expenses.
 - c. For any construction equipment or special equipment including fuel and lubricant required for the economical performance of extra work, the Engineer will pay the Contractor a rental price, for every hour that such construction equipment or special equipment is estimated to operate on the work. This provision is intended to pay for heavy or special construction equipment; the County shall therefore not pay for small tools and equipment ordinarily used in construction. Where there is a question as to whether payment pursuant to this section is valid the Engineer will make the final determination as to the validity of such payment. The hourly rental price of such construction or special equipment will not exceed 1/176 part of the monthly rate stated for such equipment in the latest edition of the "Compilation

of Rental Rates for Construction Equipment" by Associated Equipment Distributors. In the event that the equipment is not owned by the Contractor or his companies and the equipment is rented from a recognized equipment rental company, the Contractor will be paid the estimated time that the equipment will work at the hourly rental rate to which shall be added ten (10) percent for fuel, maintenance and lubrication for rented equipment.

4. Contractor is required to include a statement certifying that the proposal is consistent with the Plans and Specifications and he has reviewed all the costs for extra work and has found them to be accurate, fair and reasonable. If extra work is ordered, it must be included in the Contractor's monthly estimate when Allowance Account funds are available in the Contract for the work actually done. An Allowance Account expenditure form shall be prepared and executed by all appropriate parties to the Contract. If no allowance account funds are available a change order will be issued.
5. The performance of any extra work or the furnishing of any extra material which, in the judgment of the Engineer, is of like character to and susceptible of classification under a unit price item of the Contract shall, if the order of the Engineer shall so provide, be paid for at the unit price bid for such item or items, where Allowance Account funds are available in the Contract with the Contractor's monthly estimate, for the work actually done. Said Allowance Account funds shall be transferred to the various Proposal payment item funds via the Allowance Account expenditure form, to allow payment for this extra work without depletion of the payment item fund.
6. All extra work performed hereunder will be subject to all of the provisions of the Contract. Whenever, in the judgment of the Engineer, such extra work or such extra material is not of like character to and susceptible of classification under a unit price item of the Contract, or the application of the unit price will result in unacceptably high costs to the Department, and it is impracticable because of the nature of the work, or for any other reason, to fix the price before the extra work order is issued, extra work and material will be paid for in the following manner:
 - a. For all labor, including a working foreman in direct charge of the specified operation, the Contractor will receive a sum equal to the current local rate of wages for every hour that the labor is actually performed. For a working foreman who performs labor, the Contractor may charge one hundred (100) percent of his hourly wage rate; for a foreman who only directs workers in the performance of their work, the Contractor may charge the following: twenty five (25) percent of the working foreman's salary for directing up to two workers in their work; fifty (50) percent of sum salary for directing up to four workers in their work; seventy-five (75) percent for directing five workers in their work; and one hundred (100) percent for directing six workers or more their work, to which shall be added an amount equal to fifteen percent of such sum, and the total thereof shall be full compensation to the Contractor for performing the work, which includes overhead and profit, home office expenses, general supervision and for furnishing and repairing small tools and ordinary equipment used in doing the extra work. In addition, the Contractor shall be paid their labor burden costs of social security taxes, unemployment insurance, worker's compensation, fringe benefits, inclusive of life and health insurance, union dues, pension, pension plans, vacations, and insurance and contractor's public liability and property damage insurance involved in such extra work, based on the actual wages paid to such labor.
 - b. For all materials used, the Contractor shall receive the actual cost of such materials, including freight charges as shown by original receipted bills, to which costs will be added an amount equal to ten (10) percent thereof, for full compensation which includes overhead, profit and home office expenses.
 - c. For any construction equipment or special equipment including fuel and lubricants, required for the economical! Performance of extra work, excluding the small tools and ordinary equipment as specified above, the Engineer shall allow the Contractor a rental price to be

agreed upon in writing before such work is begun, for every 1 hour that such construction equipment or special equipment is actually operated on the work. Such hourly rental price shall not exceed 1/176 part of the monthly rate stated for such equipment in the latest edition of the "Compilation of Rental Rates for Construction Equipment" by Associated Equipment Distributors. In the event that the equipment is not owned by the Contractor or his companies and the equipment is rented from a recognized equipment rental company, the Contractor will be paid for every hour that the equipment is actually working at the hourly rental rate to which will be added ten (10) percent for fuel, maintenance and lubricants for rented equipment.

7. Contractor's representative and the Counties representative will compare records of extra work done at the end of each day. Such records will be made in duplicate upon a form provided for such purpose by the Counties representative, and shall be signed by both the counties representative and the Contractor's representative, one copy being submitted to the Engineer and the other being retained by the Contractor.
8. Contractor upon certified statements will submit all claims for extra work done, to which shall be attached the original receipted bills covering the costs of and freight charges on all materials used in such work, and such statements, accompanied by copies of the orders authorizing the performance of the work, shall be submitted to the Engineer for inclusion in the estimate of month. In which the work was actually done, where allowance account funds are available in the contract. If no allowance account fund is available, the extra work shall be paid for, subject to approval of a change order for the work, by the county representative via Expedite Ordinance or the Board of County Commissioners.
9. If required, the Contractor shall produce any books, vouchers, other records, or memoranda that will assist the Engineer in determining the true, necessary cost of work and materials to be paid for on a cost plus basis.
10. In the event that the Contractor employs a subcontractor to perform his extra work for any portion of the lump sum work, or for any portion of extra work, material or equipment. Contractor may charge an additional ten (10) percent for his full compensation for overhead, profit, home office expenses and general supervision for the portion of work performed by the subcontractor.
11. The subcontractor must comply with all the requirements of the Contract for his portion of extra work and be compensated as permitted within this Section for the extra work.
12. No additional compensation will be paid for overhead, profit, home office expenses or supervision to any subcontractors working for subcontractors.

1.20 WARRANTY OF CONSTRUCTION

- A. For a period of one year, except as provided below, from the date of Final Acceptance, the Contractor warrants that the Work conforms to the Contract requirements and the RPQ requirements and is free of any patent and/or latent defect of the material or workmanship.
 1. Exception to the above year warranty:
 - a. Where the manufacturer of material provides a warranty in excess of one (1) year, the Contractor shall provide an assignment of warranty to the County with the manufacturer's written authorization. Contractors shall be obligated to provide to the County copies of all

manufacturer's warranties and guarantees. Where the County specifies in an RPQ a warranty greater than one (1) year, such warranty will only be for the specified RPQ.

- b. The warranty hereunder shall be in addition to whatever rights the County may have under law. The Contractor's obligation under this warranty shall be at its own cost and expense, to promptly repair or replace (including cost of removal and installation), that item (or part of component thereof) which proves defective or fails to comply with the Contract within the warranty period such that it complies with the Contract.
- c. In the event the Contractor fails to repair or replace defective Work in accordance with the terms of the Contract, the RPQ, and this warranty, the County shall have the right to collect such costs incurred or withhold the cost of the anticipated repairs by offsetting the amount against any payment due the Contractor under any contract between the County and the Contractor.
- d. The warranty covering defective Work shall be reinstated for a period of one (1) year effective as of the date when the defect is remedied. If the defect is found to have a significant effect on any other part, component or item, the reinstatement of the warranty shall then be extended to cover the part component, or item so affected as well, and shall start as of the date the interrelated parts, components and items function properly. The warranty reinstatement provided for in this paragraph shall apply only to the first replacement or repair of any such item, part and component and, in the case of a failure which has a significant effect on another part, component or item, to the first extension of the said warranty to such affected items, parts and components.
- e. As specified in the construction documents. All guarantees and warranties under the Contract are fully enforceable by the County acting in its own name.

APPENDIX C OF THE SUPPLEMENTARY CONDITIONS
NOTICE OF CONSTRUCTION CLEARING HOUSE FORMS A, B AND C



MIAMI-DADE COUNTY – DEPARTMENT OF SMALL BUSINESS DEVELOPMENT
Job Clearinghouse (JCH)
CONSTRUCTION CLEARINGHOUSE JOB APPLICATION
 Governed by Miami-Dade County Code section 2-1701 and R-1395-05

Section 1. To be completed by Job Applicant. Please print clearly or type

| | | | | | |
|--|-------|----------------|--|--|--|
| Title of position sought | | | Contract/Project Number (if applicable) | | |
| Name: Last | First | Middle Initial | Last 4 digits of Social Security # | | |
| Address (Street Name and Number) | | Apt. | Home telephone number: | | |
| City | State | Zip Code | Additional Contact Telephone number: | | |
| How long have you resided at the above address: <input type="checkbox"/> less than 12 months <input type="checkbox"/> 1 -5 years <input type="checkbox"/> 6-10 yrs <input type="checkbox"/> more than 10yrs | | | Address (Street Name and Number) _____ Apt.____ City _____ State _____ Zip Code _____ | | |
| Date of Birth ____/____/____ <input type="checkbox"/> Male <input type="checkbox"/> Female | | | Languages spoken <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Creole <input type="checkbox"/> Other _____ | | |
| | | | Languages you are able to read and clearly understand: <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Creole <input type="checkbox"/> Other _____ | | |

Current Driver's license: None Operator/Class E Commercial/Class ____ Chauffeur/Class D

Have you ever been employed in the construction industry? Yes No If yes, indicate the trade and the years of experience in each trade.

General Laborer ____ months/years of experience Carpentry ____ months/years of experience Electrical ____ months/years of experience
 Mechanical ____ months/years of experience Plumbing ____ months/years of experience Site & Prep Work ____ months/years of experience
 Equipment Operator ____ months/years of experience Painting ____ months/years of experience Sprinkler fitting ____ months/years of experience
 Drywall Finishing ____ months/years of experience Masonry ____ months/years of experience Tile layer ____ months/years of experience
 Landscaping ____ months/years of experience Pipe Fitting ____ months/years of experience Truck Driver ____ months/years of experience
 Roofing ____ months/years of experience _____ ____ months/years of experience

What hours are you available to work? 6am-2pm 7am-3pm 8am- 4pm Any shift Other

What construction trades are you interested in? Same as indicated above Other _____

Applicant's signature _____ Date _____

Section 2 *****FOR SBD USE ONLY*****

Certificates/Licenses: _____
 Job References: _____

| | |
|---|---------------------------|
| Title of Position Hired: | Date of Hire: |
| Duration of Job: | Job Salary (hourly rate): |
| Employer/Contractor | Contract/Project Number: |
| Applicant was recruited through: <input type="checkbox"/> Self Recruit <input type="checkbox"/> WDO <input type="checkbox"/> WRO <input type="checkbox"/> WTP | |

Submit this application to:
 Attention: Job Clearinghouse
 Miami-Dade County, Department of Small Business Development (SBD)
 Project Review and Analysis Division
 111 NW 1st Street, 19th floor
 Miami, Florida 33128
 Telephone: (305) 375-3111 Fax (305) 375-3160



MIAMI-DADE COUNTY
DEPARTMENT OF SMALL BUSINESS DEVELOPMENT
Job Clearinghouse (JCH)

NOTICE OF CONSTRUCTION CLEARINGHOUSE JOB OPPORTUNITY

Governed by Miami-Dade County Code section 2-1701 and R-1395-05

To be completed by Employer/Contractor. Please print clearly or type

| | |
|--|-------------------------|
| EMPLOYER/CONTRACTOR INFORMATION | |
| Business Name: | Contract/Project Number |
| Address (Street Name and Number) | Federal ID# |
| City | State |
| | Zip Code |
| Telephone Number | Fax Number |
| Contact Person | Email Address |
| JOB LISTING INFORMATION | |
| Job Title | Application Deadline |
| Job Site Location | Number of Openings |
| Describe Job Duties: | Hourly Rate |
| Specialized Training: | |
| Experience Required (Months/Years): | |
| Specialized machinery or equipment: | |
| Job Duration: <input type="checkbox"/> Permanent <input type="checkbox"/> Temporary/If Temporary, how long? ____ Fringe Benefits? <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| Education Required: <input type="checkbox"/> None <input type="checkbox"/> H.S Diploma/GED <input type="checkbox"/> AA Degree <input type="checkbox"/> Bachelor's Degree <input type="checkbox"/> Master's Degree | |
| Certifications/License Required: <input type="checkbox"/> None <input type="checkbox"/> Yes If Yes, please list _____ | |
| Driver's license required: <input type="checkbox"/> None <input type="checkbox"/> Operator/Class E <input type="checkbox"/> Commercial/Class ____ <input type="checkbox"/> Chauffeur/Class D | |
| Language(s) required: <input type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> Creole <input type="checkbox"/> Other | |
| APPLICANTS SHOULD CONTACT EMPLOYER BY: | |
| <input type="checkbox"/> Call for Appointment <input type="checkbox"/> Phone Interview <input type="checkbox"/> Send Resume via: <input type="checkbox"/> Mail <input type="checkbox"/> Fax <input type="checkbox"/> Email | |
| <input type="checkbox"/> Apply In Person Day of the Week: _____ Time: _____ Application Deadline: _____ | |

Employer/Contractor must submit this form for all job openings.

Attention: Job Clearinghouse
Miami-Dade County Department of Small Business Development
Project Review and Analysis Division
111 NW 1st Street, 19th floor
Miami, Florida 33128
Telephone: (305) 375-3111 Fax (305) 375-3160



Delivering Excellence Every Day

JOB CLEARINGHOUSE AFFIDAVIT
Notice of Construction Job Opportunities

Project / Contract Number: _____

Pursuant to Miami-Dade County Resolution No. R-1395-05, there are ___ open position(s) to submit to the Job Clearinghouse for this project at this time. All open positions will be submitted to South Florida Workforce at <https://iapps.careersourcesfl.com/jchcwp/>.

(Signature of Affiant)

(Date)

(Printed Name of Affiant, Title, and Firm Name)

(Witness)

Sworn to and subscribed before me this
_____ day of _____ 20 ____

By: _____

Signature of Notary Public

- Personally Known
- Produced ID

Type of ID produced _____

SECTION 6: SPECIFICATIONS

GENERAL REQUIREMENTS

DTPW DIVISION 1

SECTION 2
SPECIAL TERMS AND CONDITIONS

2.01 PURPOSE

The purpose of this solicitation is to establish a contract for the removal and replacement of (1) existing air-cooled chiller, (1) new chilled duo water pump, hydronic piping, valves, accessories, (1) replacement air handler, including all necessary electrical upgrades to support the replacement as shown on the contract documents including additional goods, services, and extended warranty as described herein, for Miami-Dade County (County) on behalf of the Department of Transportation and Public Works (DTPW).

2.02 TERM OF CONTRACT

Contract Duration is 240 calendar days. Please refer to the invitation to Bid and SECTION 2 SPECIAL TERMS AND CONDITIONS, 2.08 DELIVERY AND ACCEPTANCE for more information.

2.03 METHOD OF AWARD

Award of this contract will be made to the responsible Bidder with a responsive bid whose offer represents the lowest price for the complete chilled water plant replacement including additional goods and services and extended warranty as described herein, meets the minimum requirements below, and all specifications and drawings in Section 3 of this solicitation. The County will award the total contract to a single vendor.

Minimum Requirements (see Checklist: Submittal Documents):

2.3.1 Bidder shall upload the Owner's or Operations manual(s), a copy thereof or other documentation clearly stating the equipment offered is designed as specified in Section 3.

2.04 "EQUAL OR BETTER" PRODUCT CAN BE CONSIDERED UPON RECEIPT OF PRODUCT INFORMATION

Manufacturer's name, brand name and/or model number information contained in this solicitation are being used for the sole purpose of establishing the minimum requirement of level of quality, standard of performance and design, and is in no way intended to prohibit the offer of another manufacturer's equal product unless otherwise indicated herein.

This solicitation requires submission of the following documentation to enable the County's evaluation of "equal" products:

1. Product Information
2. Owner's or Operations Manual.

Documentation containing terms and conditions contrary to the terms and conditions in this solicitation will be deemed null and void. If an "equal" product is offered by a Bidder, the product shall be equal or better in quality and standards of performance to the product specified in the solicitation. Where an "or equal or better" product is offered, product information is required with the initial offer and shall be submitted with complete product information (such as factory specifications, standard manufacturer information sheets, catalogues, and brochures), and if requested by the County, performance test results of the unit offered as an equal or better.

All supporting documentation submitted by the Bidder must in total meet or exceed the required specifications set forth in this solicitation. Where the product information submitted with the offer provides information that does not comply with the specifications of this solicitation, the Bidder shall state, in an official letter on corporate letterhead as part of their initial offer, the differences between the item they are specifically offering, and the equipment described by the product information, to substantiate compliance to all of the specifications set forth in this solicitation. In such cases, any offer submitted with product information but without a letter explaining compliance may result in the rejection of the offer for not meeting the solicitation specifications.

If samples of all "or equal or better" items bid are required for evaluation, such items are to be provided at no cost to the County, and should be submitted with the initial offer, or at the time of specific request. Failure to meet this requirement may result in your offer being rejected. Pursuant to Section 1, 1.5(K) the County reserves the right to request and evaluate additional information.

The County and the EOR shall be sole judges of what is considered equal, based on the best interests of the County, and its decision in this regard shall be final.

2.05 PRICES

If a Bidder is awarded a contract as a result of this solicitation, the price offered by the Bidder shall remain fixed and firm during the term of the contract. The price offered shall include all costs for delivery, installation and technical, maintenance, and factory assisted start-up for proper use of all equipment and accessories purchased herein.

2.06 METHOD OF PAYMENT:

Payments shall be provided within the terms of the Miami-Dade County Capital Improvements Information System (CIIS) Miscellaneous Construction Contracts MCC 7360 and/or 7040 program. The County will provide for this project a specific payment not to exceed more than 50% of the total contract bid, after both specified chillers have been delivered on-site. Final payments shall be made after chiller unit and all other specified equipment has been installed, commissioned, placed into operation, and all permits are passed and finalized.

2.07 SHIPPING

All vendors shall quote prices based on F.O.B. The awarded Bidder shall hold title to the goods until such time as they are delivered and accepted by an authorized DTPW representative at the following location and quantities:

Dept. of Transportation & Public Works (DTPW)
Miami Dade Transit Central Bus Administration Building
Attention: Ray Harding
3300 NW 32nd Avenue
Miami, FL 33142

All equipment shall be constructed, prepared, and loaded to avoid damage during shipping and delivery. The awarded Bidder shall be responsible for filing, processing, and collecting all damage claims.

2.08 DELIVERY AND ACCEPTANCE: DELIVERY SHALL BE WITHIN TWO HUNDRED AND FORTY (240) DAYS AFTER DATE OF ORDER

The awarded vendor shall deliver within two hundred and forty (240) calendar days after the date of the order. All deliveries shall be made in accordance with good commercial practice and all required delivery timeframes shall be adhered to by the awarded vendor; except in such cases where the delivery will be delayed due to acts of natural disasters, strikes, or other causes beyond the control of the vendor. In these cases, the vendor shall notify the County of the delays in advance of the original delivery date so that a revised delivery schedule can be appropriately considered by the County.

Should the vendor to whom the contract is awarded fail to deliver in the number of days stated above, the County reserves the right to cancel the contract on a default basis after any backorder period that has been specified in this contract has lapsed. If the contract is terminated, it is hereby understood and agreed that the County has the authority to purchase the goods elsewhere and to charge the incumbent vendor with any re-procurement costs. If the vendor fails to honor these re-procurement costs, the County may terminate the contract for default.

2.8.1 LIQUIDATED DAMAGES FOR INCOMPLETE PROJECTS

Failure to complete the project in accordance with the specifications and to the satisfaction of the County within the time stated shall cause the vendor to be subject to charges for liquidated damages in the amount of \$143.00 for each and every calendar day the work remains incomplete. As compensation due the County for loss of use and for additional costs incurred by the County due to such non-completion of the work, the County shall have the right to deduct the said liquidated damages from any amount due, or that may become due to the vendor under this agreement, or to invoice the vendor for such damages if the costs incurred exceed the amount due to the vendor.

This amount is based on the current requirement of rental AC equipment at \$4,000 per "28-day" monthly rate for one unit to cool this facility.

2.09 WARRANTY

In addition to all other standard warranties that may be supplied by the awarded Bidder, the awarded Bidder shall warrant its products against faulty labor and/or defective material, for one (1) year for all parts and labor. An additional factory extended warranty shall be provided as part of this bid for a minimum period of four (4) years for the entire chiller unit, parts, and labor and against defective material with a total five (5) after the date of acceptance of the chiller, whichever is later.

2.9.1 This warranty requirement shall remain in force for the full period listed above; regardless of whether the awarded Bidder is under contract with the County at the time of defect, in accordance with Section 1, Paragraph 1.12. Any payment by the County for the goods or services received from the awarded Bidder does not constitute a waiver of these warranty provisions.

2.9.2 The awarded Bidder shall be responsible for promptly correcting any deficiency, at no cost to the County, within seven (7) calendar days after the County notifies the awarded Bidder of such deficiency in writing. If the awarded Bidder fails to honor the warranty and/or fails to correct or replace the defective work or items within the period specified, the County may, at its discretion, notify the awarded Bidder, in writing, that the awarded Bidder may be debarred as a County vendor and/or subject to contractual default if the corrections or replacements are not completed to the satisfaction of DTPW within fourteen (14) calendar days of receipt of the notice. If the awarded Bidder fails to satisfy the warranty within the period specified in the notice, the County may (a) place the awarded Bidder in default of its contract, and/or (b) procure the products or services from another vendor and charge the awarded Bidder for any additional costs that are incurred by the County for this work or items, either through a credit memorandum or through invoicing.

2.10 EQUIPMENT SHALL BE NEW AND MOST RECENT MODEL AVAILABLE

All equipment offered by the awarded Bidder shall be new and the most recent model available. Any optional components which are required in accordance with the contract specifications shall be considered standard equipment for the purposes of this solicitation. Demonstrator models will not be accepted.

2.11 LICENSES, PERMITS AND FEES

The awarded Bidder shall obtain and pay for all licenses, permits, and applicable taxes and fees required for this contract; and shall comply with all laws, ordinances, and regulations applicable to the work contemplated herein. Damages, penalties and or fines imposed on the County, or the awarded Bidder shall be borne by the awarded Bidder.

2.11.1 Contractor must pull Mechanical A/C Permit and other required permits and provide any documentation, drawings, engineering tie-down or wind load plans as required for permitting. Per Florida State Statute 218.80 requires permit fees to be disclosed, which is part of the contractor's responsibility as part of the contractor's bid and MCC 7360 or 7040 requirements. Estimated permit fees are based on the total project cost. These fees are to be paid to the Miami-Dade County Building Department. They are estimated at approximately \$3,000. However, the final fee will be determined by the Building Department when the permit is obtained. All fees and permit costs are subject to change and are the responsibility of the awarded the contractor.

2.12 OMISSION FROM SPECIFICATIONS

The apparent silence of the specifications and any addendum regarding any details or the omission from the specifications of a detailed description concerning any point shall be regarded as meaning that only the best commercial practices are to prevail, and that only new materials and workmanship of first quality are to be used. All interpretations of this specification shall be made upon the basis of this agreement.

2.13 INSURANCE

Please Refer to Supplementary Instructions to Bidders, 1.11 ADDITIONAL INSURANCE TO BE CARRIED BY CONTRACTOR.

SECTION 3

TECHNICAL SPECIFICATIONS

UPGRADE CHILLER UNIT AT

CENTRAL ADMINISTRATION BUILDING



MIAMI-DADE COUNTY
DEPARTMENT OF TRANSPORTATION & PUBLIC WORKS (DTPW)
UPGRADE CHILLER UNIT AT CENTRAL ADMINISTRATION BUILDING

RPQ No. TP-0000037594

IRP374

3300 NW 32ND AVE MIAMI, FL, 33142

TECHNICAL SPECIFICATIONS BID SET SUBMITTAL

WO-EDP-MT-IRP374

FOLIO # 30-3128-031-0010

Prepared By:



Department of Transportation & Public Works
701 NW 1 Court STE 1700
Miami, FL 33136

CONTRACTOR'S BIDDING SCOPE OF SERVICES

MIAMI-DADE COUNTY

DEPARTMENT OF TRANSPORTATION AND PUBLIC WORKS

UPGRADE CHILLER UNIT AT CENTRAL ADMINISTRATION BUILDING

PROJECT NO. EDP-MT-IRP374

PROJECT BACKGROUND

In accordance with the terms and conditions of Agreement EDP-PSA-2029 / Project No. EDP-MT-IRP374, the Miami-Dade County Department of Transportation and Public Works (DTPW) contracted ESI Consulting Engineers to prepare MEP Construction Documents for the installation of new air-cooled-chiller and the replacement of AHU-1 serving the auditorium, along with all the related, chilled water piping, valves, and associated appurtenances for the new chiller installation at Central Bus Administration Building located at 3300 NW 32nd Avenue, Miami, FL. ESI developed the engineering documents necessary for bidding and construction for this project. All related construction documents (drawings & specifications) were submitted to Mr. Ray Harding, DTPW Facilities Maintenance Superintendent. Drawings have been reviewed & approved by the Miami-Dade County Department of Regulatory and Economic Resources (RER-Building Department) under a dry run application.

SCOPE OF WORK

The scope of the project includes the installation of a new air-cooled chiller rated at 92.25 TON in the old cooling tower courtyard, with its corresponding supports (refer to structural drawings). New chilled water piping will be extended from the new chiller courtyard up to the old chiller room and at the point of connection as shown and depicted on the submitted drawings. A new air separator, expansion tank, and chemical pot feeder have been specified accordingly. Chiller system will remain stand-alone; no controls are part of this scope of work. Power connections are to be provided for the new chiller from existing panel "MDP2" as depicted on drawings.

A new vertical floor mounted AHU has been specified. Existing ceiling mounted AHU-1 shall be removed. Scope of work includes the demolition, chilled water and ductwork modifications (inclusive of new added O/A supply in-line fan) and related ceiling work as depicted on drawings. New AHU-1 shall be powered from the existing AHU power feeder and new SF-1 shall be powered from existing panel "ILC" as depicted on drawings.

LICENSE REQUIREMENTS:

At the time of Bid and pursuant to the requirements of Section 10-3 of the Code of Miami-Dade County, Florida, the Bidder is preferred to hold a valid, current, and active:

1. Certificate of Competency from the County's Construction Trades Qualifying Board as General Mechanical or a General Engineering Contractor, Air Conditioning Unlimited, or.
2. Certification, as a General Contractor or Mechanical Contractor provided by the State of Florida Construction Industry Licensing Board, pursuant to the provisions of Section 489.115 of the Florida Statutes (F.S.), or.
3. Proof of such Certificate(s) must be submitted at the time of initial response and maintained current throughout the contract period. The County may request proof of continued certification at any time during the contract period. Failure to provide such proof within five (5) working days from notification by the County shall result in the removal from the contract and the rejection of any current or future RPQ bid submissions.

CONTRACTOR MUST MEET THE BELOW REQUIREMENTS:

- A. As per Miami Dade County Resolution R-1122-21, the Bidder must demonstrate that it has full-time personnel with the necessary experience to perform the Project's Scope of Work. This experience shall include work in successfully completed projects performed by the identified personnel whose bulk of work performed is similar in detail to the Project's Scope of Work described in these Solicitation Documents. Demonstrate the experience requirement by:
1. Providing a detailed description of at least three (3) projects similar in detail to the Project's Scope of Work described in these Solicitation Documents and in which the Bidder's identified personnel is currently engaged or has completed within the past five years. List and describe the aforementioned projects and state whether the work was performed for the County, other government clients, or private entities. The description must identify for each project:
 - a. The identified personnel and their assigned role and responsibilities for the listed project.
 - b. The client's name and address including a contact person and phone number for reference
 - c. Description of work.
 - d. Total dollar value of the contract.
 - e. Contract duration.
 - f. Statement or notation of whether Bidder's referenced personnel is/was employed by the prime contractor or subcontractor, and.
 - g. For completed projects, provide letters of certification of final acceptance or similar project closure documentation issued by the client and available Contractor's performance evaluations; or.
- B. The County reserves the right to request additional information and/or contact listed persons pertaining to bidder's experience.

MIAMI-DADE COUNTY DTPW
CENTRAL BUS CHILLED WATER PLANT REPLACEMENT

DIVISION 01 – GENERAL REQUIREMENTS

| | |
|--------|--|
| 011400 | SITE WORK AND RESTRICTIONS |
| 012613 | REQUEST FOR INFORMATION |
| 012973 | SCHEDULE OF VALUES |
| 013119 | PROJECT MEETINGS |
| 013216 | PROJECT SCHEDULE |
| 013310 | SUBMITTALS |
| 013323 | SHOP DRAWINGS AND PRODUCT DATA |
| 013529 | HEALTH, SAFETY, AND SECURITY PLAN REQUIREMENTS |
| 014126 | PERMITS |
| 014300 | QA REQUIREMENTS |
| 014500 | CONSTRUCTION CONTROL REQUIREMENTS |
| 016000 | PRODUCT MATERIAL AND EQUIPMENT REQUIREMENTS |
| 016200 | SUBSTITUTIONS AND PRODUCT OPTIONS |
| 017113 | MOBILIZATION |
| 017300 | OPERATING AND MAINTENANCE DATA |
| 017329 | CUTTING AND PATCHING |
| 017400 | CLEANING |
| 017800 | CONTRACT CLOSEOUT |
| 017833 | WARRANTIES AND BONDS |
| 017839 | PROJECT RECORD DOCUMENTS |

DIVISION 02 – EXISTING CONDITIONS

| | |
|--------|---|
| 020500 | DEMOLITION AND MAINTENANCE OF SERVICE DURING CONSTRUCTION |
|--------|---|

DIVISION 03-22 – NOT USED

DIVISION 23 – MECHANICAL

| | |
|--------|--|
| 230513 | COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT |
| 230523 | GENERAL-DUTY VALVES FOR HVAC PIPING |
| 230529 | HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT |
| 230548 | VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT |
| 230553 | IDENTIFICATIONS FOR HVAC PIPING AND EQUIPMENT |
| 230593 | TESTING, ADJUSTING, AND BALANCING FOR HVAC |
| 230700 | HVAC INSULATION |
| 230800 | COMMISSIONING OF HVAC |
| 230900 | INSTRUMENTATION AND CONTROL FOR HVAC |
| 232113 | HYDRONIC PIPING |
| 232113 | HYDRONIC PIPING (AQUATHERM) |
| 232116 | HYDRONIC PIPING SPECIALTIES |
| 232123 | HYDRONIC PUMPS |
| 232500 | HVAC WATER TREATMENT |
| 233100 | HVAC DUCTS AND CASING |

MIAMI-DADE COUNTY DTPW

CENTRAL BUS CHILLED WATER PLANT REPLACEMENT

DIVISION 23 – MECHANICAL CONTINUED

| | |
|--------|--------------------------------------|
| 233300 | AIR DUCT ACCESSORIES |
| 233400 | HVAC FANS |
| 233423 | INLINE SUPPLY FANS |
| 236400 | AIR COOLED WATER CHILLERS |
| 238200 | CONVECTION HEATING AND COOLING UNITS |

DIVISION 26 – ELECTRICAL

| | |
|--------|--|
| 260010 | SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL |
| 260519 | LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES |
| 260526 | GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS |
| 260529 | HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS |
| 260533 | RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS |
| 260553 | IDENTIFICATIONS FOR ELECTRICAL SYSTEMS |
| 262816 | ENCLOSED SWITCHES AND CIRCUIT BREAKERS |
| 262416 | PANELBOARDS |
| 262913 | MANUAL AND MAGNETIC MOTOR CONTROLLERS |

DIVISION 27-31 – NOT USED

DIVISION 28 – NOT USED

DIVISION 29-31 – NOT USED

SECTION 01 14 00
SITE AND WORK RESTRICTIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section includes specifications for the general requirements and procedures for access to the various areas within the site to perform the required construction operations to complete the facilities as depicted in the Contract documents. The Contractor is to coordinate through MDC on access and coordination issues. It is important that Contractors do not interfere with DTPW operations. As a result, there are restrictions on access and times of work made part of this contract.

1.02 SUBMITTAL REQUIREMENTS:

- A. The construction schedule submitted by the Contractor under section 01 32 16 shall take the restrictions described herein and in the Contract Documents into account for the planning of the work. The schedule of work activities needs to consider the site and work restrictions identified herein and shall demonstrate the sequencing of the work so as not to impact the Contract duration.
- B. The Contractor shall submit any required notice, request for access and any other procedural documents, as contained herein or referenced herein per the minimum lead times indicated in these procedures.
- C. Barricades and signing that are necessary to direct public and the vehicles through the construction zones are required as part of the submittal process. Provide, erect and maintain effective barricades, danger sign or any other visual warnings for the protection of the Work and the safety of the public throughout the area for the duration of the Contract.
- D. The Contractor shall coordinate all construction schedule activities with DTPW's Construction Manager to minimize or eliminate disruptions.

1. Definitions:

Engineer-of-Record (EOR) – The engineering design firm and all designated representatives who were involved in the preparation of all the Contract Documents.

MDC representative – The authorized, onsite MDC representative(s) responsible for coordinating all Metrorail tract related activities.

2. Authority:

Safety shall be a primary consideration during the prosecution of the work. Therefore, any direction given by the duly designated DTPW representative regarding train traffic or train safety shall be considered final and is to be followed immediately. If the Contractor has an objection to the request, the Contractor shall obey the request and subsequently seek relief under the applicable Contract Sections.

3. Delays in Vacating Premises:

It is absolutely essential that work operations are not disrupted. All Contractor personnel (including suppliers, sub-contractors, vendors, etc.) shall cease work within fifteen (15) minutes after receipt of directions by the EOR and/or DTPW authorized representative.

4. Special Events:

Certain special events require extended and/or more frequent service (football games, concerts, etc.) and may force work to revise the revenue service schedule and time constraints heretofore cited in this section. The Contractor shall expect and plan for these special events and reflect the impact of these special events on the project schedule and phasing plan.

5. Work Conditions and Access Requirements:

Access to any given site must be accompanied by proper documentation permits and paid fees. This request shall also include written details, including but not limited to, placement of cranes, materials, form work, personnel, and equipment; the sequence and timing of the work, and any other factor which may be construed by the DTPW Construction Manager, upon consultation with MDC representative, to affect transit safety or revenue service.

6. Special Work Protection:

Any work over and near the guideway and/or near the Bus stops, which could potentially cause damage or in any way endanger the safety of the transit patrons or the public, at the sole discretion of the DTPW Construction Manager, shall require protection such as barriers, nets, tarps, plywood, etc. The Special work Protection must reflect the Contractors' work activities and shall be designed by a Professional Engineer and submitted to work for approval. A minimum of six (6) weeks prior to performing any such work, the Contractor shall present this plan for the Special work Protection to the DTPW Construction Manager, for approval.

7. Access to Controlled Areas:

Contractor access to areas requiring track allocation is prohibited unless prior approval is granted by the DTPW representative.

8. Foreign Objects on Existing Guideway:

At no time will the Contractor be allowed to throw or discard any objects, construction materials, debris, scaffolds, etc. onto the Guideway.

9. End of Day Inspections and Other Inspections of Site work :

The Contractor is required to on a daily basis, conduct an inspection of the active site work after completion of work and immediately remove any foreign objects, clean and secure the site and materials that may pose danger. No materials, attachments, anchorage systems, formwork or obstructions will be allowed to be left scattered or not cleaned. Contractor is responsible for maintaining a clean and organize construction area. Prior to any hurricanes or other major storms, the Contractor and DTPW shall inspect the Contractor's work site, and the Contractor shall immediately secure any materials that in the sole opinion of work may pose a danger to Transit facilities.

10. Emergencies:

Notwithstanding any of the above, in the event of an emergency, the Contractor may be instructed to vacate the work area by DTPW, the Construction Manager or MDC representative. Any such direction shall require immediate action by the Contractor. Prior to vacating the work area, the Contractor shall clear the work area of all materials, equipment, etc.

11. Contractor shall provide and be responsible for all barricading of work areas to complete this project.

1.03 RESTRICTIONS ON CONTRACTOR'S ACTIVITIES:

- A. As per DTPW Adjacent Construction Manual, DTPW will provide escorts as required by the Contractor to meet the project work restriction requirements or as DTPW may deem necessary. DTPW will do its best to provide the requested escorts, but the availability of escort for different location at the same time may be very limited.
- B. The Contactor may be required to attend the DTPW track allocation weekly meeting at Lehman Center (6601 NW 72 Avenue, Second Floor Conference Room A) that takes place every Tuesday from 2:00 PM to 4:00 PM to request and obtain approval to perform work according to this paragraph and any other special conditions. This request shall include written details, including but not limited to, placement of cranes, materials, form work, personnel, and equipment; the sequence and timing of the work, and other factor which may be construed by DTPW Construction Manager, upon consultation MDC representative, to affect transit safety or revenue services.
- C. Contractor shall be aware that work in certain portions of the site may only be accomplished at night and on weekends. Contractor should consider working weekends starting Friday at 7:00 pm through Monday at 5:00 am and evening hours 7:00 pm through 5:00am Monday through Friday for portions of the work to complete this project. Contractor shall provide and be responsible for all barricading of work areas to complete this project.
- D. Access to controlled areas:
 - 1. Contractor access to areas requiring track allocation is prohibited unless prior approval is granted by the engineer, upon consultation with DTPW.
- E. Foreign Objects on Existing Guideway:
 - 1. At no time will the contractor be allowed to throw or discard any objects, construction materials, debris, scaffolds, etc., onto the guideway. Appropriate measures will be employed by the contractor to ensure that the guideway is always kept free of foreign objects.
- F. Contractor will be required to coordinate his work in a way that will minimize inconvenience to the operations of the Central Bus Facility.
- G. Contractor shall demolish and/or remove any real property, fixtures to real property and personal property as authorized by the Department. Demolition services include but not are limited to:
- H. Legally and properly disposing of debris generated during the course of providing the contracted service.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT

- A. No separate measurement or payment will be made for Site and Work Restrictions, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

REQUEST FOR INFORMATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section covers Request for Information (RFI) from the Contractor. RFI in this section is defined as: the solicitation by the Contractor for clarifications, interpretations, verifications and/or corrections of the Contract Documents.
- B. The Contractor shall comply with this section for all such requests for information. All costs incurred by the Contractor in preparing these requests shall be borne by the Contractor and are part of this contract.
- C. Any delays or impacts caused by the Contractor's failure to conform to the requirements of this section shall be solely the Contractor's responsibility and shall not be caused for any time extension and/or additional compensation.

PART 3: EXECUTION

3.01 REQUEST FOR INFORMATION REQUIREMENTS

- A. The Contractor is responsible for reviewing all Contract documents related to a particular work product well in advance of the performance of such work in accordance with Article 2: INTERPRETATIONS of the General Conditions. This review shall be planned to allow sufficient time to obtain resolution of any required RFI, as defined in this section.
- B. Time allowed for processing RFIs.
 - 1. Although every attempt will be made to expeditiously resolve all RFIs, MDC shall have ten working days to respond to an RFI, from the date the RFI is received by the Engineer, including all necessary information needed to formulate a response. Failure by the Contractor to allow sufficient time for MDC to formulate a response to an RFI, as specified in this section, shall not constitute grounds for a delay claim from the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT

- A. No separate measurement or payment will be made for Request for Information, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Specification establishes the requirements for breakdown of Lump Sum Payment Items.

1.02 SUBMITTAL REQUIREMENTS

- A. Submit to the DTPW a Preliminary Schedule of Values to include all portions of the work within 15 working days after NTP.
- B. Submit to the DTPW a Baseline Schedule of Values within 15 working days after receipt of DTPW comments on the Preliminary Schedule of Values. The Baseline Schedule of Values shall incorporate all comments associated with Contractor's Preliminary Schedule of Values submittals.
- C. Submit Documentation to support the values with data which will substantiate their accuracy.
- D. Upon acceptance by the DTPW, the Schedule of Values shall be used as the only basis for the Contractor's Applications for Payment. Acceptance of the Contractor's Preliminary/Baseline Schedule of Values is a condition precedent to processing all applications for payment other than payment for start-up costs during the first two months.
- E. The Schedule of Values shall correspond to each of the Payment Items. The breakdown of the lump sum Payment Items shall be in accordance with the approved Work Breakdown Structure, and each line item shall correspond with an activity in the Construction Schedule.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. The Schedule of Values shall be labeled with identifying information such as title of contract and location, contract number, name and contact information of Contractor, and date of submission.
- B. The Schedule of Values shall list the installed value of the component parts of the WORK in sufficient detail to serve as the basis for computing values for progress payments during construction.
- C. Identify and list the title and number of the Specifications Section that is associated with the work.
- D. Deviations from the Schedule of Values form and content must be submitted and approved by the DTPW.
- E. Lump Sum Payment Items:
 - 1. Payments for lump sum activities will be based upon physical progress (percent complete) for each related activity in the Progress Schedule.
 - 2. The dollar value allocated to lump sum activities shall be representative of the Contractor's actual costs for performing the work, including overhead and profit, and shall be balanced to ensure that sufficient funds are allocated for each portion of the work and shall be subject to acceptance by the DTPW.
 - 3. In the case of a disagreement between DTPW and Contractor's, the DTPW shall have the right to make final determination of activity dollar amounts contained in the Schedule of Values.

- F. Each Payment Item shall include a directly proportional amount of the Contractor's overhead and profit.
- G. A new Payment Item will be added to the Schedule of Values for approved Change Order Work. For payment for Time & Materials Change Order Work, the Contractor shall hold a Pre-Work Change Order Meeting with the DTPW, prior to executing the Work.
- H. The sum of all Payment Items listed in the Schedule of Values shall equal the total Contract Price.

1.04 SUB-ACCOUNTS

- A. Include a breakdown of major Payment Items into sub-accounts on which progress payments will be requested. The sub-account breakdown shall include elements for Payment Items as appropriate and show the weight of the sub-accounts equal to 100 percent of major account (Payment Item).
- B. Contractor's Schedule of Values shall list the delivered value of the products, manuals, and services provided under the various Specification Sections. The lists shall be sufficiently detailed to serve as a basis for computing values for progress payments during the construction period.
- C. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. No separate measurement or payment will be made for Schedule of Values, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes specifications for project meetings. The Contractor, along with Contractor's superintendent, project manager, superintendents of major subcontractors, and on-site safety representative, as a minimum, shall attend meetings scheduled by DTPW and shall:

1. Collect and disseminate information related to the Contract.
2. Advice about Contract-related Safety information, Safety meetings, and Safety-related issues.

1.02 SPECIAL MEETINGS: Special meetings between DTPW and the Contractor will be scheduled and conducted by DTPW throughout the course of construction as DTPW deems necessary.

1.03 PRECONSTRUCTION MEETING

A. A pre-construction meeting will be scheduled and conducted by DTPW after the effective date of the Notice of Contract Award. Contractor's Project Manager, superintendent, safety representative, Quality Control Supervisor, EEO Officer, subcontractor representatives, and community relations representative shall attend. DTPW will provide Contractor written notice of this meeting not less than five working days or one calendar week prior to the date of the meeting.

B. DTPW will discuss the following at this meeting:

1. Introduce representatives of DTPW, governmental agencies, public and private utilities.
2. Explain and discuss the responsibilities and authorities of the Engineer.
3. Discuss Equal Employment Opportunity (EEO), Disadvantaged Business Enterprise (DBE), and affirmative action requirements along with the Community Relations functions. D T P W will be handling all of the community relations functions with coordination from the Contractor as needed.
4. Discuss Contractor's construction control requirements, as specified in Section 01 45 00, Contractor Construction Control Requirements.
5. Define and establish requirements for safety, first-aid, emergency actions, security, and full-time safety representatives.
6. Explain and discuss selected laws, codes, traffic regulations, and permit requirements of public agencies and their regulations.
7. Discuss procedures for processing change notices, change orders, correspondence, RFIs, shop drawings, submittals, product data, and samples.
8. Discuss monthly progress payments.
9. Discuss final payments.
10. Discuss project schedule.

C. The Contractor shall discuss the following at this meeting:

1. Introduce Contractor's representatives and briefly describe each person's responsibilities.
2. Distribute and discuss the list identifying major Small Business and Disadvantaged Business Enterprises (SBE and DBE) subcontractors including their areas of responsibility.
3. Discuss use of office, streets, right-of-way, haul routes, storage areas, staging areas, construction areas, and temporary easements.
4. Define housekeeping procedures.
5. Discuss construction means and methods.
6. Describe general worksite layout, erosion and sedimentation control plans, haul routes, noise abatement, air and water pollution control, temporary street closings, and street restoration.
7. Discuss coordination and notifications required for utility work and services.
8. Discuss deliveries and priorities of Discuss monthly progress payments.
9. Discuss final payments.
10. Discuss project schedule.
11. Discuss public safety measures.

1.04 CONSTRUCTION PROGRESS MEETINGS

- A. Construction progress meetings will be scheduled and conducted by the Engineer and held each week during the performance of the Contract for the competent and timely execution of the Contract. Progress meetings shall include representatives of subcontractors who are or will be performing Work during the current and following month.
- B. The Contractor shall distribute notices of these meetings before such meetings to subcontractors.
- C. The agenda for construction progress meetings will be prepared by the Engineer and will generally include the following:
 1. Introduce new attendees and areas of responsibility.
 2. Review minutes of previous meetings, amend minutes if necessary, and accept minutes.
 3. At the first meeting of each month, analyze Work accomplished since previous meeting, offsite fabrication problems, product delivery problems, submitted schedule slippages, proposed changes, and circumstances that might affect progress of work.
 4. At each meeting, display and discuss the status of the Critical Path activities. If they are behind schedule describe the methods intended to be used to bring these activities back on schedule. Discuss corrective measures to maintain progress.
 5. ~~Discuss the Two Week Look Ahead Schedule submitted as specified in Section 01 32 16, Construction Contract Schedules, and last Work plan for the previous period showing activities accomplished and those not completed in accordance with the prior submittal.~~ Discuss the reasons for failure to complete the Work as shown in the schedule and the methods to be implemented to complete the unfinished activities.

6. Discuss Work quality observations, problems, and employee Work standards.
7. Discuss coordination of utility work.
8. Discuss Work by outside parties.
9. Discuss changed conditions, time extensions, and other relevant subjects as they affect the progress of the work.
10. Discuss the status of Contract changes: new changes, status of negotiations and completed changes.
11. Discuss SBE/DBE, and any Apprenticeship Program issues.

D. Each of the Contractor's inquiries, requests for information or requests for solutions to problems presented during such meetings shall be answered, when possible, during the meeting; those not answered during the meeting will be answered, the answer documented and presented by the Contractor at the next meeting. Answers provided orally at the meetings shall be recorded in the minutes.

E. Review the minutes of the meeting prepared by DTPW and submit any requested corrections. Minutes will be prepared in action-item format with named responsible parties and dates for completion indicated for each item.

1.05 PROGRESS PAYMENT MEETINGS: The Contractor and the Engineer shall meet to discuss the monthly progress payment.

1.06 CHANGE ORDER MEETINGS: Every 2 weeks or as necessary the Contractor and the Engineer shall meet to negotiate change orders.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

B. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

B. No separate measurement or payment will be made for Project Meetings, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

ATTACHMENT 1

BASELINE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____
Contract No.: _____
Contractor: _____
Baseline and/or Update No.: _____

1. **Contractor's general approach for completing the work** (Including but not limited to any additional or unusual requirements not clearly represented in the schedule, the basis for the contractor's determination of durations for major work items and his approach for meeting the interim and final completion dates in his schedule.) **Use additional sheets if necessary.**

2. **Equipment to be used** (Including time that the equipment is to be on-site.) **Use additional sheets if necessary.**

ATTACHMENT 1

BASELINE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____

Contract No.: _____

Contractor: _____

Baseline and/or Update No.: _____

3. **Anticipated delivery dates for material/equipment.** Use additional sheets if necessary.

4. **Crews and Crew Sizes.** Use additional sheets if necessary.

5. **Rates of Production and Estimated Quantities.** Use additional sheets if necessary.

ATTACHMENT 1

BASELINE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____
Contract No.: _____
Contractor: _____
Baseline and/or Update No.: _____

6. Workdays per week/Hours per shift. Use additional sheets if necessary.

7. Non-Work Periods assumed in the planning of the work (Including holidays, rain days and any other non-work period assumed by the contractor.) Use additional sheets if necessary.

8. Activities which may be expedited by the use of overtime or additional shifts. Use additional sheets if necessary.

ATTACHMENT 1

BASELINE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____
Contract No.: _____
Contractor: _____
Baseline and/or Update No.: _____

9. Sequencing and other restraints affecting the work (Including manpower, material, and equipment restraints.) **Use additional sheets if necessary.**

ATTACHMENT 2

MONTHLY SCHEDULE UPDATE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____
Contract No.: _____
Contractor: _____
Baseline and/or Update No.: _____

1. **Progress This Period** (Including all activities started, completed or in progress and signed material delivery tickets indicating when material was delivered on-site or to the fabrication plant as applicable). **Use additional sheets if necessary.**

2. **Planned Progress for Next Period.** **Use additional sheets if necessary.**

ATTACHMENT 2

MONTHLY SCHEDULE UPDATE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____
Contract No.: _____
Contractor: _____
Baseline and/or Update No.: _____

3. **Problems and Solutions** (Including a listing of all delayed activities, the reasons for delay and proposed recovery actions.) **Use additional sheets if necessary.**

4. **Changes Since Last Period.** **Use additional sheets if necessary.**

ATTACHMENT 2

MONTHLY SCHEDULE UPDATE NARRATIVE FORM FOR BAR CHART SCHEDULES

Contract Title: _____

Contract No.: _____

Contractor: _____

Baseline and/or Update No.: _____

5. Special Concerns and/or Questions regarding the Schedule. Use additional sheets if necessary.

SECTION 01 32 16

PROJECT SCHEDULE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section covers the preparation of a schedule in the form of a bar chart. (The Contractor will be allowed to use his preferred scheduling system, if approved by the Engineer. If the Contractor wishes to propose his own system, he shall request prior to the required submittal time-tables listed in this section.)
- B. Final Schedule:
 1. A bar chart schedule shall be used by the Contractor to control the progress and time fixed for completion of this project. This system shall be implemented by the Contractor. Prior to approval of the final construction schedule, the Contractor shall provide MDC with letters from all his subcontractors and suppliers indicating that they have reviewed the Contractor's schedule and concur with the sequence of events, activity durations and rates of production implied therein.
 2. All work shall be done in accordance with the schedule and all costs incurred by the Contractor to correctly implement the schedule shall be borne by the Contractor and are a part of his contract.
 3. The schedule must be updated monthly and submitted with the Contractor's pay request. No payment will be made to the Contractor unless this monthly updated schedule and progress report is submitted with the Contractor's pay request. Even if no invoice is submitted in a particular month, the Contractor shall submit monthly schedule updates and progress reports to the satisfaction of the Engineer.

PART 2 - PREPARATION

2.01 PREPARATION OF FINAL SCHEDULE:

- A. Preparation:
 1. Within 15 working days after the date of Notice to Proceed (NTP), the Contractor shall develop and submit a comprehensive and detailed Final Schedule, hereinafter referred to as the final schedule. Work performed prior to NTP shall not be allowed under this Contract.
 2. When completed, the bar chart diagram shall represent the Contractor's own plan for the project as well as the sequence of each operation and all the parties involved. The schedule shall also identify the project's critical path. It shall be the responsibility of the Contractor to ensure that all of this work is described by the diagram and that the diagram does correctly represent the sequence in which he plans to do his work and the time in which he expects to do it.
 3. As a minimum, the final schedule will cover the following areas:
 - a. Shop drawing preparation, review and approval
 - b. Procurement of major equipment or material.
 - c. Permit acquisition activities
 - d. Material samples

- e. Material delivery
 - f. All major work elements, as approved by the Engineer
 - g. Punch list activities
 - h. Rates of Production
4. The final schedule will be printed on an 11" x 17" sheet suitable for reproduction. The Contractor will submit 3 copies of this schedule.
 5. A written narrative on separate 8 1/2" x 11" sheets will be included with the contractor's final schedule. This narrative will describe the contractor's general approach for performing the work and any additional or unusual requirements not clearly represented in the schedule including, but not limited to, equipment to be used and the time equipment is to be on-site, anticipated delivery dates for material and/or equipment, crew sizes, estimated quantities and rates of production. The narrative shall explain the basis for the contractor's determination of durations for major work items and describe his approach for meeting the interim and final completion dates in his schedule. The narrative shall also address workdays per week, hours per shift, rainy days, holidays or any other non-work periods that the contractor is assuming in the planning of the work. Activities which may be expedited by the use of overtime or additional shifts shall be identified. Sequencing and other restraints such as manpower, material or equipment shall be identified and explained. A form to be used by the Contractor to prepare his baseline narrative is included as Attachment 1 to this section.
 6. When completed, the final schedule shall be submitted to the Engineer for approval. The Contractor shall incorporate the Engineer's schedule review comments within 10 days after receipt. The Engineer shall be the final authority in deciding the acceptability of the schedule. Upon approval by the Engineer, this shall become the Final Schedule for the contract. No deviations from the final schedule will be allowed without the approval of DTPW.
 7. The Contractor shall identify all available float or slack time in his schedule in a format suitable to the Engineer. Float or slack time is not for the exclusive use or benefit of either the Contractor or DTPW. Float or slack time is considered project float as it is for the benefit of both parties. As such, it is not to be used exclusively by either party but is to be used by the party that needs it first. No more than 15% to 25% of the activities in the contractor's schedule may be on or near the critical path. ("Near the critical path" is defined as any activity having float of 10 days or less)

2.02 MONTHLY SCHEDULE UPDATES

- A. The Contractor shall submit monthly schedule updates to show progress, as applicable, on all activities in progress. Such progress shall be shown in a format suitable to the Engineer. Three 11" x 17" copies of the updated schedule shall be submitted by the Contractor.
- B. The Contractor shall submit an updated narrative in the form of monthly progress reports in a format acceptable to the Engineer. Such reports shall include sections for describing "progress this period", "planned progress for next period", "problems and solutions" (including a listing of all delayed activities, the reasons for delay and proposed recovery actions) and "changes since last period". Any special concerns and or questions regarding the schedule should also be included in the progress report. As applicable, signed material delivery tickets indicating when material was delivered on-site or to the fabrication plant will be provided with the narrative on a monthly basis. A form to be used by the Contractor to prepare his monthly update narrative is included as Attachment 2 to this section.

- C. The Contractor shall submit on a weekly basis a simplified two-week look-ahead bar chart schedule showing all anticipated work scheduled to take place during the next 14 calendar days. This two-week look-ahead schedule shall be based on the approved baseline schedule.

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT

- C. No separate measurement or payment will be made for Project Schedule, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

4.03 PAY REQUESTS

- A. The Contractor's pay request shall include an update of the final schedule. The contractor will not be eligible to receive payment until his contract baseline schedule and schedule of values is approved and no payment will be made to the Contractor unless this schedule update and schedule of values is submitted with the pay request. Refer to Section 2.06 of the Special Terms & Conditions.
- B. All Contractor pay requests will be submitted in a form suitable to DTPW based on a County approved schedule of values.

4.04 FINAL PAYMENT

- A. Final payment shall be made in accordance with Article the terms and conditions of the Miscellaneous Construction Contract with Miami Dade County.

END OF SECTION

SECTION 01 33 10

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section includes specifications for the general requirements and procedures for preparing and submitting design and construction information and data for information and review. Other requirements for submittals are specified under applicable sections of the Contract Documents.

PART 2 – PRODUCTS

2.01 SUBMITTAL REQUIREMENTS:

- A. Schedule of Submittals: Within fifteen (15) days after the effective date of Notice to Proceed (NTP), the Contractor shall submit a completed submittal schedule and list of products for all items requiring the Engineer-of-Record's (EOR) review and approval, as follows:
 - 1. Design Drawings and Specifications.
 - 2. Submittal Schedule.
 - 3. Shop Drawings, including description of the items and name of manufacturers, trade names, and model numbers.
 - 4. Contract Specification Reference.
 - 5. Intended Submission & Resubmission Date(s).
 - 6. Order Release Dates.
 - 7. Lead Times to Delivery and Anticipated Delivery Date(s).
 - 8. Highlight items that require expedited review to meet the project schedule and are within the critical path of the schedule.
- A. The County will withhold acceptance of submittals which depend on other submittals not yet submitted or not yet reached a status of "No Exceptions Taken".
- B. These schedules shall be presented in a form that is readily reproducible and shall be updated and sent to DTPW and EOR on a monthly basis. Identify all submittals that are required by the Contract Documents and determine the date on which each submittal will be submitted in conformance with the schedules specified under this contract.
- C. Provide a title block for drawings containing the following information:
 - 1. Date and Revision Date(s).
 - 2. Contract Title and Number.
 - 3. The names of the Contractor, Sub-Contractors, Suppliers, and Manufacturers as applicable.
 - 4. Identification of product by description, model number, style number, serial number, or lot number.

5. Subject identification by Contract Drawing or Specification Reference.

D. Professional Engineer's Seal Required:

1. Submittals involving engineering expertise, such as excavation support structures, framework for concrete, civil and structural designs (i.e., final details of metal canopy), load calculations and operating systems engineering final design shall be sealed and signed by a professional engineer, currently registered in the State of Florida, for the discipline involved and in accordance with Florida law.

F. Submittal Stamps and Action Block Space:

1. Include a 5-inch square blank space, in the lower right corner, just above the title block, in which the professional engineer may indicate the action taken.

G. Review Period:

1. Prepare submittals sufficiently in advance so that review may be given before commencement of related work.
2. Allow thirty (30) calendar days after receipt by the EOR for review of each submittal.
3. The Contractor shall be responsible for determining whether or not certain governmental entities and utility companies will require longer review periods. The EOR will assist in this effort. Where longer review periods are required, the Contractor shall schedule the work accordingly, so that the work and construction schedules are not adversely impacted.

H. Submittal Delivery:

1. Ship submittals are prepaid (FedEx, etc...) or delivered by hand directly to the DTPW and EOR's office.

I. Transmittal Form:

1. Accompany all submittals with a transmittal form, including a brief description of the items that have been included.

J. Changes in Reviewed Submittals:

1. Changes in reviewed submittals will not be permitted unless those approved submittals with changes have been resubmitted and reviewed, in the same manner as the original submittal.

K. Supplemental Submittals:

1. Supplemental submittals initiated by the Contractor for consideration of corrective procedures shall contain sufficient data for review. Make supplemental submittals in the same manner as initial submittals.

L. Incomplete submittal packages will be returned without review.

PART 3 – EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITIES:

A. Contractor's Review:

1. Each submittal shall be reviewed, stamped, and signed as reviewed and approved by the Contractor before submission.
2. If the submittal is designated to be sent to the EOR for information, approval by the designated approval authority shall take place before submission to the EOR.
3. The Contractor shall coordinate each submittal with the requirements of the work, placing particular emphasis upon ensuring that each submittal of one trade is compatible with other submittals of that trade and with the submittals of other trades. Ensure submittal is complete with all relevant data required for review.
4. Review of drawings and associated calculations by the EOR shall not relieve the Contractor from the responsibility for errors or omissions in the drawings and associated calculations, or from deviations from the Contract Documents, unless submittals containing such deviations were submitted to the EOR and the deviations were specifically called to the attention of the EOR in the letter of transmittal and approved by the EOR as a Contract Change.
5. The Contractor's liability to work, in case of deviations in the submittals from the requirements of the Contract Documents, is not relieved by the EOR's review of submittals containing deviations, unless the EOR expressly approves the deviations by issuing a Contract Change Order.
6. The Contractor shall be responsible for the correctness of the drawings, for shop fits and field connections, and for the results obtained by the use of such drawings.

B. Submittal Quantities:

1. Unless noted otherwise, Contractor shall submit seven (7) copies of all submittals and electronic files in a form acceptable to DTPW and the EOR. Where permits and licenses and other such documents are obtained in name of Department of Transportation and Public Works, submit the original and six (6) copies.

C. Distribution of Submittals after Review:

1. Distribute prints or copies of reviewed submittals, bearing the EOR's or designated approval authority's stamp and signature, to affect and concerned sub-contractors, suppliers, and fabricators; and to affected and concerned members of the Contractor's workforce.

D. Maintain at the job site a complete up-to-date, organized file of all past and current submittals including an index and locating system which identifies the status of each submittal:

1. Assign a sequential number to each submittal, which shall indicate the applicable specification section for which the submittal is required.
2. Assign a revision number, using an alphanumeric sequence (i.e., 15, 15A, 158, etc.) to all submittals.

3.02 ENGINEER'S REVIEW:

- A. Submittals will be reviewed for conformance with requirements of the Contract Documents. Review of a separate item will not constitute review of an assembly in which the item functions. Review will not relieve the Contractor from Contractor's responsibility for accuracy of submittals, for conformity of submittals to requirements of Contract Documents, for compatibility of described product with contiguous products and the rest of the system, or for prosecution and completion of the Contract in accordance with the Contract Documents.

- B. The EOR will indicate in its reviews of submittals and the action taken by means of their submittal stamp. The submittal stamp will be affixed by the EOR within the action block and the stamp will be signed and dated.
- C. The submittal stamp action block marks will have the following meanings:
 - 1. The mark "NO EXCEPTIONS TAKEN" means that every illustration and description appear to conform to the respective requirements of the Contract Documents; that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed; and that the submittal need not be resubmitted.
 - 2. The mark "EXCEPTIONS AS NOTED - RESUBMISSION NOT REQUIRED" means that every illustration and description appear to conform to the respective requirements of the Contract Documents upon incorporation of the reviewer's corrections, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed. Submittals so marked need not be resubmitted unless the Contractor challenges the review/s exception.
 - 3. The mark "EXCEPTIONS AS NOTED - RESUBMISSION REQUIRED" means that every illustration and description appear to conform to the respective requirements of the Contract Documents, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed after incorporation of the reviewers' corrections and verification by the EOR that the reviewer's corrections have been properly incorporated in the submittal. Resubmission is also required if the Contractor challenges the reviewer's corrections.
 - 4. The mark "REJECTED" means that the submittal is deficient to the degree that the reviewer cannot correct the submittal with a reasonable degree of effort, has not made a thorough review of the submittal, and that the submittal needs revision and is to be corrected and resubmitted.
- D. Review stamps or other approval methods of the various designated approval authorities may not be the same as those described herein. The Contractor shall coordinate (through the EOR) with the various designated approval authorities and shall obtain approvals in the clearest and most straight forward manner possible.
- E. Contractor shall attend meetings as requested by DTPW and EOR to address issues related to the review of submittals.
- F. The EOR will return submittals to the Contractor within thirty (30) calendar days after submittals have been received.
- G. Contractor shall include at least thirty (30) days in the project schedule for the EOR to review submittals.
- H. Allow thirty (30) days for review by the EOR of all re-submittals.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- D. No separate measurement or payment will be made for Submittals, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies preparing and submitting shop drawings, product data, and samples required under the contract.
- B. Dates for submission, and dates on which approved shop drawings, product data, and samples for each product will be needed, shall be designated in the Contractor's Schedule.

1.02 SHOP DRAWINGS:

- A. "Shop Drawings" are defined as drawings, diagrams, illustrations, schedules of materials, catalog cuts, brochures and other data prepared by the Contractor or subcontractor, manufacturer, supplier or distributor, which illustrates how specific portions of the work shall be fabricated and/or installed.
- B. Furnish all shop drawings that are necessary to complete the scope of work in compliance with the design shown on the plans. Prepare all shop drawings using the same units of measure as those used in the contract drawings.
- C. Shop drawings provided by the Contractor with each submittal shall be original drawings, sharp, clear and distinct, suitable for reproduction.
- D. Shop drawings minimum sheet size: 11 X 8.5 inches.
- E. Changes in products, for which shop drawings have been accepted, will not be permitted unless those changes have been accepted, in writing by the Engineer, as provided in Section 01 62 00, SUBSTITUTIONS AND PRODUCT OPTIONS.
- F. As a minimum, the following shop drawings shall be submitted by the Contractor for review by the DTPW:
 - 1. Concrete mix design
 - 2. Insulation materials
 - 3. Plumbing Equipment and Piping
 - 4. Chiller Components.

1.03 QUALITY ASSURANCE:

- A. Shop drawings shall be prepared to a high standard of quality, and to the satisfaction of the County. Drawing level control shall be established and implemented to ensure documentation is controlled for specified applications on contract.

1.04 PRODUCT DATA:

- A. Provide original documents or clearly legible photographic or xerographic copies of documents other than drawings, such as trade literature, catalogue information, calculations, manuals, etc. Clearly label and number each sheet in the submittal to indicate the total number of sheets in the series (i.e., 1 of 12, 2 of 12, ... 12 of 12).

- B. Prepare all documents using the same units of measure as those used in the contract drawings. Bind and submit all documents with a cover sheet. List on the cover sheet the complete Contract number, a title referencing the submittal item(s), the name of the firm and person(s) responsible for the preparation of the document, the contractor's approval stamp with the data and initials, and, when applicable, the signature and embossed seal of the Specialty Engineer.
- C. Manufacturers' standard schematic drawings shall be modified to delete information which is not applicable to the project. Standard information shall be supplemented to include additional information applicable to the project.
- D. Manufacturers' standard catalog cuts, brochures, diagram, schedules, performance charts, illustrations, calculations, and other descriptive data shall be modified to delete information which is not applicable to the project. Dimensions, clearances, reference standards, performance characteristics and capacities, and wiring and piping diagrams and controls, component parts, finishes shall be shown.
- E. Certificates of Compliance shall be submitted for those products for which no samples and test results are specified. Certificates shall state that the product complies with the requirements of the respective specification section and shall be signed by a representative of the product manufacturer. A copy of the certificate shall accompany the product for which the certificate is prepared.

1.05 SAMPLES:

- A. Samples shall be of sizes and quantities to clearly illustrate full color range and functional characteristics of products and materials and shall clearly show attachment devices. After review and approval by the Engineer, samples may be used in construction of the project if samples are not damaged and are properly dispositioned for use. Changes in products for which samples have been accepted will not be permitted unless those changes have been approved, in writing, by the Engineer.
- B. Samples and sample installation shall be erected at the job site at locations acceptable to the Engineer and shall remain in place or available until completion of the project. The County shall be the sole determining decision approver of any approved equal submitted.

1.06 DADE COUNTY PRODUCT CONTROL APPROVAL:

- A. The Contractor shall submit all required Dade County Product Approvals, as applicable, in accordance with this section and the Florida Building Code.

1.07 CONTRACTOR RESPONSIBILITIES:

- A. Shop drawings, product data, and samples shall be reviewed, stamped and signed as approved, by the Contractor's designated authority prior to submission to the Engineer. Each submittal shall be coordinated with the requirements of the work. Returned marked-up submittals shall be reviewed and those requiring changes shall be changed and shall be resubmitted.
 - 1. Field measurements, catalog numbers, and similar data shall be verified.
 - 2. Work, for which submittals are required, shall not be started until submittals bearing the Engineer's stamp and signature indicating review and approval has been received.
 - 3. Before submitting samples, assure that products of which samples will be submitted will be available in the quantities required by the project.
 - 4. The responsibility for errors and omissions in submittals shall not be relieved by the Engineer's review and approval of submittals.

5. Responsibility for deviations in submittals from requirements of the Contract Documents shall not be relieved by the Engineer's review and approval of those submittals, unless the Engineer gives written approval of specific deviations.
6. The Contractor shall verify that the product or system submitted for review has been approved by Dade County Product Control, if applicable, prior to making the initial submittal. Products which require Dade County Product Control approval and are not so approved shall be rejected by the Engineer. Product approval shall not be requested or initiated during the shop drawing review process but shall be requested and obtained prior to the Contractor's bid submittal.

1.08 SUBMISSION REQUIREMENTS:

- A. Submittals, excepting test results, shall be made in not less than 30 days before work covered by the submittals is scheduled to be performed. Allow 20 calendar days for review of shop drawing submittal by the Engineer. Test results shall be submitted within five days after each test has been completed. Office samples shall be shipped prepaid. Submittals require approval of the Engineer prior to work covered by the submittals being scheduled to be performed.
- B. Quantities to be submitted shall be as follows:
 1. Shop drawings provided by the Contractor with each submittal shall be original drawings, sharp, clear and distinct, suitable for reproduction, until approved by the Engineer. If shop drawings are not approved, the marked-up drawing(s) will be returned.
 2. Shop drawings minimum sheet size: 11 X 8.5 inches.
 3. Three copies of manufacturers' standard schematic drawings.
 4. Three copies of manufacturers' calculations and three copies of manufacturers' standard data.
 5. Three samples as specified in each of the specification sections, unless otherwise specified.
 6. Three copies of each test result.
 7. Three copies of each Certificate of Compliance.
 8. Three copies of the Dade County Product Control Notice of Acceptance, if applicable.
- C. Submittals shall be accompanied by two transmittal forms containing the following information:
 1. Date submitted to the Engineer.
 2. Project title and Contract Number.
 3. Supplier's, manufacturer's and subcontractor's name, address and telephone number.
 4. Number and title of each shop drawing, product data, and sample submitted.
 5. Notification of known deviations from the drawings and the specification sections; and
 6. Dade County Product Approval number, if applicable.
 7. Other pertinent data.

C. Submittals shall include a white space, three by four inches, in the lower right corner just above the title block, in which the Engineer may indicate the action taken. Submittals, as applicable, shall show as a minimum the following information:

1. Date and revision dates.
2. Project title, drawing title and number and DTPW Contract Number
3. The names of the Contractor's engineer, Subcontractor, lower tier Subcontractor, supplier, manufacturer and the name of the detailer or person(s) responsible for the drawing.
4. Consecutively number each sheet in the submittal series and indicate the total number in the series (i.e., 1 of 12, 2 of 12, ... 12 of 12).
5. Identification of product by description, model number, style number, serial number, or lot number.
6. Location of the item(s) within the project.
7. Relation to adjacent structure or materials.
8. Field dimensions clearly identified as such.
9. Applicable specification section numbers.
10. Applicable standards, such as ASTM number and Federal Specification number.
11. Identification of known deviations from the drawings and specification sections.
12. Contractor's stamp, signed, and dated certifying review of submittal, verification of field measurements, and approval for compliance with the drawings and specification sections, and, when applicable, the signature and embossed seal of the Specialty Engineer.
13. Include in submittals a reference to supporting Subcontract drawing.
14. The Engineer will request a re-submittal if any of this minimum information is not included.

1.09 RESUBMISSION REQUIREMENTS:

- A. Resubmittals shall be submitted by the Contractor so as to avoid delays to the project.
- B. Initial Shop Drawings: Shall be revised as required and resubmitted as specified for initial submittal. Changes which are made, other than those requested by the Engineer, shall be so indicated.
- C. New Product Data and Samples: Shall be resubmitted as specified for initial submittal.

1.10 DISTRIBUTION OF SUBMITTALS AFTER REVIEW:

- A. Approved shop drawings and product data bearing the Engineer's stamp and signature will be distributed by the Engineer to the Contractor's field office. The Contractor shall distribute copies to concerned lower tier subcontractors, suppliers, and fabricators; and to concerned members of the Contractor's work force.

1.11 ENGINEER'S DUTIES:

- A. Submittals will be reviewed and marked.

- B. Submittals will be reviewed for conformance to the requirements of the Drawings and Specification sections. Review will not relieve the contractor from his responsibility for the accuracy of the submittals or for the conformity of the submittals to the requirements of the drawings and specification sections. Review will not relieve the contractor of the responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Engineer in writing of such deviation at the time of submission and the Engineer has given written approval to the specific deviation, nor shall the Engineer's approval relieve the Contractor from responsibility for errors or omissions in the shop drawings, product data sheets or samples.
- C. Review of a separate item shall not constitute review/approval of an assembly in which the item functions.
- D. Stamp, date and signature will be affixed and will certify that the submittal has been reviewed.
- E. The Engineer will return to the Contractor the shop drawings or product data within the time frames specified in Article 1.08, SUBMISSION REQUIREMENTS, for the Contractor's use and distribution.

PART 2 – PRODUCTS

2.01 PRODUCTS:

- A. No products are required except as indicated in PART I: GENERAL.

PART 3 – EXECUTION

3.01 EXECUTION:

- A. No execution is required except as indicated in PART I: GENERAL.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- E. No separate measurement or payment will be made for SHOP DRAWINGS PRODUCT DATA AND SAMPLES, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 35 29

HEALTH, SAFETY AND SECURITY PLAN REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section includes specifications for complying with applicable laws and regulations related to worker safety and health. It is not the intent of DTPW to develop or manage the safety and health programs of the Contractor, its subcontractors, or suppliers, or in any way assume the responsibility for the safety and health of their employees. The work Construction Safety Manual (CSM) is a Contract Document that specifies minimum requirements for the Contractor's Site Safety Plan. The Contractor shall adhere to the DTPW CSM and applicable federal, state, and local safety and health standards.

1.02 REGULATORY REQUIREMENTS:

- A. United States Code (USC)
- B. Federal Occupational Safety and Health Act (USC 651 et seq.)
- C. Code of Federal Regulations (CFR)
- D. OSHA General Health and Safety Standards (29 CFR 1910)
- E. OSHA Construction Safety and Health Standards (29 CFR 1926)
- F. Emergency Planning and Community Right-to-Know (40 CFR 300)
- G. DOT Rail Fixed Guideway Systems - Traffic Safety (49 CFR 659)
- H. Florida State Statute or Code

1.03 SUBMITTAL REQUIREMENTS:

- A. Submit to work for review and approval a Construction Site Safety Plan (CSSP) that meets the requirements of the DTPW CSM, within thirty (30) days after receipt of Notice of Award of Contract and prior to start of any work. DTPW Construction Safety Manual (DTPW CSM), requires the Contractor to assure that all employees, visitors, sub-contractors, and their suppliers and vendors, while on the work site comply with the provisions and the minimum standards set forth under the William-Setiger Occupational Safety and Health Act of 1970 and as amended, the Construction and General Industry Standards (29CFR1926/1910), and all other applicable federal, state and local laws. The Contractor shall become familiar with the contents applicable to their operations. Non-compliance with the DTPW CSM will be treated the same as non-compliance with any Contract provision.
- B. The DTPW CSM shall be used as a guideline and establish the basis in developing the Contract specific Contractor's Construction Site Safety Plan as well as the Contractor's Accident Prevention Program. The Contractor shall assume full responsibility for compliance with all code mandated safety regulations and for complying with the DTPW CSM during the performance of all activities and in all phases of construction, installation, testing and final turnover to work.
- C. The Contractor's plan shall incorporate such programs and activities as may be necessary to comply with the work Construction Site Safety Manual and all known regulatory and code requirements. The Plan shall include site specific procedures in the event of fire, injury, accident or other emergency conditions. A copy of this plan shall be made available at all construction offices. The plan shall include, at a minimum, the following elements:

1. Emergency planning, response procedures and contact numbers
 2. Accident Prevention Program, accident and injury reporting and follow up
 3. Traffic control, signage, graphics and maintenance of way
 4. Adverse weather plans and hurricane preparedness
 5. Excavation, trenching, shoring and underpinning
 6. Demolition and teardown plans, procedures and permits
 7. Electrical safety, assured grounding and lock/out - tag/out procedures
 8. Hoisting, rigging, conveyors, materials handling and storage
 9. Fire prevention and protection including welding, cutting and hot work
 10. First Aid Plan, on site providers and ongoing medical surveillance
 11. Hazard materials communications, handling, transportation and storage
 12. Sanitation and housekeeping
 13. Personal protective equipment utilization
 14. Safety orientation for new hires and continuing education
 15. Weekly toolbox safety meetings
 16. Job Hazard Analysis including remedial measures
 17. Worksite safety inspection checklists and reporting procedures
 18. Confined spaces training and permit procedures
 19. Fall protection plans, training, equipment and inspection
 20. Safety incentive program
 21. Drug and alcohol-free program
- D. In addition, the Contractor is required to employ a full-time safety supervisor whose sole responsibility shall be construction site safety. Assigned safety supervisor shall not have any conflicting duties or be utilized for non-construction related activities.
- E. The Contractor's Site Safety Plan will be submitted for review but not approved. DTPW verify that the minimum requirements are met. Comments will indicate whether or not the CSSP contains the minimum necessary information as indicated herein. The Contractor shall be solely responsible for all aspects of construction site safety and security.

1.04 SAFETY PRECAUTIONS:

1. All products and materials used in connection with this work shall remain asbestos-free.

2. Immediately notify DTPW and EOR if, during the course of the Contract, there should be a discovery of any undetermined substance.
3. Adhere to the applicable regulations for the entire duration of the Contract.
4. Perform electrical work (if required) within this Contract in accordance with the requirements of NFPA 70.
5. The Contractor shall take responsibility for the health and safety of the Contractor's employees, sub-contractors, vendors, and other individuals within the job site or who may be impacted by the work in progress.

1.05 ACCIDENTS AND INJURIES:

- A. In the case of accident or injury, the Contractor shall provide such equipment and facilities as are necessary or required in order to provide for first aid service to anyone who may be injured in the progress of the work. The Contractor shall have a standing arrangement for the transportation and hospital treatment of any person who may be injured or may become ill.
- B. Report immediately to DTPW, EOR and area safety manager (if one is available) for every accident, injury or damage to property; and furnish the required reports in writing within the times specified in the DTPW CSM. An accident, injury, or illness is any occurrence that results in a bruise, breaking the skin, or loss of time of more than fifteen (15) minutes of work time; an impairment of vision or mobility; or that adversely affects job performance as a result of equipment, material, vapors, lighting liquid, or solid materials. The report shall include full information, including testimony from witnesses regarding any and all accidents.

1.06 CONTRACTOR CONSTRUCTION SITE SECURITY PLAN:

- A. The Contractor is required to submit for work review and approval a Contract specific Construction Site Security Plan as herein defined. This Plan shall provide guidelines to implement security procedures and describe the Contractors' commitments and specific actions proposed to provide a secure project site. The Plan shall include, at a minimum:
 1. Security personnel, roles and responsibilities, contact numbers
 2. Procedure for performing background checks of Contractor key personnel
 3. Security awareness, training, drills and continuing education
 4. Incident response, reporting, investigation, follow up and lessons learned
 5. Critical Assets, Threat and Vulnerability Analysis and countermeasures
 6. Perimeter protection, security doors, fencing, gates, signage, barriers, lighting
 7. Access control, authorized site personnel, badge issuance, vehicle identification
 8. Intrusion detection, surveillance devices, alarms and central monitoring
 9. Theft prevention, lock and key control, tool cages, storage boxes, lay down areas
 10. Procedure for conducting periodic security meetings, surveillance and audits

11. Contraband identification, deterrence, denial, detection and disposal

12. Response to Department of Homeland Security threat advisories, bulletins, levels

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

A. No separate measurement or payment will be made for Health, Safety and Security Plan requirements and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 41 26

PERMITS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall identify, apply for, and obtain all required permits. The Contractor shall make sure all the necessary permits and licenses are in place prior to commencement of the WORK.
- B. The Contractor shall keep copies of these permits on the project site at all times. The Contractor shall familiarize himself with, and comply with, all requirements of these permits.
- C. The Contractor particular attention is called to any Special Conditions of the permits relating to construction procedures, and all other general and special conditions. In the event any of the conditions of the permits are in conflict with the requirements of these Specifications, the more stringent conditions shall take precedence. The Contractor is to conform to all regulations of the governmental agencies having jurisdiction over this work, whether or not included in the permit.
- D. Any deviations from the Plans, Specifications or permits appended thereto must first be approved by the DTPW even if approval for the change has been given by the permitting agency.
- E. The Contractor shall assume throughout the life of the Contract all obligations and responsibilities imposed as permitted of the above-mentioned permits. All expenses necessary for compliance with the regulations and requirements of each permitting agency and its permit shall be borne by the Contractor and shall be included in the overall price.
- F. The cost of any fees such as impact fees, inspection fees, etc. and the cost of all required permits shall be borne by the Contractor. As specified in the paragraph above, all costs of compliance with the permit(s) shall be borne by the Contractor and included in the price.
- G. All surveying required by the Project permits shall be done by the Contractor's Florida Registered Land Surveyors. This includes staking out limits of construction.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #9, General Requirements.

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. QUALITY ASSURANCE

1. The Contractor shall develop an effective Quality Assurance Plan (QAP) to assure adequate quality throughout all phases of the Contract Work and shall describe the methods used and means employed for the implementation of the plan. The Contractor's QAP shall, at minimum, contain the fifteen (15) quality elements of the FTA Quality Management System (QMS) Guidelines (FTA-PA-27-5194-12.1) as revised. The QAP shall ensure compliance with the requirements of the contract documents within the Contractor's, subcontractor's, and supplier's organizations.
2. A QAP template shall be attached to the contract documents to be used in the development of the Contractor's QAP.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 ORGANIZATION

- A. Personnel performing Quality Assurance/Quality Control (QA/QC) functions shall have sufficient, well-defined responsibility, authority, and the organizational freedom to identify and evaluate quality problems, and to initiate, recommend or provide solutions.
- B. The Contractor's QAP shall be subject to the Department of Transportation and Public Works (DTPW) verification at any time. Verification may include but not be limited to:
 1. Surveillance of the operations.
 2. Auditing of records and activities.
 3. Inspection to measure quality of items and/or works to ensure compliance with requirements.
 4. Review of Quality Records to ensure proper records keeping of activities affecting quality. These records shall be available for review by the DTPW at any time.

3.02 APPLICABILITY

- A. The responsibility for providing QA/QC disciplines to verify that the work is performed in accordance with the Contract document rests with the Contractor. The Contractor's QAP shall be used to control quality throughout the duration of the project. Any inspections, audits or tests provided by the Department of Transportation and Public Works (DTPW), or designee shall not relieve the Contractor of the responsibility of providing work that strictly complies with the Contract requirements.

3.03 REQUIREMENTS

- A. The Contractor's QAP shall be in-line with the FTA QMS Guidelines (FTA-PA-27-5194-12.1) and shall also include:

1. An organizational chart indicating lines of authority and reporting relationship including QA/QC personnel.
- B. Detailed Quality Procedures and Inspection Forms.
1. The QAP and associated quality procedures and inspection forms should be submitted to the Department of Transportation and Public Works (DTPW) within five (5) days after Notice to Proceed (NTP) for review and approval.

Note: All work undertaken by the Contractor before the approval of the Contractor's QAP will be at the Contractor's risk and expense.

- C. Records for all material tests, audits, and inspections performed, including data on conforming as well as nonconforming items shall be maintained by the Contractor at the job site current, up to date, and available for the DTPW inspection at any time throughout the contract work.
- D. The Contractor's Daily Inspection Reports (DIR) is required by this Section and shall be available for review by the DTPW.
- E. Test Records and Calibration Identification status of testing equipment required for the project shall be maintained by the Contractor and available for inspection by the DTPW at any time throughout the contract work.

3.04 NONCONFORMANCE AND REPAIR ACTION

- A. The Contractor shall maintain an effective system for controlling nonconforming material, including procedures for its identification, segregation, and disposition.
- B. All nonconforming material shall be positively identified to prevent unauthorized use, shipment, or intermingling with conforming material. Disposition for the use or repair of nonconforming material shall require the approval of the DTPW.
- C. The Contractor shall be responsible for all costs associated with the removal of components and/or devices, the shipping charges to and from the Contractor's facilities and the costs associated with their reinstallation and/or repair.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. No separate measurement or payment will be made for Quality Assurance Requirements, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 45 00

CONSTRUCTION CONTROL REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section specifies the Contractor's requirements for defining and controlling in-process Work. The Contractor is responsible for implementing and maintaining a program that will define how the Work is to be performed and who is responsible to ensure Work meets Contract Document requirements. This shall be detailed by Construction Work Plans (CWP) for each phase of the Work to be performed.
- B. DTPW may impose hold points in CWPs to verify compliance with Contract Documents during any phase of the Work and the Contractor may not proceed with the Work until a hold point has been released by DTPW.
- C. The Contractor shall identify all safety-critical submittals associated with the Contract Specifications and Standard Specifications Section Article numbers referenced in the submittals.
- D. DTPW will have access to areas where Work is performed under the Contract to conduct audits, surveillance, inspections, and tests to verify compliance with the Contract requirements. Access includes on-site and off-site Work areas of the Contractor, Subcontractor's, manufacturers, and suppliers.

PART 2 – PRODUCTS

2.01 SUBMITTALS

- A. The Contractor shall develop a list of Construction Work Plans within 45 days after Notice to Proceed.
- B. Construction Work Plans required by the Contract Specifications shall be submitted a minimum of 30 days prior to commencement of each phase of the Work.
- C. Commissioning Plan within 45 days after Notice to Proceed.
- D. List of material suppliers and fabricators shall be submitted within 45 days after Notice to Proceed.
- E. Responses to Nonconformance Reports
- F. Names and qualifications of personnel performing Special Processes.
- G. Contractor shall annotate all safety-critical submittals as such on the "Master Submittal List" submittal and on the Contractor's submittal transmittal documents.

2.02 CONSTRUCTION WORK PLANS

- A. Construction Work Plans are detailed descriptions of a specific Work activity. DTPW, in consultation with the Contractor, will determine which Work activities require submission and approval of a CWP. The Contractor shall prepare and submit a list of CWPs to DTPW. DTPW may add CWPs to the list. Upon approval of the CWP list, the Contractor shall prepare and submit a CWP for each of these Work activities. No Work shall begin without DTPW acceptance of a CWP. As a minimum, each CWP shall include:

A. Scope of Work.

1. List of persons responsible for supervision of the Work.
2. List of required submittals, drawings, and job hazard analysis.
3. Planned start-work date, progress rate expected, and Work hours.
4. Sequence of events and construction methods for performing the Work. Include DTPW hold points and inspection requirements.
5. Tests required by Contractor and/or DTPW.
6. Prerequisite activities and related construction safety issues.
7. Off-site activities and locations.
8. Procedures for controlling hazardous materials as applicable.
9. Actions defined as "Special Events", which may expose the general public to danger or inconvenience, and which may require a third party to be notified.
10. Safety-critical installations, inspections, and tests.

PART 3 – EXECUTION

3.01 READINESS REVIEW

- A. Upon approval of a CWP and before beginning associated Work activities, DTPW will conduct a Readiness Review Meeting with Contractors, Sub-Contractors, and applicable third-party representatives to discuss all elements contained in the CWP. DTPW will document the meeting with an agenda and minutes of the meeting including an attendance record.

TESTING

1. Control of Inspection, Testing, and Monitoring Equipment: Contractor and its Testing Laboratory shall calibrate and certify all testing equipment and monitoring devices. Calibration and certification requirements shall include the following:
 - a. Calibration to known national standards.
 - b. List the current status of calibration, and date re-calibration or certification is required.
 - c. List on a log that guideways all calibration and certifications.

The guideway log shall identify the testing equipment or monitoring devices by name and serial number and shall show the date of calibration, date of next calibration, name of person or agency conducting the certification or calibration and shall contain a brief description of use. All testing equipment and monitoring devices shall be stored in a safe and secure location. They shall be maintained throughout the Contract and shall only be used for testing or monitoring work for which they are designed.

2. Re-issue is required if equipment is suspected of being out of calibration, broken, dismantled, or damaged.
3. Requirements apply to subcontractors, Suppliers, and all others performing tests.

4. Test Reports: Test reports are considered Contract Record documents and shall be submitted to DTPW. Test records shall contain as a minimum:
 - a. Contract or Project identification number.
 - b. Identification of items tested.
 - c. Quantity
 - d. Date test was conducted.
 - e. Name of technician.
 - f. Acceptance criteria.
 - g. Results
 - h. Location where sample was taken (i.e. Coordinates, stationing, and landmarks.)
 - i. Reference to Contract or Standard Specifications requirement or test procedure
 - j. Quantity of item tested Authorized signature.
5. Contractor-performed tests are subject to verification by DTPW.
6. Testing conducted by DTPW's or any other approved testing laboratory does not relieve the Contractor of the responsibility to meet the requirements of the Contract Documents.

INSPECTION

1. DTPW is responsible for performing Quality Control Inspection for Work identified in the Contract Documents unless otherwise stated. Provide 48-hour notice to DTPW for inspection coverage of Work activities.

SUPPLIER CONTROL

1. Submit a list of all suppliers and fabricators that will be used to supply materials and items referenced in the Contract Documents. The list shall include:
 - a. Name of the supplier or fabricator
 - b. Address and telephone number of the supplier or fabricator.
 - c. Description of material or fabricated item to be procured from the supplier or fabricator.
 - d. Contract Specifications Section, Article number and/or drawing references of the material or item to be purchased.

CONTROL OF MATERIALS

1. Submit a CWP for Control of Materials. The CWP shall include provisions to ensure materials, equipment, parts, and components processed through the Contractor's receiving operations are identified, free from damage, traceable to acceptance criteria, and meet Contract requirements.
2. Handling, storage, and maintenance of materials/equipment shall be in accordance with manufacturer's recommendations.
3. All materials, equipment, parts, and components are subject to receipt inspection by DTPW.

CONTROL OF SPECIAL PROCESSES

1. Submit CWPs for Control of Special Processes (e.g., welding, soldering, and HDPE installation.)
2. Contractor or Subcontractor personnel performing special processes shall be qualified in accordance with applicable codes, standards, and manufacturers' recommendations. Qualification records of personnel performing special processes shall be current and maintained in the Worksite files.
3. Submit qualification records of personnel performing special processes to DTPW before they start work on the Project.

CONTROL OF NON-CONFORMING ITEMS

1. The Contractor will document nonconforming items on a Non-Conformance Report (NCR). DTPW may issue a Non-Conformance Report if the Contractor fails to issue the Non-Conformance Report in a timely manner.
2. DTPW will be responsible for controlling Non-Conformance Reports through use of a sequential numbering system and updated by use of a Non-Conformance Log.
3. Upon receipt of a Non-Conformance Report, the Contractor shall be responsible for investigating and describing the root cause of the nonconformance and recommending a disposition by means of a Corrective Action Report (CAR). The Quality Assurance Requirements shall reflect this procedure. The following disposition codes shall be used for determining disposition:
 - a. "USE AS IS" - allows the use of an item that does not meet specified Contract requirements without the need for corrective action.
 - b. "REPAIR/REWORK" - item must be reworked or repaired to bring it into conformance with the requirements of the Contract.
 - c. "REJECT" - item is unsuitable for its intended use, is economically or physically incapable of being reworked or repaired and must be replaced to bring it into conformance with the Contract Requirements.
4. Nonconforming items disposed as "USE AS IS" or "REPAIR/REWORK," require review and approval of DTPW.

DOCUMENT CONTROL

1. Submit a CWP for Document Control detailing the control of receipt, status, maintenance, and transmittal of Project records and documents.
2. The Contractor shall establish a document control system to store and record the large quantity of correspondence, drawings, progress reports, technical reports, specifications, Contract Documents, Submittals, calculations, and administrative documents generated under the Contract. The Contractor shall establish correspondence routing, filing, control, and retrieval methods that are compatible with the system currently in use by DTPW or as approved otherwise by DTPW.

3. Technical document control, storage, and retrieval methods shall include the use of both hard copies and electronic records. Technical document control methods shall be capable of handling documents being developed (progress), finalized documents (for construction) and documents representing as-built conditions.
4. All correspondence of the Contractor to and from DTPW and its representatives (including DTPW) shall be serialized, and the Contractor shall maintain separate incoming and outgoing correspondence logs.
5. Within 5 Workdays of issuance of the Notice to Proceed, the Contractor and DTPW shall each designate, in writing, their respective authorized representatives to receive copies of all or specified correspondence. All correspondence shall include the Project Name, Contract Name, and Contract Number, along with the specific subject of the letter. All replies shall refer specifically to prior correspondence to which it relates.
6. Do not change or alter Contract records or documents without DTPW's written approval.
7. Ensure current revisions of procedures, instructions, drawings, and other documents are provided at Work locations.
8. Identify and maintain records and documents in an organized manner. Make records available to DTPW upon request.
9. Protect records and documents from damage, deterioration, and loss. Keep records in fireproof cabinets at the Contractor's Work site or maintain a duplicate set at another location.

RECORDS

1. Records are defined as documentation required by the Contract. Record documents include, but are not limited to, correspondence, submittals, test reports, Contract and shop drawings, schedules, certificates of compliance, pay requests, change documents, requests for information, and schedules.
2. All records shall be maintained and retained in accordance with the Contractor's Document Control CWP.
3. All record documentation shall be made available and is subject to audit by DTPW or its designee.

AUDITS

1. DTPW may perform audits and surveillances on and off site during any phase of the Work. Audits are multi-day functions, which include scheduled reviews of the Contractors Work activities as required by the Contract, including formal notification, audit entrance/exit meetings, an audit plan, performance of the audit, and issuance of an audit report. Surveillance is unscheduled review of the Contractor's Work activities and generally focuses on a specific activity. Surveillance does not include formal notification, entrance/exit meetings or written plan, but is documented in a surveillance report. The Contractor shall facilitate audits/surveillance by providing access to its facilities, personnel, and records.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- B. No separate measurement or payment will be made for Contractor Construction Control Requirements, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 60 00

PRODUCTS MATERIAL AND EQUIPMENT REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section includes specifications for general requirements for materials and equipment, including the packaging, handling, delivery, and storage thereof. Additional requirements are included in the general requirements and technical specifications.

1.02 QUALITY CONTROL:

- A. Provide products, materials and equipment of the same generic kind from a single source. Where products or materials, by nature, are available only from sources that do not individually comprise sufficient quantity for the total project requirement, select products and materials from those individual sources that are nearly equal and uniform in the indicated qualities.

PART 2 – PRODUCTS

2.01 PRODUCT SCHEDULE

- A. Prepare a schedule listing the principal products (by generic names) required for the work. For each product show the proprietary product names and manufacturer names proposed for incorporation in the work.
- B. Submit the product listing schedule within thirty (30) calendar days of the NTP.
- C. The list of products is not a substitute for required submittals, acceptance of products or a vehicle for submitting substitutions to products specified.

2.02 PROCEDURES FOR SELECTING PRODUCTS:

- A. The specified requirements for individual products indicated in the Contract are multiple in nature and may include generic, descriptive, proprietary, performance, prescriptive, proscriptive, compliance with standards, compliance with codes, conformance with graphic details, and other similar forms of requirements.
- B. Provide products conforming to all specified requirements unless otherwise directed. Other products will be considered only if requested as substitution.
- C. Contractor's options: Where an option or choice is indicated, provide only one of the options. The choice of an option is the Contractor's. Where submittals are required, state which option has been chosen.
- D. An option is not a consideration of whether a product or method shall be provided, but which of the several indicated products or methods shall be provided.
- E. Non-compliance of a named product: If it is known that a named product or product source does not comply with requirements or is no longer available, advise the Engineer before proceeding.
- F. Equivalent materials and equipment: Whenever a material or article is specified or described by using the name of a proprietary product or the name of a particular manufacturer or vendor, the specific item mentioned is understood as establishing type, function, dimension, appearance, and desired quality.

G. The Contractor's options for selecting products are limited by the specified requirements and governing regulations. Following are some of the various selection procedures for specified requirements:

H. Qualities or Performance Requirements:

1. Provide products that comply with the specific qualities indicated, and which are recommended or certified in writing by manufacturer for the specific use indicated. General performance of a product is implied where product is specified for specific performances.

I. Prescriptive Requirements:

1. Provide products produced in accordance with the prescriptive requirements, using the specified ingredients and components, and complying with the specified requirements for mixing, fabricating, curing, finishing, testing, and similar operations.

J. Standards, Codes, and Regulations:

1. Provide product that comply with the specified standards, codes, and regulations and with the other requirements.

K. Or Equal:

1. Where named products or sources are accompanied by the term "or equal" or other language of similar effect, provide one of the specified products, or submit a request for substitution for a product not named, in accordance with the requirements of Section 01 62 00 – Substitutions and Product Options, which the Contractor judges to be of equal or better quality.

L. Product Names:

1. Unless otherwise indicated, products identified by name mean a manufacturer's product as recorded in published literature, of latest issue preceding the date of Contract Documents. Submit request for substitution in order to use products of a later or earlier model.

M. Visual Matching:

1. Where matching an established sample is required, the Engineer of Record will make final judgment of whether a product proposed by Contractor matches the sample satisfactorily.

N. Visual Selection:

1. Where product requirements include "... as selected from manufacturer's standard colors, patterns, textures..." or words of similar effect, the selection of manufacturing source and basic product, which complies with the requirements, is the Contractor's option, but the selection of color, pattern and texture is the Engineer of Record's responsibility.

O. Non-Conforming Products:

1. Use of a product not conforming to specified requirements may only be approved by means of a request for substitution as specified elsewhere.

P. Precedence of Specification by Qualities, Reference Standard, and Source:

1. If it occurs that a product cannot be supplied to meet all requirements, the following order of precedence will be followed:

Q. Qualities:

1. For product specified by qualities or description, and also by reference standard or by source and name, the specified qualities or description shall take precedence.

R. Reference Standards:

1. For product specified by reference to a published standard, and by source or name, the reference standard shall take precedence over the source.

2.03 PRODUCT REQUIREMENTS:

- A. Where available, provide standard products of types that have been produced and used previously and successfully on other projects, and in similar applications.

2.04 MANUFACTURERS' INSTRUCTIONS:

- A. When the Contract Documents require that installation of work comply with manufacturers' instructions, obtain and distribute copies of such instructions to parties involved in the installation and seven (7) copies to the EOR. Maintain one set at the site until installation is complete.
- B. Handle, install, connect, clean, condition, and adjust products in strict compliance with the instructions and specified requirements. Should job conditions or specified requirements conflict with the manufacturers' instructions, notify the EOR. Handle all equipment in strict accordance with the manufacturer's written handling instructions.
- C. Perform work in accordance with the manufacturer's instructions. Do not omit any steps unless specifically modified or exempted by the Contract Documents.

2.05 HANDLING OF MATERIALS:

- A. Handle all materials and equipment to be incorporated in the work in a manner that will prevent misalignment of parts or the occurrence of damage of any kind.
- B. Protect all materials and equipment at all times from all environmental conditions that might cause damage in a secure and dry storage facility.
- C. Verify with the manufacturer all information regarding scheduling, delivery, and preparations necessary for installation.
- D. Verify that equipment and installation supplied under other Contracts, but required for the work in this Contract, are compatible.
- E. Contractor shall ensure that each item is marked in accordance with referenced codes and standards.
- F. Ship each unit securely wrapped, crated or packaged, and labeled for safe handling in shipment and to avoid damage or distortion.
- G. Supply all necessary supervision and coordination information to accommodate the installations of equipment.
- H. Adhere to manufacturer's handling requirements when off-loading equipment and materials at the jobsite.

2.06 STORAGE OF MATERIALS AND EQUIPMENT:

- A. All equipment and materials shall be stored in accordance with the manufacturer's recommendations, or as specified in the Contract Documents, to preserve their quality and fitness for the work. Stored equipment and materials, although determined acceptable for the work upon delivery or during storage, must again be inspected by the Contractor before their incorporation into the work. Stored equipment and materials shall be located and arranged to facilitate inspection by DTPW.
- B. Work-furnished materials or materials paid for before incorporation shall be stored in secure locations approved by DTPW in a manner that will preserve their full value. Such materials shall be prominently labeled as property of work and shall not be co-mingled with non-work materials. If necessary, storage shall be in controlled environment buildings.

PART 3 – EXECUTION

NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01

- A. No separate measurement or payment will be made for Product Requirements, and this will be paid for as part of the overall Contract for that particular item of work.

END OF SECTION

SECTION 01 62 00

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1: GENERAL

1.01 DESCRIPTION:

This Section specifies the procedures to be followed for preparing, submitting, amending and updating of lists of products proposed to be incorporated in the work.

1.02 SELECTED PRODUCTS:

Within 15 working days after the effective date of Notice to Proceed, submit five copies of the list of selected products. Arrange the list in the order of each Section's appearance in the specification.

- A. For products specified only by reference standards, any product satisfying those standards may be selected. Show name and address of manufacturer; trade name, model number or catalog designation of the product; manufacturer's reference standards and pertinent performance and test data.
- B. For products specified by naming one product or by naming several products, this establishes a product standard unless otherwise noted. Any other product, which is equal in the opinion of the Engineer may be furnished. A request must be submitted to the Engineer as required for substitutions, for acceptance of products not specifically named.
- C. Amend and update list as changes concerning the information become known.

1.03 LIST OF SUBSTITUTE PRODUCTS AND METHODS:

Formal requests from the Contractor will be considered by the Engineer of Record for substitution of products and methods in place of those specified, but only if these requests are submitted within 30 days after effective date of Notice To Proceed. No substitutions request will be considered after 30 days. Acceptance of substitute products and methods shall be only for the characteristics and use named in the acceptance and shall be interpreted neither as a modification to the Specification and Drawing requirements nor to establish acceptance of products and methods for other portions of the DTPW System. The Engineer of Record and DTPW Construction/Project Manager shall judge the quality and suitability of the substitute product and method, and their decision shall be final. Where use of a substitute product and method involves redesign of other parts of the Work, the cost and time required to affect that redesign will be considered in evaluating the suitability of the substitute product and method.

- A. Submit five copies of list of substitute products and methods, including the following information:
 - 1. Complete data substantiating compliance of the proposed substitution with the requirements of the Specifications and Drawings.
 - 2. For products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature, including product description, performance and test data and pertinent reference standards.
 - 3. For construction methods:

- a. Detailed description of proposed method.
 - b. Working drawings illustrating methods.
4. Itemized comparison of proposed substitution with product specified. Comparison shall include cost, differences in estimated life, estimated maintenance, availability of spare parts and repair services, energy consumption, performance capacity, salvageability, manufacturer's warranties and other material differences.
 5. Data relating to changes in construction schedule.
 6. Accurate cost data on proposed substitution in comparison with product and method specified except that cost data will not be required on substitutes proposed as equal, equivalent or superior to specified brand names and for which no request is made for price adjustment to the Subcontract.
 7. Equitable adjustment and credit that the Contractor proposes to offer DTPW if the substitutions are not equal, equivalent or superior to specified brand names.
- B. In making request for substitution, Contractor shall verify:
1. That the Contractor has personally investigated the proposed product and method and that to the best of their knowledge, information and belief, the product and method is either equivalent or superior to that product and method specified and that he will update information as new or different data become known to them. DTPW shall be the sole determining factor as to what is an approved equal.
 2. That the Contractor will furnish the same guarantee for substitution as he would for the product and method specified.
 3. That the Contractor will coordinate installation of the accepted substitution into the Work and will make those changes required for the Work to be complete and operable.
 4. That cost data is complete and includes related costs and excludes cost of engineering redesign.
 5. That the Contractor waives claims for additional time and costs related to the substitution, which become apparent.
- A. Amend and update list as changes concerning information on the list become known to him.
- B. Substitutions will not be considered, if indicated or implied on Shop Drawings or Product Data submittal for which no formal request for substitution has been submitted. Requests for substitutions will not be considered if acceptance will require substantial revisions of drawings and specifications or both.

PART 2: PRODUCTS

2.01 PRODUCTS: No products are required except as indicated in PART 1: GENERAL.

PART 3: EXECUTION

3.01 EXECUTION: No execution is required except as indicated in PART 1: GENERAL.

PART 4: MEASUREMENT AND PAYMENT

4.01 MEASUREMENT: Work under this Section will not be separately measured for payment.

4.02 PAYMENT: Work under this Section will be paid for as part of the pay-item unit price requiring the work specified in this section under Pay Item #9, General Requirements, in the Bid Form.

END OF SECTION

SECTION 01 71 13

MOBILIZATION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. This section specifies the mobilization of the construction equipment at the worksites for material and supplies necessary for the prosecution of the work, but not to be incorporated in the work, for temporary storage of equipment and material at the site and for demobilization of the construction equipment. Mobilization should also include the costs of bonds and insurance required by the Contract Documents.
- B. Construction equipment, material, supplies, and other items necessary for mobilization shall be available at the work site at the times they are to be built, used, installed, or operated.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 EQUIPMENT:

- A. Construction equipment shall be of the capacity, type, quality, function and in the quantity necessary for the timely prosecution of the work.

3.02 SUBMITTALS:

- A. Submit within seven days after the effective date of NTP, a layout of the proposed construction plan site including fences, parking, and storage areas.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this section will be separately measured for payment under Mobilization.

4.02 PAYMENT:

- A. Work under this Section will be paid for as part of the lump sum price under Pay item No. 8, Mobilization, of the Bid Form.

END OF SECTION

SECTION 01 73 00

OPERATING AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Prepare Operating and Maintenance (O & M) Manual covering all equipment and systems provided under this project.
- B. Instruct DTPW's personnel in the operation of equipment and maintenance provided under this project.
- C. This Section covers the services of the manufacturer's representatives and special coordinating services required of the Design-Builder that shall apply during construction, facilities startup, and training of the DTPW's personnel for facilities operation.
- D. The Design-Builder shall inform all subcontractors and manufacturers of the requirements herein and include the following services in his costs for the work. Where a minimum amount of time is stated in the Technical Specifications for manufacturers' services, any additional time required to perform the specified services shall be at no additional cost to DTPW.

1.02 FORM, FORMAT AND SUBMITTALS CONTENTS

- A. Operating and Maintenance manuals will be used for use by Miami-Dade Transit DTPW personnel in the operation and maintenance of the various systems.
- B. The DTPW shall be furnished with one set of any special tools required for servicing for each type of equipment actually furnished.
- C. Prepare data in the form of an instructional manual for use by DTPW's personnel. Format:
 - 1. Size: 8½ in. x 11 in.
 - 2. Paper: 20-pound minimum, white, for typed pages.
 - 3. Text: Manufacturer's printed data or neatly typewritten.
 - 4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to the size of the text paper.
 - 5. Provide fly-leaf for each separate product, or each piece of operating equipment.
 - a. Provide typed description of product, and major component parts of equipment.
 - b. Provide indexed tabs.
 - 6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.

- b. Identify of separate structure as applicable.
- c. Identity of general subject matter covered in the manual.

D. Binders:

- 1. Commercial quality three-ring binders with durable and cleanable plastic covers.
- 2. Maximum ring size: As required (Minimum 1½-inches).

E. Content of Manual:

- 1. Neatly typewritten table of contents, arranged in a systematic order.
 - a. Design-Builder, name of responsible principal, address and telephone number.
 - b. A list of each product required to be included, indexed to the content of the volume.
 - c. List, with each product, the name, address and telephone number of:
 - i. Sub Design-Builder or installer.
 - ii. Maintenance Design-Builder, as appropriate.
 - iii. Identify the area of responsibility of each.
 - iv. Local source of supply for parts and replacement.
 - d. Identify each product-by-product name and other identifying symbols as set forth in Contract Documents.

F. Product Data:

- 1. Include only those sheets which are pertinent to the specific product.
- 2. Annotate each sheet to:
 - a. Clearly identify the specific product or part Installed.
 - b. Clearly identify the data applicable in the installation.
 - c. Delete references for inapplicable information.

G. Drawings:

- 1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component part of equipment and system.
 - b. Control wiring, schematic wiring, and flow diagram.
- 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
- 3. Do not use Project Record Documents as maintenance drawings.

- H. Written text, as required to supplement product data for the particular installation:
 - 1. Organize in a consistent format under separate headings for different procedures.
 - 2. Provide a logical sequence of instructions for each procedure.
- I. Copy of each warranty, bond and service contract issued.
 - 1. Provide information sheet for DTPW's personnel, give:
 - a. Proper procedures in the event of failure.
 - b. Instances which might affect the validity of warranties or bonds.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Content, for each unit of equipment and system, as appropriate:
 - 1. Description of unit and component parts.
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of all replaceable parts.
 - 2. Operating Procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down, and emergency instructions.
 - c. Special operating instructions.
 - 3. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble shooting".
 - c. Disassembly, repair, and reassembly.
 - d. Alignment, adjusting, and checking.
 - 4. Servicing and lubrication schedule.
 - a. List of lubricants required.
 - 5. Manufacturer's printed operating and maintenance instructions.
 - 6. Description of sequence of operation by control manufacturer.
 - 7. Original manufacturer's parts list, illustration, as drawings and diagrams required for maintenance.
 - a. Predicted life of parts subject to wear.

- b. Items recommended to be stocked as spare parts.
- 8. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
- 9. Other data as required under pertinent sections of specifications.
 - a. Prepare and include additional data when the need for such data becomes apparent during instruction of DTPW's personnel.
 - b. Additional requirements for operating and maintenance data: The respective sections of Specifications.

1.04 POSTED OPERATING INSTRUCTIONS

- A. General: Operating instructions and diagrams shall be prepared for posting near the equipment. Posted operating instructions shall be photographic or equal non-fading reproductions framed under glass encased in non-discoloring plastic and shall be mounted in location directed. Copies of the posted operating instructions shall also be used with the operating and maintenance manuals as a basis in training employees in the operation and maintenance of systems and related equipment installed.
- B. Contents: Posted operating instructions shall consist of simplified, consolidated equipment, control and power diagrams graphically representing the entire system and actual equipment installed, including concise written instructions on how to start and stop systems, what settings and conditions are to be observed and what control adjustments are to be made or maintained by the operation.

1.05 MANUFACTURER'S NAMEPLATES

- A. Each major component of equipment to have manufacturer's name, address, model number and rating on a plate securely affixed in a conspicuous place. Nameplate of a distributing agent will not be acceptable in lieu of manufacturer's nameplate.
- B. Nameplate shall be die-stamped, engraved, or etched to guarantee long term legibility.

1.06 GUARANTY/WARRANTY

- A. The Installing Contractor shall guarantee that all new equipment has the capacity specified and that it will operate without excess noise or vibration.
- B. Installing Contractor shall furnish a written guarantee covering all workmanship and materials for a period of one (1) year, from the date of acceptance. This shall include an agreement to repair or replace, at his expense, all defects that may appear at that time, which in the opinion of the DTPW, are due to defective workmanship or materials.
- C. Copies of factory warranties on all equipment furnished shall be submitted with the above-mentioned, written guarantee period, and included in maintenance manuals.
- D. The contractor shall provide the additional full manufacture's 5-year parts and labor warranty of the entire chiller unit as listed in Daikin's specifications to the County.

1.07 OPERATION AND MAINTENANCE RESPONSIBILITY

- A. Installing contractor shall provide all required service and maintenance on all equipment installed under this contract as described in Section 2.09 of the Special Terms & Conditions. The starting date of one (1) year service period shall be determined by the DTPW. Included in the service and

maintenance to be provided during shall be all required lubrication, adjusting belt tensions, eliminating excessive noise and vibration, correcting all electrical and mechanical faults, recording all permanent installed gauge meter and temperature readings, and other general service items, including the answering of service calls. Provide extended warranty as outlined in section 2.09 of special terms and conditions.

B. Services During Construction:

1. General: Competent and experienced technical representatives shall represent the manufacturers of all equipment and systems as many days as may be necessary to resolve assembly or installation problems at the worksite which are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers of all equipment furnished, whether or not specifically set forth in the Technical Specifications.
2. Manufacturer's Certificate of Proper Installation: Where called for in the Technical Specifications, the manufacturer's representative shall provide a certificate stating that the equipment or system has been installed in accordance with the manufacturer's recommendation and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, and that the proper electrical and mechanical connections have been made.

C. Functional Testing Assistance:

1. Where functional (or run) testing is called for on the Technical Specifications, the manufacturer's representative shall assist with the initial test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment and system adjustment and calibrations shall be performed in the presence of and with the assistance of the manufacturer's representative. The previously specified Manufacturer's Certificate of Proper Installation shall include the statement that proper adjustment has been made and that the equipment or system is ready for plant startup and operation.
2. The Design-Builder, as applicable to the equipment furnished, shall state in writing that all necessary hydraulic structures, piping systems, and valves have been successfully tested; that all necessary equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are all operational; that the systems and subsystems are capable of performing their intended functions; and that the facilities are ready for startup and intended operation.

D. Training of DTPW's Personnel

1. Where called for in the Specifications, the manufacturer's representative shall provide detailed instructions to the DTPW's personnel for operation and maintenance of the specified equipment. These training services shall include pre-startup classroom and onsite equipment instruction and/or post-startup classroom and onsite equipment instruction, as stated in the Specifications.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION NOT USED

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

A. No separate measurement or payment will be made for Operating and Maintenance Data, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED:

- A. Contractor responsibility: All cutting, fitting and patching required to complete the work to:
1. Make several parts fit together properly.
 2. Uncover portions for the work to provide for the installation of ill-timed work.
 3. Remove and replace defective work.
 4. Remove and replace work not conforming to requirements of Contract Documents.
 5. Remove samples of installed work as specified for testing.
 6. Remove routine penetrations of non-structural surfaces for installation of piping and electrical conduits.

1.02 SUBMITALS:

- A. Submit a written request to the Engineer well in advance of executing any cutting or alteration which affects:
1. Work of the Owner or any separate contractor.
 2. Structural value or integrity of any element of the Project.
 3. Integrity or effectiveness of weather-exposed or moisture resistant elements or systems.
 4. Efficiency, operational life, maintenance or safety of operational elements.
 5. Visual qualities of sight-exposed elements.
- A. Include with each request:
1. Identification of the Project.
 2. Description of affected work.
 3. The necessity for cutting alteration or excavation.
 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.
 5. Description of proposed work:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades who will execute the work.

- c. Products proposed to be used
- d. Extent of refinishing to be done.
- 6. Alternatives to cutting and patching.
- 7. Cost proposal, when applicable.
- 8. Written permission of any separate contractor whose work will be affected.
- B. Should conditions of Work or the schedule indicate a change of Products from original installation, submit request for substitution.
- C. Submit written notice to the Engineer designating the date and time the work will be uncovered.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Comply with specifications and standards for each specific product involved.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Inspect existing conditions of Project, including elements subject to damage or movement during cutting or patching.
- B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Engineer in Writing; do not proceed with work until the Engineer has provided further instruction.

3.02 PREPARATION:

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of Project from damage.
- C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations far from water.

3.03 PERFORMANCE:

- A. Execute cutting and demolition by methods which will prevent damage to other work, and which will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Employ original Installer or Fabricator to perform cutting and patching for:

1. Weather-exposed or moisture-resistant elements.
 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
 - E. Restore work which has been cut or removed, install new products to provide complete work in accord with requirements of Contract Documents.
 - F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetration through surfaces.
 - G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 1. For continuous surfaces, refinish to nearest intersection.
 2. For an assembly, refinish entire unit.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment

4.02 PAYMENT:

- A. Work under this Section will be paid for as part of the pay-item unit price requiring the work specified in this section under Pay Item #9, General Requirements, in the Bid Form.

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section specifies the maintenance of the work site in a clean, orderly hazard-free condition.

1.02 QUALITY ASSURANCE:

- A. Conduct cleaning and disposal operations in accordance with local ordinances and anti-pollution laws. Rubbish, volatile wastes, and other construction wastes shall be neither burned nor buried on the work site, and shall not be disposed of into storm drains, sanitary drains, streams or other waterways.
- B. Final cleaning shall be accomplished either by workmen experienced in cleaning operations or by professional cleansers.

PART 2 – PRODUCTS

2.01 CLEANING MATERIALS:

- A. Cleaning materials shall be as recommended by the manufacturer of the surface to be cleaned.

PART 3 – EXECUTION

3.01 SAFETY REQUIREMENTS:

- A. Maintain work site in accordance with local ordinances and anti-pollution laws applicable to work site cleanliness, and in a neat, orderly and hazard-free condition until final acceptance of the work. Catwalks, accessible underground structures, work site sidewalks and walkways adjacent to the work site shall be kept free from hazards caused by construction activities.
- B. No volatile substances are to be used on the job site.
- C. Prevent accumulation of waste, which creates hazardous conditions.
- D. Artificially ventilate spaces, which are not naturally ventilated when noxious substances are being used in those spaces.

3.02 INTERIM CLEANING:

- A. Perform cleaning every workday for duration of the work. Structures, ground, and areas of the work site and public and private properties shall be maintained free from accumulations of waste materials and rubbish caused by construction operations on the work site. Waste material will be removed from the work site daily.
- B. Remove or secure loose material on open decks and on other exposed surfaces at end of each day's work or more to maintain work site in hazard-free condition. Prevent dislodgment of materials due to wind and other forces.

- C. Empty on-site waste containers whenever necessary so that trash overflow does not occur. Legally dispose of contents at either public or private dumping areas.
- D. Control the handling of materials, debris and rubbish; do not drop or throw from heights.
- E. Perform cleaning operations such that dust and other contaminants resulting from cleaning processes will not fall on structures or pedestrian traffic below.

3.03 FINAL CLEANING:

- A. In preparation for substantial completion, conduct final inspection of exposed interior and exterior surfaces and of concealed spaces.
- B. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from finished surfaces.
- C. Maintain cleaning operations until project has been finally accepted.

3.04 DAMAGE TO EXISTING FINISHES:

- A. Repair any concrete damaged.
- B. Repaint to match existing areas of damaged paint due to Contractor's operation.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. Work under this Section will be paid for as part of the pay-item unit price requiring the work specified in this section under Pay Item #9, General Requirements, in the Bid Form.

END OF SECTION

SECTION 01 78 00
CONTRACT CLOSE-OUT

PART 1 – GENERAL

1.01 SUBSTANTIAL COMPLETION:

- A. Substantial Completion shall be determined in accordance with Article 29 of the General Conditions and this Section. Should a conflict arise between the General Conditions and this Section, the General Conditions shall take precedence.

1.02 FINAL CONSTRUCTION REVIEW:

- A. When Contractor considers work is complete, he shall submit a written certification that work is acceptable and that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been reviewed for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Equipment and systems have been tested in the presence of the Engineer and are operational.
 - 5. Work is completed and ready for final Construction Review.
- B. The Engineer will make a Construction Review to verify status of completion with reasonable promptness after receipt of such certification.
- C. Failure of the Engineer to Reject Work During Construction: If, during construction operations or during inspections for substantial or final completion, the Engineer should fail to reject defective Work or materials, whether from lack of discovery of such defect or for any other reason, such initial failure to reject shall in no way prevent his later rejection when such defect is discovered, or obligate the Owner to final acceptance, and the Contractor shall make no claim for losses suffered due to any necessary removals or repairs of such defects.

1.03 CONTRACTOR'S CLOSE-OUT SUBMITTALS:

- A. Upon receipt of notice of acceptability from the Engineer, the Contractor shall furnish evidence of compliance with requirements of governing authorities and Contract Documents to the Engineer, as follows:
 - 1. As-built drawings and other project record Documents: As specified in Section 01 78 39.
 - 2. Operating and Maintenance Data, Instructions to Owners Personnel: As specified and in accordance with the requirements of the individual Sections of the Specifications.
 - 3. Warranties and Bonds: As specified in Section 01 78 33 and in accordance with the requirements of the individual Sections of the Specifications.
 - 4. Spare parts and Maintenance Materials: To requirements of various Sections.
 - 5. Evidence of Payment to subcontractors, material men and equipment suppliers and releases of liens.

1.04 FINAL ADJUSTMENTS OF ACCOUNTS:

- A. Final Payment shall be determined in accordance with this contract's requirements.

1.05 FINAL CHANGE ORDER:

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

PART 2 – PRODUCTS

2.01 PRODUCTS:

- A. No products are required except as indicated in PART 1: GENERAL.

PART 3 – EXECUTION

3.01 EXECUTION:

- A. Prior to final payment, the Contractor shall complete and execute the Close-Out forms in Attachment "B" to the General Conditions.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. No separate measurement or payment will be made for Contractor Construction Control Requirements, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 01 78 33

WARRANTIES AND BONDS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. The warranties provided by the Contractor shall be for the longest period, starting on the date of final acceptance, of those specified on paragraphs 1.01 A., 1 through 3 below and in accordance with Section 2.09 of the Special Terms & Conditions:
 - 1. Minimum one year from final acceptance on all the work as specified in the General Conditions and Section 2.09 of the Special Terms & Conditions, or.
 - 2. Warranty period(s) as specified by the approved material or equipment manufacturers as specified in the General Conditions and Section 2.09 of the Special Terms & Conditions, or.
 - 3. Longer warranty period(s) as specified in the Technical Specifications or as specified in the General Conditions and Section 2.09 of the Special Terms & Conditions.
- B. The Contractor shall provide certifications and other commitments, extended warranties and agreements for continuing services as specified elsewhere in the Contract Documents.
- C. Reinstated warranty as applicable, see 1.04, B.

1.02 DISCLAIMERS AND LIMITATIONS

- A. Manufacturers' disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 DEFINITIONS

- A. Standard product warranties are reprinted written warranties published by the individual manufacturers for particular products and are specially endorsed by the manufacturer to the Owner.

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

- D. Owner Recourse: Written warranties made to the owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.
- E. Rejection of Warranties: The COUNTY/DTPW reserves the right to reject warranties and to limit selections of products with acceptable warranties and to limit selections of products with warranties not in conflict with requirements of the contract Documents.
- F. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. All warranties including standard one year warranty, shall start at date of substantial completion of the Contract, or when work of an area is substantially completed, accepted and taken over for use by the Owner. Ensure that all warranties comply with this stipulation prior to submission of same.
- H. The Owner will give prompt notice in writing to the Contractor of any defects noted during the warranty periods requesting him to promptly remedy such defects.
- I. Prior to final acceptance, the Contractor shall formally assign to the Owner all extended warranties given by subcontractors for their work on the project, and such subcontractor shall be formally advised of the assignment.

1.05 SUBMITTALS

- A. Submit written warranties to the Engineer prior to the date of the final acceptance inspection
- B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Engineer for approval prior to final execution.
- C. Submit a list of all warranty items within 90 days after notice to proceed Refer to individual Sections of Division 2 through 16 for specific content requirements, and particular requirements for submittal of specific warranties.
- D. Prior to final acceptance compile two copies of each required warranty, and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual and submit under Section 01 78 39 - Project Record Documents.
- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 inch by 11-inch paper.
- F. Provide heavy paper dividers with celluloid covered tabs for each separate warranty Mark the tab to identify the product or installation Provide a typed description of the product or installation, including the name of the product, and the installer name, address and telephone number.
- G. Identify each binder on the front and the spine with the typed or printed title, "WARRANTIES AND BONDS", the project title or name, and the name of the Contractor.

- H. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 – PRODUCTS

2.01 PRODUCTS:

- A. No products are required except as indicated in PART 1: GENERAL.

PART 3 – EXECUTION

3.01 EXECUTION:

- A. No execution is required except as indicated in PART 1: GENERAL.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #9, General Requirements, in the Bid Form.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This Section specifies the maintaining, marking, recording, and submitting of project record documents.
- B. DEFINITIONS:
 - 1. Conformed Contractor Contract Documents: The conformed documents provided to the Contractor Firm at the time the Contractor contract was executed, prior to the start of the Contractor Contract.
 - 2. Contractor Document Transmittal (CDT): Reviewed and approved drawings, catalog cuts, samples or other documents submitted by the Contractor Firm for County review showing in detail how the Contractor proposes to carry out the work.
 - 3. As-Builts: During construction, a set of released for construction drawings and specifications, kept current by marking in red all “as-built” construction conditions and changes arising out of RFIs, clarifications, directed field changes and sketches. At the conclusion of construction activities, the information contained in these blue lines and specifications shall be incorporated into the Compact Disk (CD) containing the latest conformed drawings including revisions made by the Contractor Firm’s Engineer of Record during construction. (Changes to specifications are typically only affected through change orders. However, on some occasions clarifications may require a modification to the specifications). The revised CADD drawings which include the information incorporated from the blue lines and specifications become As-Builts.
 - 4. Shop Drawings: Final CAD files to be provided in AutoCAD as well as 11x17 PDF’s. See Contractor Firm Document Transmittals.

1.02 SUBMITTALS

- A. Upon completion of the work, the Contractor Firm shall submit the As-Builts to the DTPW Construction Manager in time to be used for the final inspection and acceptance and for verification. Availability of As-Builts shall be prerequisite to scheduling a final inspection of this Contractor Contract. Non-availability of As-Builts or inaccuracies therein may be grounds for cancellation and postponement of any scheduled final inspection by the DTPW Construction Manager until such time as the discrepancy has been corrected. Upon completion of the work, the As-Builts shall become the property of MDC. The Contractor Firm will transmit the As-Builts to the DTPW Construction Manager with an attached Project Records “As-Built” Drawings Index Form uniquely identifying and describing each document. Specifically, the following documents shall be submitted by the Contractor after construction is completed, but prior to submitting the request for final inspection:
 - B. The Contractor shall submit two CDs labeled “As-Builts,” one in PDF format and the other in CADD format. The Contractor shall date and mark each drawing as “As-Built” using the revision block, and each drawing should be electronically signed by the Contractor certifying the accuracy and validity of the information contained therein. The Contractor Firm shall also submit two printouts from the CD containing the As-Builts, and one set of blue lines and specifications to reflect change notices, change orders, requests for information and field changes in red. The information regarding field conditions/changes is to be maintained in the set of blue line recorded drawings and a set of specifications during construction. At the end of construction, the “as-built” conditions are incorporated into the latest conformed drawings. These final CADD drawings become As-Builts.

- C. The Contractor Firm's Engineer shall sign each red line drawing certifying the accuracy and validity of the as-built information contained therein.

1.03 QUALITY ASSURANCE

- A. Project record documents shall conform to a high standard of quality, similar to that set forth in the National CADD Standard ANSI and ISO, or other relevant lower tier specification defining drafting quality and electronic file formatting.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 MAINTENANCE OF DOCUMENTS:

- A. The Contractor shall maintain at field office, one copy of each of the following:
 - B. Contractor Contract Documents
 - 1. Conformed Contractor Contract Drawings and Conformed Specifications.
 - 2. Construction Safety Manual.
 - 3. Change Orders, Change Notices, and other modifications to the Contractor Contract.
 - 4. Engineer Field Order or written instruction.
 - 5. Approved shop drawings, product data and samples.
 - 6. Field test reports/records.
 - 7. Updated set of record drawings (blue lines) marked in red to show field changes.
 - 8. Request for information (RFI).
 - 9. All directed Field Changes and sketches.
 - C. Equal Employment and Affirmative Action Records.

3.02 RECORDING "AS-BUILT" DRAWING:

- A. A flowchart explaining this process is included with this section.
- B. Record information concurrently with construction progress on a conformed set of blue lines and specifications. During construction, this set of blue lines and specifications are known as "As-Built" drawings.
- C. Do not conceal any work until the required information is recorded.
- D. Drawings: legibly mark in red to record actual construction depicting the as-constructed configurations resulting from field and/or design changes:
 - 1. Horizontal and vertical location of underground utilities and appurtenances, referenced by dimensions to permanent, visible, and accessible features of the structure.

2. Location of internal utilities, electrical conduits, and appurtenances, referenced by dimensions to permanent, visible, and accessible features of the structure.
3. Field changes of dimension and detail.
4. Details not on original conformed Contractor Contract Drawings.
5. Changes made by Change Notice or by Change Order.

E. Legibly mark-up each section of specifications to record:

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

F. Any changes due to RFIs, clarifications and field sketches shall be incorporated into the record drawings by affixing sketches and other 8 1/2" x 11" sheets to the blue lines. This information will be incorporated into the CD containing the latest conformed drawings once construction is complete.

G. Do not use the record drawing set for construction progress purposes.

3.03 DOCUMENT MAINTENANCE:

- A. Provide files and racks for storage of documents to maintain in clean, dry, and legible condition.
- B. Do not use record documents for construction purposes.
- C. Make documents available for inspection by the DTPW Construction Manager, MDC, Federal Government and State Government.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- C. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- E. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #9, General Requirements, in the Bid Form.

END OF SECTION

SECTION 02 05 00

DEMOLITION AND MAINTENANCE OF SERVICE DURING CONSTRUCTION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. This Section includes furnishing all labor, materials, permits, notifications, equipment and incidentals required for the demolition and disposal of all materials and equipment designed for removal. Such materials and equipment include pumps, pipe, valves, supports, control panels, blower for exhaust fans, and other related appurtenances.
2. These Specifications call attention to certain activities necessary to maintain and facilitate operation during and immediately following construction and do not purport to cover all of the activities necessary. The Contractor shall exercise due care to maintain continuous operation of the existing facilities and minimize operation inconvenience. In accordance with this requirement, a Demolition and Removal Plan shall be developed and submitted in accordance with Paragraph 1.06 herein and Section 013216 – Project Schedules.
3. Demolition includes, but is not limited to:
 - a. Existing Water-Cooled Chillers, Chilled and Condenser Water Pumps, Accessories, Hydronic piping, Valves, Supports and Hangers, and associated controls. The existing system shall remain completely operational until all new equipment has been delivered to the site.
 - b. Throughout the project: Piping, electrical conduits, wiring, control panels, junction boxes, pavement, and other items as shown on the Drawings, no longer needed to support system operation, or necessary to complete the Project.
 - c. Disposal of non-salvageable and excess unacceptable material as specified below.
 - d. Off-site disposal of excess and unacceptable materials.
4. The Contractor shall examine the Contract Documents, visit the project site and determine the extent of the work affected therein, and all conditions under which the work will be performed.

1.02 PERMITS AND NOTICES

- A. Permits and Licenses: Contractor shall obtain all necessary permits and licenses for performing the work and shall furnish a copy of same to the Owner prior to commencing the Work. The Contractor shall comply with the requirements of the permits.

1.03 CONDITIONS AND STRUCTURES

- A. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner insofar as practicable, however, minor variations within the structure may occur prior to the start of demolition work.

1.04 RULES AND REGULATIONS

- A. The Florida Building Code and applicable codes shall control demolition, modification, or alteration of the existing buildings or structures.

1.05 DISPOSAL OF MATERIAL

- A. All equipment on the contract documents shall be transported and disposed of by the Contractor.
- B. Concrete, concrete block, and unsalvageable bricks shall be hauled to a waste disposal site by the Contractor.
- C. The storage of or sale of removed items on the site shall not be allowed.

1.06 SUBMITTALS

- A. Submit to the Engineer of Record within twenty (20) days after the Notice-to-Proceed for approval, five (5) copies of the proposed Demolition and Removal Plan for the structures and modifications as shown on the Drawings or as specified herein prior to the start of Work. Include a detailed schedule showing the coordination of bypassing, shutoff, capping and continuation of utility service as required. The Demolition and Removal Plan shall include as a minimum, the following:
 - 1. A detailed sequence of demolition and removal work to ensure the continued service and compliance with regulatory agency requirements, as well as the expeditious completion of the Contractor's work.
 - 2. A list of all activities, including Owner activities, bypass activities and shutdowns, required to complete the work.
 - 3. The sequence of demolition and renovation of existing facilities shall be in accordance with the approved Demolition and Removal Plan as specified in this Section. The Contractor is solely responsible for construction and demolition sequencing of the Work.

1.07 TRAFFIC AND ACCESS

- A. Conduct demolition and modification operations, and the removal of equipment and debris to ensure minimum interference roadways, on-site and off-site and to ensure minimum interference with occupied or used facilities.
- B. The Contractor shall at all times maintain safe and convenient access to the existing site.
- C. Do not close or obstruct roadways or walks without permission from the Owner and Engineer of Record. Provide alternate traffic routes around closed or obstructed access ways.
- D. Special attention is directed towards maintaining safe and convenient access to the existing facilities remaining in service by Department personnel. Relocation of the Contractor's materials or equipment due to uncoordinated interruption will be at the Contractor's expense.

1.08 DAMAGE

- A. Promptly repair damage caused to adjacent facilities by demolition operations at no cost to the Owner.

1.09 UTILITIES

- A. Maintain existing utilities to remain in service and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Owner and the Engineer of Record. Provide temporary service during interruptions to existing utilities as acceptable to the Owner.

- C. The Contractor shall cooperate with the Owner to shut off utilities serving structures as required by demolition operations.
- D. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the utility companies.
- E. All utilities being abandoned shall be disconnected and terminated at the service mains in conformance with the requirement of the utility companies or the municipality owning or controlling them.

1.10 POLLUTION CONTROL

- A. Take all necessary measures and means to provide dust, dirt, debris and paint abatement methods to prevent damage to surrounding properties, on-site structures, and private property.
- B. Clean on-site structures and improvements of all dust, dirt and debris caused by demolition operations as directed by the Engineer. Clean or repair all off-site property as shown on the Drawings and specified herein. Return areas to conditions existing prior to the start of work.

1.11 QUALITY CONTROL

- A. Protect all existing materials and equipment to be salvaged or reused from damage.
- B. No above-ground pipes, junction boxes, conduits, or wires are to be left abandoned.
- C. Leave all exposed ends of all pipe and conduit or junction boxes covered and safe.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 SEQUENCE OF WORK

- A. The sequence of demolition and renovation of existing facilities shall be in accordance with the approved demolition and removal plan.
- B. The Contractor shall have a basic understanding of the operation of the existing facility before preparation of the Demolition and Removal Plan to maintain facility operation and reliability during the demolition process.
- C. Show the complete sequence of construction by activity and by structure.

3.02 REMOVAL OF EXISTING EQUIPMENT, PIPING, AND APPURTENANCES

- A. Subject to the constraints of maintaining the existing facility in operation, existing equipment appurtenances not necessary for the operation of the new equipment shall be removed as shown or indicated on the Drawings.
- B. All existing equipment, piping, and appurtenances to remain in the mechanical room shall be cleaned, flushed, and drained. All valves shall be left in the open position.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #6, Demolition, in the Bid Form.

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes single- and three-phase motors for application on equipment provided under other sections and for motors furnished loose to Project.
- B. Related Sections:
 - 1. Section 260553 - Identification for Electrical Systems.

1.02 REFERENCES

- A. American Bearing Manufacturers Association:
 - 1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. National Electrical Manufacturers Association:
 - 1. NEMA MG 1 - Motors and Generators.
- C. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

- A. Section 013300 - Submittals: Submittal procedures.
- B. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.
- C. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 Product Material and Equipment Requirements: Product Storage and Handling Requirements.
- B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

- C. Protect products from weather and moisture by covering them with plastic or canvas and by maintaining heating within enclosure.
- D. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 – PRODUCTS

2.01 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

- A. Motors 3/4 hp and Larger: Three-phase motor as specified below.
- B. Three-Phase Motors: NEMA MG 1, Design B, energy-efficient squirrel-cage induction motor, with windings to accomplish starting methods and number of speeds as indicated on Drawings.
 - 1. Voltage: As indicated on Drawings.
 - 2. Service Factor: 1.15
 - 3. Enclosure: Meet conditions of installation unless specific enclosure is indicated on Drawings.
 - 4. Design for continuous operation in 40 degrees C environment, with temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
 - 5. Insulation System: NEMA Class **F**.
 - 6. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
 - 7. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay with wiring to terminal box.
 - 8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 200,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
 - 9. Sound Power Levels: Conform to NEMA MG 1.
- C. Single Phase Motors:
 - 1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.
 - 2. Voltage: As shown on drawings.
- B. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.02 SOURCE QUALITY CONTROL

- A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

PART 3 – EXECUTION

3.01 EXISTING WORK

- A. Disconnect and remove abandoned motors
- B. Maintain access to existing motors and other installations that are remaining active and requiring access. Modify installation or provide access panel.

3.02 INSTALLATION

- A. Install securely on firm foundation. Mount ball bearing motors in accordance with motor manufacturer's requirements.
- B. Install engraved plastic nameplates in accordance with Section 230553.
- C. Ground and bond motors.

3.03 FIELD QUALITY CONTROL

- A. Section 014500 and 017800 Contract Closeout Field inspecting, testing, adjusting, and balancing.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.15.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 05 23

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Globe valves.
2. Ball valves.
3. Butterfly valves.
4. Check valves.

B. Related Sections:

1. Section 230503 - Pipes and Tubes for HVAC Piping and Equipment: Product and installation requirements for piping materials applying to various system types.
2. Section 230529 - Hangers and Supports for HVAC Piping and Equipment: Product and installation requirements for pipe hangers and supports.
3. Section 230700 - HVAC Insulation: Product and installation requirements for insulation for valves.
4. Section 232113 - Hydronic Piping: Product and installation requirements for piping used in hydronic piping systems.
5. Section 232116 - Hydronic Piping Specialties: Product and installation requirements for piping specialties used in hydronic piping systems.

1.02 REFERENCES

A. ASTM International:

1. ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
2. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D4101 - Standard Specification for Propylene Injection and Extrusion Materials.

B. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 67 - Butterfly Valves.
2. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
3. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
4. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.

5. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
6. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
7. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

C. Underwriters Laboratories Inc.

1. UL 842 - Valves for Flammable Fluids.

1.03 SUBMITTALS

- A. Section 013323 – Shop Drawings: Requirements for submittals.
- B. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.
- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements: Environmental conditions affecting products on site.

1.08 WARRANTY

- A. Section 017833 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish full 5-year manufacturer warranty for valves.

1.09 EXTRA MATERIALS

- A. Section 017800 - Execution and Closeout Requirements: Requirements for extra materials.
- B. Furnish two packing kits for each size valve.

PART 2 – PRODUCTS

2.01 GLOBE VALVES

- A. Manufacturers:
 - 1. NIBCO
 - 2. Substitutions: Section 016000 – Material and Equipment Requirements & 016200 – Substitutions, and product options.
 - 3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision in this regard shall be final.
- B. 1 inch and Smaller: MSS SP 80, Class 125, bronze body, bronze trim, union bonnet, hand wheel, Teflon composition disc, solder or threaded ends.
- C. 1-1/2 inches and Larger: MSS SP 85, Class 125, cast iron body, bronze trim, hand wheel, outside screw and yoke, flanged ends.

2.02 BALL VALVES

- A. Manufacturers:
 - 1. **American Valve / Watts**
 - 2. Substitutions: Section 016000 – Material and Equipment Requirements & 016200 – Substitutions, and product options .
 - 3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision in this regard shall be final.
- B. 1-1/4 inches and Smaller: 600 psi WOG, 150 WSP, two-piece bronze body, type lead-free bronze valve with stainless steel trim, full port, 316 Stainless steel ball and stem, PTFE seats, blow-out proof stem, solder or threaded ends with union, locking lever handle with stem extensions (**Watts** GS series LFB6080G2-SS)
- C. 1-1/2 inches and larger: MSS SP 72, NSF/ANSI 61 & 372, 300 psi WOG, 150 WSP, cast 316 stainless steel body, stainless steel ball, full port, reinforced PTFE seats, blow-out proof stem, flanged ends, locking lever handle. (**CF8M American Valve Inc. model 4001 as specified on plans**)
- D. 4 inch valves for temporary connections shall be ball valves shall be of the floating-ball design providing bi-directional, tight shutoff in accordance with MSS SP-72. The valves shall be rated 200 psi non-shock at 200 deg F. Bodies shall be of cast iron per ASTM A126 Class B, with ANSI Class 125 flat-face flanges. (**American Valve Inc. model 3700 as specified on plans**)

2.03 BUTTERFLY VALVE

A. Manufacturers:

1. NIBCO
2. Substitutions: Section 016000–Material and Equipment Requirements & 016200 – Substitutions, and product options.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision in this regard shall be final.

B. 2-1/2 inches and Larger: MSS SP 67, Class 150.

1. Body: Cast or ductile iron, wafer ends, stainless steel stem, extended neck.
2. Disc: stainless steel.
3. Seat: Resilient replaceable EPDM.
4. Handle and Operator: 10 position lever handles.

2.04 CHECK VALVES

A. Manufacturers:

1. NIBCO.
2. Substitutions: Section 016000 – Material and Equipment Requirements & 016200 – Substitutions, and product options.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision in this regard shall be final.

B. Horizontal Swing Check Valves:

1. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Teflon disc, solder or threaded ends.

C. Spring Loaded Check Valves:

1. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Teflon disc, integral seat, solder or threaded ends.
2. 2-1/2 inches and Larger: MSS SP 71, Class 125 wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify piping system is ready for valve installation.

3.02 INSTALLATION

- A. Install valves with stems upright or horizontal, not inverted.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install 3/4-inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.
- D. Install valves with clearance for installation of insulation and allowing access.
- E. Provide access where valves and fittings are not accessible.
- F. Refer to Section 230529 for pipe hangers.
- G. Refer to Section 230700 for insulation requirements for valves.

3.03 VALVE APPLICATIONS

- A. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.
- B. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Install ball or globe valves for throttling, bypass, or manual flow control services.
- D. Install spring loaded check valves on discharge of water pumps.
- E. Install lug end butterfly valves adjacent to equipment when functioning to isolate equipment.
- F. Install ball and butterfly valves in chilled and condenser water systems for shut-off service.
- G. Install calibrated ball and globe valves in chilled and condenser water systems for throttling service.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Flashing.
5. Sleeves.
6. Formed steel channel.
7. Firestopping and accessories for HVAC Work.

B. Related Requirements:

1. Section 230548 - Vibration and Seismic Controls for HVAC: Coordination with installation of rigid pipe anchors.
2. Section 230700 - HVAC Insulation: Piping and accessory insulation as required by this Section.

1.02 DEFINITIONS

- ###### A. Firestopping (Through-Penetration Protection System):
- The material used to seal or stuff, or an assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire-rated construction.

1.03 REFERENCE STANDARDS

A. American Welding Society:

1. AWS D1.1/D1.1M - Structural Welding Code - Steel.

A. ASME International:

1. ASME B31.1 - Power Piping.
2. ASME B31.5 - Refrigeration Piping and Heat Transfer Components.
3. ASME B31.9 - Building Services Piping.

C. ASTM International:

1. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

2. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
3. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
4. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

D. FM Global:

1. FM - Approval Guide.

E. Intertek Testing Services (Warnock Hersey Mark):

1. WH-ETL - Product Directory.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

G. UL:

1. UL - Fire-resistance-rated Systems and Products.
2. UL 263 - Fire Tests of Building Construction and Materials.
3. UL 1479 - Fire Tests of Through-Penetration Firestops.
4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.

1.04 PREINSTALLATION MEETINGS

- A. Section 013119 Project Meetings: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.05 SUBMITTALS

- A. Section 013323 – Shop Drawings: Requirements for submittals.
- B. Product Data:
 1. Hangers and Supports: Submit manufacturer's catalog information, including load capacity.
 2. Firestopping: Submit information on product characteristics, performance, and limitations.
- C. Shop Drawings:
 1. Indicate system layout with location, including critical dimensions and sizes.
 2. Indicate pipe hanger and support locations and detail of trapeze hangers.
- D. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrated items, and specified design numbers to seal openings to maintain fire-resistance rating of adjacent assembly.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Delegated Design Submittals:

1. Submit signed and sealed Shop Drawings with design calculations and assumptions for load-carrying capacity of trapeze, multiple-pipe, and riser support hangers.
2. Submit sizing methods and calculations sealed by a registered professional engineer (P.E.).
3. Firestopping Engineering Judgments: For conditions not covered by UL or WH- ETL listed designs, submit judgments by licensed P.E. suitable for presentation to authority having jurisdiction for acceptance as meeting fire protection code requirements.

G. Manufacturer Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.
2. Firestopping: Submit preparation and installation instructions.

H. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

I. Qualifications Statements:

1. Submit qualifications for manufacturer, installer, and licensed professional.
2. Submit manufacturer's approval of installer.
3. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M.

1.06 QUALITY ASSURANCE

A. Through-Penetration Firestopping of Fire-Rated Assemblies:

1. Comply with UL 1479 or ASTM E814.
2. Positive Pressure Differential:
 - a. As required to achieve fire F-ratings and temperature T-ratings as indicated on Drawings, but not less than one hour.
 - b. Minimum 0.10-inch wg.
3. Wall Penetrations: Fire F-ratings as indicated on Drawings, but not less than one hour.
4. Floor and Roof Penetrations:
 - a. Fire F-ratings and temperature T-ratings as indicated on Drawings, but not less than one hour.
 - b. Floor Penetrations within Wall Cavities: T-rating not required.

B. Through-Penetration Firestopping of Non-fire-rated Floor and Roof Assemblies:

1. Materials: Resist free passage of flame and products of combustion.
2. Noncombustible Penetrating Items: Connecting maximum three stories.

3. Penetrating Items: Materials approved by authorities having jurisdiction for connecting maximum two stories.
- C. Fire-Resistive Joints in Fire-Rated Floor, Roof, and Wall Assemblies:
1. Comply with ASTM E1966 or UL 2079.
 2. As required to achieve fire-resistance rating as indicated on Drawings for assembly in which joint is installed.
- D. Fire-Resistive Joints between Floor Slabs and Exterior Walls:
1. Comply with ASTM E119.
 2. Positive Pressure Differential:
 - a. As required to achieve fire F-ratings and temperature T-ratings as indicated on Drawings for floor assembly.
 - b. Minimum 0.10-inch wg.
- E. Surface-Burning Characteristics:
1. Maximum 25/450 flame-spread/smoke-developed index.
 2. Testing: Comply with ASTM E84.
- F. Welding of Hanger and Support Attachments to Building Structure: Comply with AWS D1.1/D1.1M.
- G. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.
- C. Welders: AWS qualified within previous 12 months for employed weld types.
- D. Licensed Professional: P.E. experienced in design of specified Work and licensed at Project location.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 Product Material and Equipment Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:

1. Protect materials from moisture and dust by storing them in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.09 AMBIENT CONDITIONS

- A. Section 015200 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Minimum Conditions:
 1. Do not apply firestopping materials if temperature of substrate material and ambient air is below 60 degrees F.
 2. Maintain this minimum temperature before, during, and for minimum three days after installation of firestopping materials.
- C. Provide ventilation in areas to receive solvent cured materials.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 1. Verify field measurements prior to fabrication.
 2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

- A. Section 017800 - Contract Closeout: Requirements for warranties.
- B. Furnish manufacturer's warranty for pipe hangers and supports minimum one-year.

PART 2 – PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Hydronic Piping:
 1. Comply with ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches:
 - a. Material: Malleable iron.
 - b. Type: Adjustable swivel and split ring.
 3. Hangers for Cold Pipe, Sizes 2 Inches and Larger:
 - a. Material: Carbon steel.
 - b. Type: Adjustable; clevis.

4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Multiple or Trapeze Hangers for Hot Pipe, Sizes 6 Inches and Larger:
 - a. Steel channels with welded spacers and hanger rods.
 - b. Roll: Cast iron
6. Wall Support for Pipe Sizes 3 Inches and Smaller: Cast-iron hooks.
7. Wall Support for Pipe Sizes 4 Inches and Larger: Welded steel bracket and wrought steel clamp.
8. Vertical Support: Steel riser clamp.
9. Floor Support for Cold Pipe:
 - a. Pipe Saddle: Cast iron; adjustable.
 - b. Support: Concrete pier or steel column.
 - c. Furnish lock nut, nipple, and floor flange.
10. Copper Pipe Support: Copper-plated carbon-steel ring.

B. Accessories:

1. Hanger Rods: Mild steel threaded both ends.

2.02 INSERTS

A. Description:

1. Malleable iron case with galvanized steel shell and expander plug for threaded connection.
2. Lateral adjustment, top slot for reinforcing rods, and lugs for attaching to forms.
3. Size: To suit threaded hanger rods.

2.03 FLASHING

A. Metal Flashing:

1. Material: Galvanized steel.
2. Thickness: 26 gauge.

B. Metal Counterflashing:

1. Material: Galvanized steel.
2. Thickness: 22 gauge.

C. Sheet Lead Flashing:

1. Waterproofing: 5 psf.
2. Soundproofing: 1 psf.

A. Flexible Flashing:

1. Material:
 - a. Sheet butyl.
 - b. Compatible with roofing.
2. Thickness: 47 mils.

B. Caps:

1. Material: Steel.
2. Minimum Thickness:
 - a. 22 gauge.
 - b. 16 gauge at fire-resistive elements.

2.04 SLEEVES

A. Pipes through Non-fire-rated Floors:

1. Material: Galvanized steel.
2. Thickness: 18 gauge.

B. Pipes through Non-fire-rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18-gauge galvanized steel.

C. Sealant:

- a. Material: Acrylic.

2.05 FORMED STEEL CHANNEL

A. Description:

1. Material: Galvanized 12-gauge steel.
2. Thickness: 12 gauge.
3. Hole Spacing: 1-1/2 inches O.C.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Section 017800 - Contract Closeout: Requirements for installation examination.
- B. Verify that openings are ready to receive sleeves.
- C. Verify that openings are ready to receive firestopping.

3.02 PREPARATION

- A. Section 017800 - Contract Closeout: Requirements for installation preparation.
- B. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that may affect bond of firestopping material.
- C. Remove incompatible materials that may affect bond.
- D. Install backing materials to arrest liquid material leakage.
- E. Obtain permission from Owner before using powder-actuated anchors.
- F. Do not drill or cut structural members.

3.03 INSTALLATION

A. Inserts:

1. Install inserts for placement in concrete forms.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
4. If concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. If inserts are omitted, drill through concrete slab from below and provide through bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

B. Pipe Hangers and Supports:

1. Comply with ASME B31.9.
2. Support horizontal piping as scheduled.
3. Minimum Hanger Spacing: 1/2 inch between finished covering and adjacent Work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Minimum Vertical Hanger Adjustment: 1-1/2 inches.
6. Support vertical piping at every floor.
7. If piping is installed in parallel and at same elevation, provide multiple-pipe or trapeze hangers.
8. Support riser piping independently of connected horizontal piping.

9. Provide copper-plated hangers and support for copper piping.
10. Design hangers for pipe movement without disengagement of supported pipe.
11. Painting and Coating:
 - a. Prime coat exposed steel hangers and supports.
 - b. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
12. Insulation:
 - a. Provide clearance in hangers and from structure and other equipment for installation of insulation.

C. Flashing:

1. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weatherproofed or waterproofed walls, floors, and roofs.

D. Sleeves:

1. Exterior Watertight Entries: Seal with mechanical sleeve seals.
2. Set sleeves in position in forms and provide reinforcing around sleeves.
3. Sizing:
 - a. Size sleeves to be large enough to allow for movement due to expansion and contraction.
 - b. Provide for continuous insulation wrapping.
4. Spaces:
 - a. If piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent Work with firestopping insulation and calk airtight.
 - b. Provide close-fitting metal collar or escutcheon covers at both sides of penetration.
 - c. Install stainless-steel escutcheons at finished surfaces.

E. Firestopping:

1. Install material at fire-rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, and other items requiring firestopping.
2. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
3. Apply firestopping material to uniform density and texture and in sufficient thickness to achieve required fire and smoke rating.
4. Placement: Compress fibered material to maximum 40 percent of its uncompressed size.
5. Dam Material: Remove after firestopping material has cured.

6. Fire-Rated Surfaces:

- a. Seal opening at floor, wall, and roof.
- b. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
- c. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
- d. Pack void with backing material.
- e. Seal ends of sleeve with UL-listed fire-resistive silicone compound to meet fire rating of structure being penetrated.

7. Nonrated Surfaces:

- a. Seal opening through non-fire-rated walls and roof openings.
- b. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.
- c. Size sleeve allowing minimum of 1 inch void between sleeve and building element.
- d. Install type of firestopping material as recommended by manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Section 017800 - Contract Closeout: Requirements for testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.05 CLEANING

- A. Section 017800 - Contract Closeout: Requirements for cleaning.
- B. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Section 017800 - Contract Closeout: Requirements for protecting finished Work.
- B. Protect adjacent surfaces from damage by material installation.

3.07 ATTACHMENTS

- A. Pipe Hanger Spacing:
 1. Pipe Material: Copper tube.
 - a. Size: 1-1/4 inches and smaller.
 - b. Maximum Hanger Spacing: 6 feet.
 - c. Hanger Rod Diameter: 1/2 inch.

2. Pipe Material: Copper tube
 - a. Size: 1-1/2 inches and larger.
 - b. Maximum Hanger Spacing: 10 feet.
 - c. Hanger Rod Diameter: 1/2 inch.
3. Pipe Material: Steel.
 - a. Size: 3 inches and smaller.
 - b. Maximum Hanger Spacing: 12 feet.
 - c. Hanger Rod Diameter: 1/2 inch.
4. Pipe Material: Steel.
 - a. Size: 4 inches and larger.
 - b. Maximum Hanger Spacing: 12 feet.
 - c. Hanger Rod Diameter: 5/8 inch.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 230548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Vibration isolators.

B. Related Requirements:

1. Section 230529 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports.
2. Section 230593 - Testing, Adjusting, and Balancing for HVAC: Requirements for sound and vibration measurements performed independent of this Section.
3. Section 233100 - HVAC Ducts and Casings: Vibration isolation devices for ducts and casings.
4. Section 233300 - Air Duct Accessories: Product requirements for both solid and flexible duct connectors for duct sound attenuators specified for placement by this Section.

1.02 REFERENCE STANDARDS

A. Air Movement and Control Association International, Inc.:

1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

B. Air-Conditioning, Heating, and Refrigeration Institute:

1. AHRI 575 - Method of Measuring Machinery Sound within an Equipment Space.

C. American National Standards Institute:

1. ANSI S1.4 - Specification for Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S1.13 - Measurement of Sound Pressure Levels in Air.
4. ANSI S12.60 - Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools.

D. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 68 - Laboratory Method of Testing to Determine the Sound Power in a Duct.
2. ASHRAE Handbook - HVAC Applications.

E. ASTM International:

1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2. ASTM E477 - Standard Test Method for Laboratory Measurements of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
3. ASTM E596 - Standard Test Method for Laboratory Measurement of Noise Reduction of Sound-Isolating Enclosures.

C. Sheet Metal and Air Conditioning Contractors' National Association:

1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.03 PREINSTALLATION MEETINGS

- A. Section 013119 - Project Meetings: Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.04 SUBMITTALS

- A. Section 013323 - Shop Drawings: Requirements for submittals.
- B. Product Data:
 1. Submit schedule of vibration isolator type with location and load on each.
 2. Submit manufacturer catalog information indicating materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.
- C. Shop Drawings:
 1. Indicate static and dynamic load of both inertia bases and vibration isolators.
 2. Indicate assembly, materials, thickness, dimensional data, pressure losses, acoustical performance, layout, and connection details for fabricated sound attenuation products.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions:
 1. Submit special procedures and setting dimensions.
 2. Indicate installation requirements maintaining integrity of sound isolation.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Manufacturer Reports: Certify that sound isolation installation is complete and complies with instructions.
- H. Qualifications Statements:
 1. Submit qualifications for manufacturer, installer, and licensed professional.
 2. Submit manufacturer's approval of installer.

1.05 CLOSEOUT SUBMITTALS

- A. Section 017800 - Contract Closeout: Requirements for submittals.

1.06 QUALITY ASSURANCE

- A. Perform Work according to AMCA 300 standards and ASHRAE 68 recommendations

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.
- C. Licensed Professional: Professional engineer experienced in design of specified Work and licensed at Project location.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 Product Material and Equipment Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing them in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.09 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Section 017800 Contract Closeout 017800 - Contract Closeout: Requirements for warranties.
- B. Furnish manufacturer's warranty for inertia bases, minimum one-year.

PART 2 – PRODUCTS

2.01 PERFORMANCE AND DESIGN CRITERIA

- A. Provide vibration isolation devices on motor-driven equipment over 0.5 hp, plus connected piping and ductwork.
- B. Minimum Static Deflection of Isolators:
 - 1. Under 20 hp.
 - a. 400 to 600 rpm: 1.0 inch
 - b. 600 to 800 rpm: 0.5 inch
 - c. 800 to 900 rpm: 0.2 inch
 - d. 1,100 to 1,500 rpm: 0.15 inch
 - e. Over 1,500 rpm: 0.1 inch
 - 2. Over 20 hp.
 - a. 400 to 600 rpm: 2.0 inches
 - b. 600 to 800 rpm: 1.0 inch
 - c. 800 to 900 rpm: 0.5 inch
 - d. 1,100 to 1,500 rpm: 0.2 inch
 - e. Over 1,500 rpm: 0.15 inch
- C. Consider upper floor locations critical unless otherwise indicated.

2.02 VIBRATION ISOLATORS

- A. Open Spring Isolators:
 - 1. Spring Isolators:
 - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 - 2. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 - 3. Spring Mounts: Furnish leveling devices, minimum 0.25-inchthick neoprene sound pads, and zinc chromate-plated hardware.
 - 4. Sound Pads:
 - a. Size: Based on minimum deflection of 0.05 inch.

- b. As specified for neoprene pad isolators.
- B. Restrained Spring Isolators:
 - 1. Spring Isolators:
 - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 - 2. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 - 3. Spring Mounts: Furnish leveling devices, minimum 0.25-inchthick neoprene sound pads, and zinc chromate-plated hardware.
 - 4. Sound Pads:
 - a. Size: Based on minimum deflection of 0.05 inch.
 - b. As specified for neoprene pad isolators.
- B. Restrained Spring Isolators:
 - 1. Spring Isolators:
 - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 - 2. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 - 3. Spring Mounts: Furnish leveling devices, minimum 0.25-inchthick neoprene sound pads, and zinc chromate-plated hardware.
 - 4. Sound Pads:
 - a. Size: Based on minimum deflection of 0.05 inch.
 - 5. As specified for neoprene pad isolators.
 - 6. Restraints: Furnish mounting frame and limit stops.
- C. Closed Spring Isolators:
 - 1. Spring Isolators:

- a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 2. Type: Closed spring mount with top and bottom housing separated by neoprene rubber stabilizers.
 3. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators and neoprene side stabilizers with minimum clearance of 0.25 inch.
- D. Restrained Closed Spring Isolators:
1. Spring Isolators:
 - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 2. Type: Closed spring mount with top and bottom housing separated by neoprene rubber stabilizers.
 3. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 4. Housings: Incorporate neoprene isolation pad meeting requirements for neoprene pad isolators and neoprene side stabilizers with minimum clearance of 0.25 inch and limit stops.
- E. Spring Hangers:
1. Spring Isolators:
 - a. Exterior and Humid Areas: Furnish hot-dip galvanized housings and neoprene-coated springs.
 - b. Code: Color-code springs based on load carrying capacity.
 2. Springs:
 - a. Minimum Horizontal Stiffness: 75 percent of vertical stiffness.
 - b. Working Deflection: Between 30 and 60 percent of maximum deflection.
 3. Housings: Incorporate neoprene isolation pad as specified for neoprene pad isolators.
 4. Misalignment: Capable of 20-degree hanger rod misalignment.
- F. Neoprene Pad Isolators:

1. Rubber or neoprene-waffle pads.
 - a. Hardness: 30 durometers.
 - b. Minimum Thickness: 1/2 inch.
 - c. Maximum Loading: 40 psi.
 - d. Rib Height: Not greater than 0.7 times width.
1. Configuration: Single layer.
- D. Rubber Mount or Hanger:
 1. Material: Molded rubber.
 2. Deflection: 0.5 inches.
 3. Insert: Threaded.
- E. Glass-Fiber Pads: Neoprene-jacketed, pre-compressed, molded glass fiber.
- F. Seismic Snubbers:
 1. Description: Non-directional and double-acting unit consisting of interlocking steel members restrained by neoprene elements.
 2. Neoprene Elements:
 - a. Replaceable.
 - b. Minimum Thickness: 0.75 inch.
 3. Capacity: Four times assigned load to mount groupings at 0.4-inch deflection.
 4. Attachment Points and Fasteners: Capable of withstanding three times rated load capacity of seismic snubber.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Section 017800 - Contract Closeout: Requirements for installation examination.
- B. Verify that equipment, ductwork, and piping are installed before starting Work of this Section.

3.02 PREPARATION

- A. Section 017800 Contract Closeout: 017800 - Contract Closeout. Requirements for installation preparation.
- B. Existing Work:
 1. Provide access to existing piping and ductwork and other installations remaining active and requiring access.

1. Extend existing piping and ductwork installations using materials and methods compatible with existing electrical installations.

3.03 INSTALLATION

- A. Attach ductwork to acoustic louvers with flexible duct connections as specified in Section 233300 - Air Duct Accessories.
- B. Install isolation for motor-driven equipment.
- C. Bases:
 1. Steel: Provide 1 inch of clearance between housekeeping pad and base.
 2. Concrete Inertia: Provide 2 inches of clearance between housekeeping pad and base.
- D. Make equipment level.
- E. Install spring hangers without binding.
- F. Isolators:
 1. Closed Spring Isolators: Adjust such that side stabilizers are clear under normal operating conditions.
 2. Prior to making piping connections to equipment with operating weights substantially different from installed weights, block up equipment with temporary shims to final height; when full load is applied, adjust isolators to load to allow shim removal.
- G. Snubbers:
 1. Provide resiliently mounted equipment, piping, and ductwork with seismic snubbers.
 2. Provide each inertia base with minimum of four seismic snubbers located close to isolators.
 3. Equipment Designated for Post-Disaster: Snub to 0.05-inch maximum clearance.
 4. Other Snubbers: Provide clearance between 0.15 and 0.25 inch.
- H. Support piping connections to isolated equipment resiliently for scheduled distance.
- I. Support piping connections to isolated equipment resiliently to nearest flexible pipe connector.

3.04 FIELD QUALITY CONTROL

- A. Section 017800 - Contract Closeout: Requirements for testing, adjusting, and balancing.
- B. Inspect isolated equipment after installation and submit report, including static deflections.
- C. Sound Measurements: As specified in Section 230593 - Testing, Adjusting, and Balancing for HVAC.
- D. Testing Agency:
 1. Furnish services of testing agency to take noise measurement.

2. Use meters according to ANSI S1.4.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Nameplates.
2. Tags.
3. Stencils.
4. Pipe markers.
5. Labels.

1.02 REFERENCES

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.03 SUBMITTALS

- A. Section 013323 – Shop Drawings: Submittal procedures.
- B. Product Data: Submit manufacturers catalog literature for each product required.
- C. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Samples: Submit two tags, labels, pipe markers, size used on project.
- E. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 Contract Closeout: Closeout procedures.
- B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.05 QUALITY ASSURANCE

- A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.
- B. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.07 PRE-INSTALLATION MEETINGS

- A. Section 013119 Project Meetings: Pre-installation meeting.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 EXTRA MATERIALS

- A. Section 017800 Contract Closeout: Spare parts and maintenance products.
- B. Furnish two containers of spray-on adhesive .

PART 2 – PRODUCTS

2.01 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.02 TAGS

- A. Plastic Tags
 - 1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter or square
- B. Information Tags
 - 1. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3- 1/4 x 5-5/8 inches with grommet and self-locking nylon ties.
- C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.03 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2-inch-high letters.
 - 2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch-high letters.
 - 3. Over 6 inches Outside Diameter of Insulation or Pipe: 1-3/4 inches high letters.
 - 4. Ductwork and Equipment: 1-3/4 inches high letters.
- B. Stencil Paint: Semi-gloss enamel, colors and lettering size conforming to ASME A13.1.

C. Color and Lettering: Conform to ASME A13.1.

2.04 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Plastic Pipe Markers

1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers

1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.05 LABELS

A. Description: Aluminum, size 1.9 x 0.75 inches, adhesive backed with printed identification.

PART 3 – EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.

C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.

D. Install tags using corrosion resistant chain. Number tags consecutively by location.

E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags.

F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify valves in main and branch piping with tags.

H. Identify air terminal units and radiator valves with numbered tags.

I. Tag automatic controls, instruments, and relays. Key to control schematic.

J. Identify piping, concealed or exposed, with stenciled painting. Use tags on piping 3/4-inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

K. Identify ductwork with stenciled painting. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Testing adjusting and balancing of air systems.
2. Testing adjusting and balancing of hydronic systems.
3. Measurement of final operating condition of HVAC systems.

B. Related Sections:

1. Section 230800 – Commissioning of HVAC: Requirements for coordination between Commissioning and testing, adjusting, and balancing work.

1.02 REFERENCES

A. Associated Air Balance Council:

1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems.

C. Natural Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

A. Testing Adjusting and Balancing Bureau:

1. TABB - International Standards for Environmental Systems Balance.

1.03 SUBMITTALS

A. Section 013323 – Shop Drawings: Submittal procedures.

B. Prior to commencing Work, submit proof of latest calibration date of each instrument.

C. Test Reports: Indicate data on NEBB Report forms or TABB Report Forms

D. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

- E. Prior to commencing Work, submit report forms or outlines indicating adjusting, balancing, and equipment data required. Include detailed procedures, agenda, sample report forms and Copy of NEBB Certificate of Conformance Certification or TABB International Quality Assurance program guarantee.
- F. Submit draft electronic copies of report for review prior to final acceptance of Project.
- G. Furnish Final reports in letter size, 3-ring binder manuals, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets and indicating thermostat locations.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 Contract Closeout: Closeout procedures.
- B. Project Record Documents: Record actual locations of balancing valves and settings.
- C. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems and TABB International Quality Assurance program.
- B. Maintain one copy of each document on site.
- C. Prior to commencing Work, calibrate each instrument to be used.

1.06 QUALIFICATIONS

- A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years documented experience certified by NEBB or TABB.

1.07 PRE-INSTALLATION MEETINGS

- A. Section 013119 - Project Meetings: Pre-installation meeting.

1.08 SEQUENCING

- A. Sequence balancing between completion of systems tested and Date of Substantial Completion.

1.09 SCHEDULING

- 1. Section 013216 - Project Schedule: Coordination and project conditions.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify systems are complete and operable before commencing work. Verify the following:
 - 1. Systems are started and operating in safe and normal condition.

2. HVAC control systems are installed completely and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed, and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place or in normal position.
15. Service and balancing valves are open.

3.02 PREPARATION

- A. Furnish instruments required for testing, adjusting, and balancing operations.
- B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.03 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus **10** percent of design.
- B. Air Outlets and Inlets: Adjust total to within plus **10** percent and minus **5** percent of design to space. Adjust outlets and inlets in space to within plus or minus **10** percent of design.
- C. Hydronic Systems: Adjust to within plus or minus **10** percent of design.

3.04 ADJUSTING

- A. Verify recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.
- D. Report defects and deficiencies noted during performance of services, preventing system balance.

- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.
- G. Check and adjust systems approximately six months after final acceptance and submit report.

3.05 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities.
- B. Make air flow rate measurements in main ducts by Pitot tube traverse of entire cross-sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain:
 - 1. Space temperatures are within 2 degrees F.
 - 2. Minimal objectionable drafts.
- B. Use volume control devices to regulate air quantities only to extent adjustments do not create objectionable air motion or sound levels. Effect volume control by using volume dampers located in ducts.
- C. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.
- D. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- E. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50 percent loading of filters.
- F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- G. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- H. At modulating damper locations, take measurements and balance at extreme conditions.
- I. Check multi-zone units for motorized damper leakage. Adjust air quantities with mixing dampers set first for cooling, then heating, then modulating.
- J. For variable air volume system powered units set volume controller to airflow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable-air-volume temperature control.
- K. On fan powered VAV boxes, adjust airflow switches for proper operation.

3.06 WATER SYSTEM PROCEDURE

- A. Adjust water systems, after air balancing, to obtain design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow-metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in system.
- C. Confirm air bleeds indicate system is full of water.
- D. Adjust systems to obtain specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- E. Perform system balance with automatic control valves fully open triple duty valves fully open and pump VFDs at 100 percent speed.
- F. Confirm pump rotation and differential pressure at full flow.
- G. Perform adjustment of water distribution systems by the following measures:
 - 1. Reduce total system flow rate first by reducing speed of VFD.
 - 2. Use balancing cocks, valves, and fittings.
- H. Do not use service or shut-off valves for balancing unless designed for balancing and shut-off functions. Where available pump capacity is less than total flow requirements or individual system parts, simulate full flow in one part by temporary restriction of flow to other parts.

3.07 SCHEDULES

- A. Complete list of Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. HVAC Pumps.
 - 2. Water-Cooled Centrifugal Water Chillers.
 - 3. Fan Coil Units.
 - 4. Fans.
- B. Report Forms
 - 1. Title Page:
 - a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
 - d. Project name
 - e. Project location

- f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
2. Summary Comments:
- a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate building pressurization.
 - e. Nomenclature used throughout report
 - f. Test conditions
3. Instrument List:
- a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range.
 - f. Calibration date
4. Electric Motors:
- a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP and kW
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements

- h. Sheave Make/Size/Bore
5. V-Belt Drive:
- a. Identification/location
 - b. Required driven RPM
 - c. Driven sheave, diameter and RPM
 - d. Belt, size and quantity
 - e. Motor sheave diameter and RPM
 - f. Center to center distance, maximum, minimum, and actual
6. Pump Data:
- a. Identification/number
 - b. Manufacturer
 - c. Size/model
 - d. Impeller
 - e. Service
 - f. Design flow rate, pressure drop, BHP and kW
 - g. Actual flow rate, pressure drop, BHP and kW
 - h. Discharge pressure
 - i. Suction pressure
 - j. Total operating head pressure.
 - k. Shut off, discharge and suction pressures
 - l. Shut off, total head pressure
7. Chillers:
- a. Identification/number
 - b. Manufacturer
 - c. Capacity
 - d. Model number
 - e. Serial number

- f. Evaporator entering water temperature, design and actual
 - g. Evaporator leaving water temperature, design and actual
 - h. Evaporator pressure drop, design and actual
 - i. Evaporator water flow rate, design and actual
 - j. Condenser entering water temperature, design and actual
 - k. Condenser pressure drop, design and actual
 - l. Condenser water flow rate, design and actual
8. Fan Coil Data:
- a. Manufacturer
 - b. Identification/number
 - c. Location
 - d. Model number
 - e. Size
 - f. Air flow, design and actual
 - g. Water flow, design and actual
 - h. Water pressure drop, design and actual
 - i. Entering water temperature, design and actual
 - j. Leaving water temperature, design and actual
 - k. Entering air temperature, design and actual
 - l. Leaving air temperature, design and actual
9. Exhaust Fan Data:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure

- h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM
10. Duct Traverse:
- a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor

END OF SECTION

SECTION 23 07 00

HVAC INSULATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. HVAC piping insulation, jackets and accessories.
2. HVAC equipment insulation, jackets and accessories.
3. HVAC ductwork insulation, jackets, and accessories.

1.02 REFERENCES

A. ASTM International:

1. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
5. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
6. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
7. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
8. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
9. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
10. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
11. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
12. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
13. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

14. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
15. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
16. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
17. ASTM C1071 - Standard Specification for Thermal and Acoustical Insulation (Glass Fiber, Duct Lining Material).
18. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
19. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
20. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
21. ASTM D4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane.
22. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
23. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

B. Sheet Metal and Air Conditioning Contractors National Association:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

C. Underwriters Laboratories Inc.:

2. UL 1978 - Standard for Safety for Grease Ducts.

1.03 SUBMITTALS

- A. Section 013323 – Shop Drawings: Submittal procedures.
- B. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.
- C. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index of not exceeding 50 in accordance with ASTM E84.
- B. Pipe insulation shall be manufactured in accordance with ASTM C585 for inner and outer diameters.
- C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

- D. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.
- E. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Applicator: Company specializing in performing Work of this section **with minimum three years documented experience**.

1.06 PRE-INSTALLATION MEETINGS

- A. Section 013119 - Project Meetings: Pre-installation meeting.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 Product Material and Equipment Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 Product Material and Equipment Requirements: Environmental conditions affecting products on site.
- B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.
- C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 017800 Contract Closeout: Product warranties and product bonds.
- B. Furnish **five-year** manufacturer warranty for manmade fiber.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. Glass Fiber and Mineral Fiber Insulation

- B. Manufacturers:

1. Johns Manville.
2. Substitutions: Section 016000 - Product Requirements & 016200 – Substitutions.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.

C. Closed Cell Elastomeric Insulation

D. Manufacturers:

1. Johns Manville.
2. Substitutions: Section 016000 - Product Requirements & 016200 – Substitutions.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision in this regard shall be final.

2.02 PIPE INSULATION

A. TYPE P-1: ASTM C547, molded glass fiber pipe insulation.

1. Thermal Conductivity: 0.23 at 75 degrees F.
2. Operating Temperature Range: 0 to 850 degrees F.
3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
4. Jacket Temperature Limit: minus 20 to 150 degrees F.

B. TYPE P-5: ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.

1. Thermal Conductivity: 0.27 at 75 degrees F.
2. Operating Temperature Range: Range: Minus 70 to 180 degrees F.

2.03 PIPE INSULATION JACKETS

A. Aluminum Pipe Jacket:

1. ASTM B209.
2. Thickness: 0.016-inch-thick sheet.
3. Finish: Smooth.
4. Joining: Longitudinal slip joints and 2-inch laps.
5. Fittings: 0.016-inch-thick die shaped fitting covers with factory attached protective liner.
6. Metal Jacket Bands: 1/2 inch wide; 0.015-inch-thick aluminum.

2.04 PIPE INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.
- D. Piping 2 inches diameter and larger: Wood insulation saddle, hard maple. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.
- E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum jacket single piece construction with self-adhesive closure. Thickness to match pipe insulation.
- F. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- G. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.
- H. Insulating Cement: ASTM C195; hydraulic setting on mineral wool.
- I. Adhesives: Compatible with insulation.

2.05 EQUIPMENT INSULATION

- A. TYPE E-8: ASTM C534, Type II, flexible, closed cell elastomeric insulation, sheet.
 - 1. Thermal Conductivity: 0.27 at 75 degrees F.
 - 2. Operating Temperature Range: Range: Minus 70 to 220 degrees F.

2.06 EQUIPMENT INSULATION JACKETS

- A. Aluminum Equipment Jacket:
 - 1. ASTM B209.
 - 2. Thickness: 0.016
 - 3. Finish: Smooth.
 - 4. Joining: Longitudinal slip joints and 2 inch laps.
 - 5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.07 EQUIPMENT INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

- D. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.
- E. Adhesives: Compatible with insulation.

2.08 DUCTWORK INSULATION

- A. TYPE D-1: ASTM C1290, Type III, flexible glass fiber, commercial grade with factory applied reinforced aluminum foil jacket meeting ASTM C1136, Type II.
 - 1. Thermal Conductivity: 0.27 at 75 degrees F.
 - 2. Maximum Operating Temperature: 250 degrees F.
 - 3. Density: 1.0 pound per cubic foot.
- B. TYPE D-2: ASTM C612, Type IA or IB, rigid glass fiber, with factory applied all service facing meeting ASTM C1136, Type II.
 - 1. Thermal Conductivity: 0.24 at 75 degrees F
 - 2. Density: 3 pounds per cubic foot

2.09 DUCTWORK INSULATION JACKETS

- A. Aluminum Duct Jacket:
 - 1. ASTM B209.
 - 2. Thickness: 0.016
 - 3. Finish: Smooth.
 - 4. Joining: Longitudinal slip joints and 2 inch laps.
 - 5. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.10 DUCTWORK INSULATION ACCESSORIES

- A. Vapor Retarder Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.
- B. Vapor Retarder Lap Adhesive: Compatible with insulation.
- C. Adhesive: Waterproof type.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- F. Impale Anchors: Galvanized steel, 12 gauge self-adhesive pad.

- G. Adhesives: Compatible with insulation.
- H. Membrane Adhesives: As recommended by membrane manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify piping, equipment and ductwork has been tested before applying insulation materials.
- B. Verify surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION - PIPING SYSTEMS

- A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
- B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.
- C. Piping Systems Conveying Fluids Below Ambient Temperature:
 - 1. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
 - 2. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
 - 3. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor retarder adhesive or PVC fitting covers.
- D. Glass Fiber Board Insulation:
 - 1. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
 - 2. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.
 - 3. Cover wire mesh or bands with cement to a thickness to remove surface irregularities.
- E. Inserts and Shields:
 - 1. Piping 1-1/2 inches Diameter and Smaller: Install galvanized steel shield between pipe hanger and insulation.
 - 2. Piping 2 inches Diameter and Larger: Install insert between support shield and piping and under finish jacket.
 - a. Insert Configuration: Minimum 6 inches long, of thickness and contour matching adjoining insulation; may be factory fabricated.
 - b. Insert Material: Compression resistant insulating material suitable for planned temperature range and service.

3. Piping Supported by Roller Type Pipe Hangers: Install galvanized steel shield between roller and inserts.

F. Insulation Terminating Points:

1. Coil Branch Piping 1 inch and Smaller: Terminate hot water piping at union upstream of the coil control valve.
2. Chilled Water Coil Branch Piping: Insulate chilled water piping and associated components up to coil connection.
3. Condensate Piping: Insulate entire piping system and components to prevent condensation.

G. Closed Cell Elastomeric Insulation:

1. Push insulation onto pipe.
2. Miter joints at elbows.
3. Seal seams and butt joints with manufacturer's recommended adhesive.
4. When application requires multiple layers, apply with joints staggered.
5. Insulate fittings and valves with insulation of like material and thickness as adjacent pipe.

H. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with aluminum jacket.

3.03 INSTALLATION - EQUIPMENT

A. Factory Insulated Equipment: Do not insulate.

B. Exposed Equipment: Locate insulation and cover seams in least visible locations.

C. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor retarder cement.

D. Equipment Containing Fluids Below Ambient Temperature:

1. Insulate entire equipment surfaces.
2. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
3. Furnish factory-applied or field-applied vapor retarder jackets. Secure factory applied jackets with pressure sensitive adhesive self-sealing longitudinal laps and butt strips. Secure field-applied jackets with outward clinch expanding staples and seal staple penetrations with vapor retarder mastic.
4. Finish insulation at supports, protrusions, and interruptions.

E. Equipment Containing Fluids 140 degrees F or Less:

1. Do not insulate flanges and unions, but bevel and seal ends of insulation.
2. Install insulation with factory-applied or field applied jackets, with or without vapor barrier. Finish with glass cloth and adhesive.

3. Finish insulation at supports, protrusions, and interruptions.
- F. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with aluminum jacket.
- G. Cover glass fiber, cellular glass, and cellular foam insulation with aluminum jacket.
- H. Nameplates and ASME Stamps: Bevel and seal insulation around; do not cover with insulation.
- I. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation for easy removal and replacement without damage.

3.04 INSTALLATION - DUCTWORK SYSTEMS

- A. Duct dimensions indicated on Drawings are finished inside dimensions.
- B. Insulated ductwork conveying air below ambient temperature:
 1. Provide insulation with vapor retarder jackets.
 2. Finish with tape and vapor retarder jacket.
 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- C. Insulated ductwork conveying air above ambient temperature:
 1. Provide with or without standard vapor retarder jacket.
 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- D. Ductwork Exposed in Mechanical Equipment Rooms or Finished: Finish with aluminum jacket.
- E. External Glass Fiber Duct Insulation:
 1. Secure insulation with vapor retarder with wires and seal jacket joints with vapor retarder adhesive or tape to match jacket.
 2. Secure insulation without vapor retarder with staples, tape, or wires.
 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 4. Seal vapor retarder penetrations by mechanical fasteners with vapor retarder adhesive.
 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- F. External Elastomeric Duct Insulation:
 1. Adhere to clean oil-free surfaces with full coverage of adhesive.
 2. Seal seams and butt joints with manufacturer's recommended adhesive.
 3. When application requires multiple layers, apply with joints staggered.

4. Insulate standing metal duct seams with insulation of like material and thickness as adjacent duct surface. Apply adhesive at joints with flat duct surfaces.
5. Lift ductwork off trapeze hangers and insert spacers.

3.05 SCHEDULES

A. Cooling Services Piping Insulation Schedule:

1. Chilled Water Supply and Return, 40 to 60 Degrees F:
 - a. Type: P-1
 - b. Thickness:
 - i. Pipe Size 1-1/2 Inches and Larger: 1.0 inch
 - c. Provide Aluminum Jacket
2. Condensate Piping from Cooling Coils:
 - a. Type: P-5
 - b. Thickness: 0.5 inch

B. Equipment Insulation Schedule:

1. Chilled Water Pump Bodies:
 - a. Type: E-8
 - b. Thickness: 0.5 inch
2. Chilled Water Air Separators
 - a. Type: E-8
 - b. Thickness: 0.5 inch
3. Chilled Water Expansion Tanks:
 - a. Type: E-8
 - b. Thickness: 0.5 inch
4. Chiller Cold Surfaces Not Factory Insulated:
 - a. Type: E-8
 - b. Thickness: 0.5 inch

C. Ductwork Insulation Schedule:

1. Outside Air Intake:

- a. Type: D-2
- b. Thickness: 1.5 inches
- 2. Equipment Casings:
 - a. Type: D-2.
 - b. Thickness: 1.0 inch
- 3. Supply Ducts - Externally Insulated, Installed Thickness:
 - a. Type: D-1
 - b. Thickness: 1.0 inch
- 4. Return Ducts - Externally Insulated, Installed Thickness:
 - a. Type: D-1
 - b. Thickness: 1.0 inch
- 5. Exhaust Ducts Within 10 feet of Exterior Openings, Installed Thickness:
 - a. Type: D-1
 - b. Thickness: 1.0 inch
- 6. Exhaust Ducts Exposed to Outdoor Air:
 - a. Type: D-2.
 - b. Thickness: 2.0 inches

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 08 00
COMMISSIONING OF HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. HVAC commissioning description.
2. HVAC commissioning responsibilities.

B. Related Sections:

1. Section 230593 - Testing, Adjusting, and Balancing for HVAC: For requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.
2. Section 230900 - Instrumentation and Control for HVAC: Submittal and training requirements.
3. Section 233300 - Air Duct Accessories: Product requirements for ductwork test holes.

1.02 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Guideline 1 - The HVAC Commissioning Process.

B. Building Commissioning Association:

1. BCA - Commissioning Handbook.

C. National Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Building Systems Commissioning.

D. Testing Adjusting and Balancing Bureau:

1. TABB - Commissioning Manual.

1.03 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:

1. Testing and startup of HVAC equipment and systems.
2. Equipment and system verification checks.
3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.

5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
8. Provide assistance to the Commissioning Authority to develop, edit, and document system operation descriptions.
9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. New HVAC systems that were installed under this Contract.
2. Existing HVAC systems that were modified, adjusted, upgraded, or affected by the work performed under this Contract.

C. The following is a partial list of equipment that may be included in this HVAC Commissioning:

1. Chillers.
2. Pumps.
3. Piping systems.
4. Ductwork.
5. Variable frequency drives.
6. Fan Coil Units.
7. Fans.
8. Chemical treatment systems.
9. Automatic HVAC control system.
10. Testing, Adjusting and Balancing work.

D. Perform seasonal function performance tests for the following equipment and systems:

1. Cooling equipment during cooling season.

1.04 COMMISSIONING SUBMITTALS

- A. Draft Forms: Submit draft of system verification form and functional performance test checklist.
- B. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified. Use AABC forms as guidelines.
- C. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.05 CLOSEOUT SUBMITTALS

- A. Section 017800 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.
- C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals, when necessary, revisions are discovered during commissioning.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ASHRAE Guideline 1, NEBB, and TABB requirements.
- B. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards

1.07 COMMISSIONING RESPONSIBILITIES

- A. Equipment or System Installer Commissioning Responsibilities:
 - 1. Attend commissioning meetings.
 - 2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
 - 3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
 - 4. Provide instructions and demonstrations for Owner's personnel.
 - 5. Ensure subcontractors perform assigned commissioning responsibilities.
 - 6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
 - 7. Develop startup and initial checkout plan using manufacturer startup procedures and functional performance checklists for equipment and systems to be commissioned.
 - 8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.
 - 9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
 - 10. Provide manufacturer representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
 - 11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
 - 12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.

13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.
 14. Prior to startup, inspect, check, verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.
 15. Provide factory supervised startup services for equipment and systems. Coordinate work with manufacturer and Commissioning Authority.
 16. Perform verification checks and startup on equipment and systems as specified.
 17. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
 18. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
 19. Conduct HVAC system orientation and inspection.
- B. Temperature Controls Installer Commissioning Responsibilities:
1. Attend commissioning meetings.
 2. Review design for ability of systems to be controlled including the following:
 - a. Confirm proper hardware requirements exists to perform functional performance testing.
 - b. Confirm proper safeties and interlocks are included in design.
 - c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.
 - d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.
 - e. Confirm sensors selected are within device ranges.
 - f. Review sequences of operation and obtain clarification from Engineer.
 - g. Indicate delineation of control between packaged controls and building automation system, listing BAS monitor points and BAS adjustable control points.
 - h. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.
 3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.
 4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.
 5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.

6. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements of Section 230900, and 230953.
7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.
8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.
9. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.
10. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:

1. Attend commissioning meetings.
2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes.
3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.08 COMMISSIONING MEETINGS

- A. Attend initial commissioning meeting and progress commissioning meetings as required Commissioning Authority.

1.09 SCHEDULING

- A. Prepare schedule indicating anticipated start dates for the following:

1. Piping system pressure testing.
2. Piping system flushing and cleaning.
3. Ductwork cleaning.
4. Equipment and system startups.
5. Automatic temperature control system checkout.
6. Testing, adjusting, and balancing.
7. HVAC system orientation and inspections.
8. Operation and maintenance manual submittals.
9. Training sessions.

- B. Schedule seasonal tests of equipment and systems during peak weather conditions to observe full-load performance.

- C. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy or use.

1.10 COORDINATION

- A. Coordinate programming of automatic temperature control system with construction and commissioning schedules.

PART 2 – PRODUCTS NOT USED

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required to meet performance requirements by commissioning plan.
- B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.
- C. Install replacement sheaves and belts to obtain system performance, as requested by Commissioning Authority.
- D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements.
- E. Prior to start of functional performance test, install replacement filters in equipment

3.02 FIELD TESTS AND INSPECTIONS

- A. Seasonal Sensitive Functional Performance Tests:
 - 1. Test cooling equipment at summer design temperatures.
- B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #5, Commissioning & Startup, in the Bid Form.

END OF SECTION

SECTION 23 09 00

INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Control panel enclosures.
2. Thermostats.
3. Alarm system.
4. Control air dampers.
5. Electric damper actuators.
6. Control valves.
7. Electric valve actuators.
8. Direct digital control system components.
9. Duct-mounted smoke detector.

B. Related Requirements:

1. Section 230513 - Common Motor Requirements for HVAC Equipment: Product requirements for electric motors.
2. Section 230553 - Identification for HVAC Piping and Equipment: Nameplates and labeling for control panels specified in this Section.
3. Section 232116 - Hydronic Piping Specialties: Product requirements for thermometer sockets and gauge taps for placement by this Section. Installation requirements for piping products are furnished in this Section.
4. Section 233300 - Air Duct Accessories: Product requirements for duct-mounted thermometers. Installation requirements for dampers and other duct-mounted products furnished in this Section.

1.02 REFERENCE STANDARDS

A. Air Movement and Control Association International, Inc.:

1. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality.

C. American Society of Mechanical Engineers:

1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

D. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM A536 - Standard Specification for Ductile Iron Castings.
3. ASTM B32 - Standard Specification for Solder Metal.
4. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
5. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.
6. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing.

E. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

F. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats.

G. National Fire Protection Association:

1. NFPA 72 - National Fire Alarm and Signaling Code.
2. NFPA 90A - Installation of Air-Conditioning and Ventilating Systems.

H. Underwriters Laboratories, Inc.:

1. UL 1820 - Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics.

1.03 COORDINATION

- A. Coordinate installation of control components in piping systems with work of Section 232116 - Hydronic Piping Specialties.
- B. Coordinate installation of control components in duct systems with work of Section 233300 - Air Duct Accessories.

1.04 SUBMITTALS

- A. Section 013323 – Shop drawings: Requirements for submittals.
- B. Product Data:
 1. Submit description and engineering data for each control system component, including sizing as applicable.

C. Shop Drawings:

1. Indicate operating data, system drawings, wiring diagrams, and written, detailed operational description of sequences.
2. Coordinate submittals with information requested in Section 230993 – Sequence of Operations for HVAC Controls.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Instructions: Submit installation requirements for each control component.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Qualifications Statements:

1. Submit qualifications for manufacturer and installer.
2. Submit manufacturer's approval of installer.

1.05 CLOSEOUT SUBMITTALS

A. Section 017800 - Execution and Closeout Requirements: Requirements for closeout procedures.

B. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors.

C. Operation and Maintenance Data: Submit inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017800 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.07 QUALITY ASSURANCE

A. Control Air Damper Performance: According to AMCA 500-D.

B. Perform Work according to Miami Dade County Department of Transportation and Public Works standards.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept controls on-Site in original factory packaging and inspect for damage.

C. Store materials according to manufacturer's instructions.

1.10 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

1.11 WARRANTY

- A. Section 017800 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five-year manufacturer's warranty for each control-system component.

PART 2 – PRODUCTS

2.01 CONTROL PANEL ENCLOSURES

- A. Furnish enclosure for each system under automatic control.
- B. Equipment Mounting:
1. Within Cabinet: Relays and controls.
 2. Flush on Cabinet Panel Face: Temperature indicators, pressure gauges, pilot lights, push buttons, and switches.
- C. Construction:
1. Comply with NEMA 250, Type 4.
 2. Material: Stainless steel.
- D. Covers:
1. Continuous hinge.
 2. Closure: Flush latch operable by screwdriver.
- E. Finish: Manufacturer's standard enamel.

2.02 THERMOSTATS

- A. Line Voltage Thermostats:
1. Selector Switch:
 - a. Integral.
 - b. Manual HAND-OFF-AUTO.
 - c. Two-pole.
 2. Dead Band: Maximum 2 degrees F.

3. Cover: Locking with set point indication,

B. Room Thermostat Accessories:

1. Thermostat Covers: Brushed aluminum.

2. Furnish insulating bases for thermostats located on exterior walls.

3. Thermostat Guards:

a. Material: Locking transparent plastic.

b. Mounting: On separate base from thermostat.

2.03 CONTROL AIR DAMPERS

A. Frames:

1. Materials: Galvanized steel welded or riveted with corner reinforcement.

2. Minimum Thickness: 16 gauge.

B. Blades:

1. Material: Galvanized steel.

2. Blade

a. Minimum Thickness: 16 gauge.

3. Attach to minimum 1/2-inch shafts with set screws.

C. Seals:

1. Blades:

a. Material: Synthetic elastomeric.

b. Mechanically attached.

c. Field replaceable.

2. Jambs: Stainless-steel spring.

D. Outside Air Damper Leakage: Maximum rate of 3 cfm per sq. ft. at 1-inch wg pressure differential.

2.04 ELECTRIC DAMPER ACTUATORS

A. Manufacturers:

1. Belimo

2. Substitutions: Section 016000 - Product Requirements & 016200 – Substitutions.

3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.

B. Operation: Reversing type, proportional motor.

C. Enclosure: Comply with NEMA 250, Type 4.

D. Mounting: Direct.

E. Stroke:

1. Full Stroke: 90 seconds, end to end.

2. Spring Return: 15 seconds, return to normal.

F. Protection: Electronic stall.

G. Electrical Characteristics:

1. Control Input: Zero to 10 V dc.

H. Nominal Power: 120V ac.

I. Torque: Sized for minimum 150 percent of required duty.

J. Duty Cycle: Rated for 65,000 cycles.

K. Accessories:

1. Cover-mounted transformer.

2. Auxiliary potentiometer.

3. Damper linkage.

4. Direct-drive feedback potentiometer.

5. Output position feedback.

6. Field-selectable, rotational, spring return direction.

7. Field-adjustable zero and span.

8. End switch.

2.05 CONTROL VALVES

A. Globe Pattern:

1. Inches and Smaller:

a. Body and Trim: Bronze.

b. Stem: Rising.

- c. Disc: Renewable composition.
- d. End Connections: Screwed, with back seating capacity packable under pressure.
- 2. 2-1/2 Inches and Larger:
 - a. Body: Iron.
 - b. Trim: Bronze.
 - c. Stem: Rising.
 - d. Disc: Plug type; renewable.
 - e. Seats: Renewable.
 - f. End Connections: Flanged.
- 3. Hydronic Systems:
 - a. Service Pressure Rating: 125 psig at 250 degrees F.
 - b. Plugs and Seats: Replaceable; brass.
 - c. Sizing:
 - i. Valves: 3 psi maximum pressure drop at design flow rate.

B. Ball Valves:

- 1. Body: Forged brass.
- 2. Ball: Chrome-plated brass.
- 3. Stem: Blowout proof.
- 4. O-Rings:
 - a. Material: EPDM.
 - b. Minimum Pressure Rating: 600 psig.
- 5. Fluid Temperature Range: Minus 20 to 250 degrees F.
- 6. Flow Characteristics:
 - a. Two-Way Valves: Equal percentage.
 - b. Three-Way Valves: Equal percentage through control port and linear through bypass port.
- 7. End Connections:
 - a. Threaded for two-way valves 3 inches and smaller.
 - b. Threaded for three-way valves 2 inches and smaller.

2.06 ELECTRIC VALVE ACTUATORS

A. Manufacturers:

1. Belimo.
2. Substitutions: Section 016000 - Product Requirements & 016200 – Substitutions.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.

B. Motor:

1. Type: Permanent-split capacitor or shaded pole.
2. Gear Trains: Completely oil immersed and sealed.
3. Spring-Return Motors: Furnish integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, and feedback potentiometer.

C. Actuator:

1. Description: Nonhydraulic design for minimum 100,000 full-stroke cycles at rated torque.
2. Type: Direct coupled.
3. Rating: Not less than twice thrust needed for actual operation of valve.
4. Coupling: V bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Failsafe Operation: Mechanical, spring-return mechanism.
7. Non-Spring-Return Actuators: Furnish external, manual gear release.
8. Spring-Return Actuators: Furnish manual override, taking no more than 10 turns completely.
9. Electrical Characteristics:
 - a. Two-Position Spring Return: 120 V AC
 - b. Modulating: 24 V ac; maximum 15 VA.
 - c. Proportional Signal: 2 to 10 V dc or 4 to 20 mA dc.
 - d. Position Feedback Signal: 2 to 10 V dc.
10. Temperature Rating: Minus 22 to 140 degrees F.
11. Run Time: 200 seconds open and 40 seconds closed.

D. Sizing: Size for torque required for valve closing at maximum pump differential pressure, regardless of water loop system pressures.

2.07 DIRECT DIGITAL CONTROL SYSTEM COMPONENTS

A. Temperature Sensors:

1. Type: Resistance temperature detector.
2. Accuracy:
 - a. Plus, or minus 1 degree F.
 - b. Sensing Accuracy: Plus, or minus 0.5 degree F.
 - c. Minimum Display Accuracy and Resolution: Plus, or minus 1 degree F.
3. Communications Port: Built in.
4. Space Sensors:
 - a. Digital with LCD display, day-night override button, and set point slide adjustment override options.
 - b. Set Point Slide Adjustment: Capable of being software-limited by automation system, to limit amount of room adjustment.
5. Outside Air Sensors:
 - a. Inlet Fitting: Watertight.
 - b. Furnish with shield for protection from direct sunlight.
6. Duct Temperature Sensors:
 - a. Type: Rigid or averaging, as indicated in sequence of operations.
 - b. Averaging Sensor Minimum Length: 5 feet.
 - c. Duct Cross Sections Greater than 10 sq. ft.: Serpentine averaging element to sense stratified air temperatures.
7. Piping Temperature Sensors: Separable brass well.

B. Airflow Switches:

1. Description: UL listed; SPDT snap acting; pilot-duty rated at minimum 125 VA.
2. Type: Paddle or differential pressure, as indicated in sequences of operation.
3. Sensitivity: Adjustable.
4. Enclosure: Comply with NEMA 250, Type 1.

C. Refrigerant Detectors:

1. Description: Dual-level detectors, using solid-state sensors.
2. Alarm:

- a. Preset: 300 ppm.
- b. Indicator light.
- c. SILENCE switch and light.
- d. TEST switch and light.
- e. TROUBLE light.

3. Auxiliary Relay: Preset for 150 ppm.

2.08 DUCT-MOUNTED SMOKE DETECTOR

- A. Comply with NFPA 72.
- B. Type: Ionization.
- C. Furnish two-wire detector with common power supply and signal circuits.
- D. Accessories:
 1. Auxiliary SPDT relay contact.
 2. Key-operated NORMAL-RESET-TEST switch.
 3. Duct sampling tubes extending width of duct.
 4. Visual indicator for detector actuation.
 5. Duct-mounted housing.

2.09 OPERATION

- A. Motors: As specified in Section 230513 - Common Motor Requirements for HVAC Equipment.
- B. Disconnect Switch: Factory mounted in control panel.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Section 017800 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that pneumatic tubing is clear of water, oil, and other contaminants.
- C. Verify that compressed-air supply has operating filter and dryer before installing control devices or actuators.
- D. Verify that air-handling units and ductwork installation has been completed and that air filters are in place before installing sensors in airstreams.
- E. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings before installation.
- F. Verify that building systems to be controlled are ready to operate.

3.02 INSTALLATION

A. Tubing:

1. In mechanical rooms, install bundled plastic tubing with junction boxes or single plastic tubing within tray or raceway.
2. Install tubing exposed only in mechanical rooms.
3. Mechanically attach tubing to supporting surfaces.
4. Install minimum 1-inch tubing sleeves through concrete surfaces, extended 6 inches above floors and 1 inch below bottom surface of slabs.
5. Purge tubing with dry, oil-free compressed air before connecting control instruments.
6. Install instrument air tubing with check and hand valves to expansion tanks, using Schrader fittings and hose.
7. Install instrument air tubing with check and hand valves to chiller.
8. Copper Tubing:
 - a. Install copper tubing in mechanical rooms at following locations:
 - i. Where tubing may be subject to damage.
 - ii. Where tubing may be subject to ambient temperature exceeding 200 degrees F.
 - iii. Where tubing is to be installed adjacent to heating pipes passing through common sleeve.
 - iv. Where tubing may not be readily accessible.
 - b. Solder copper tubing joints, except at instruments and equipment.
 - c. Install compression fittings at instruments and equipment.

B. Thermostats Humidistats Space Temperature Sensors and Other Exposed Control Sensors:

1. Install after locations have been coordinated with other work.
2. Install 48 inches above floor.
3. Align with light switches.

C. Thermostats:

1. Install thermostats in aspirating boxes as indicated on Drawings.
2. Install guards on thermostats as indicated on Drawings.

D. Control Panels:

1. Install control panels adjacent to associated equipment on vibration-free walls or freestanding supports.

2. Use one cabinet for more than one system in same equipment room.
 3. Install engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face, as specified in Section 230553 - Identification for HVAC Piping and Equipment.
 4. Label with appropriate equipment or system designation as specified in Section 230553 - Identification for HVAC Piping and Equipment.
 5. Install HAND-OFF-AUTO switches to override automatic interlock controls when switch is in HAND position.
- E. Install conduit and electrical wiring as specified in Section 260503 - Equipment Wiring Connections.

3.03 FIELD QUALITY CONTROL

- A. After completion of installation, test and adjust control equipment.
- B. Submit data showing set points and final adjustments of controls.
- C. Test pneumatic systems to maximum system pressure of 30 psig.
- D. Calibration:
 1. Check calibration of instruments.
 2. Recalibrate instruments out of calibration.
 3. Replace defective instruments.
- E. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than 24 hours on-Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.
- F. Equipment Acceptance:
 1. Adjust, repair, modify, or replace components failing to perform as specified, and rerun tests.
 2. Make final adjustments to equipment under direction of manufacturer's representative.
- G. Furnish Installation Certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.04 DEMONSTRATION

- A. Section 017800 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate complete operation of systems, including sequence of operation, equipment startup, shutdown, routine maintenance, and emergency repair procedures, to Owner's personnel.

3.05 MAINTENANCE

- A. Section 017800 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Provide service and maintenance of control system for five years from date of Substantial Completion.

- C. Furnish complete service of controls systems, including callbacks.
- D. Inspections:
 - 1. Furnish four complete subsequent inspections per year to inspect, calibrate, and adjust controls.
 - 2. Submit written report after each inspection.
- E. Examine unit components monthly, and clean, adjust, and lubricate equipment.
- F. Provide systematic examination, adjustment, and lubrication of unit and controls checkout and adjustments.
- G. Repair or replace parts according to manufacturer's operating and maintenance data, using parts produced by manufacturer of original equipment.
- H. Perform Work without removing units from service during normal building occupied hours.
- I. Provide emergency callback service at all hours for this maintenance period.
- J. Replacement Parts:
 - 1. Maintain adequate stock of parts locally, for replacement or emergency purposes.
 - 2. Ensure personnel availability to fulfill parts service without unreasonable loss of time.
- K. Perform Work using personnel under supervision of manufacturer or original installer.
- L. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 21 13

HYDRONIC PIPING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Chilled water piping, above grade.
2. Condenser water piping, above ground.
3. Equipment drains and overflows.
4. Unions and flanges.
5. Pipe hangers and supports.

B. Related Sections:

1. Section 230523 - General-Duty Valves for HVAC Piping: Product requirements for valves for placement by this section.
2. Section 230529 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports, sleeves, for placement by this section.
3. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for Vibration Isolation for placement by this section.
4. Section 230553 - Identification for HVAC Piping and Equipment: Product requirements for pipe identification for placement by this section.
5. Section 230700 - HVAC Insulation: Product requirements for Piping Insulation for placement by this section.
6. Section 232116 - Hydronic Piping Specialties: Product and execution requirements for piping specialties used in heating and cooling piping systems.
7. Section 232123 - Hydronic Pumps: Product and execution requirements for pumps used in heating and cooling piping systems.
8. Section 232500 - HVAC Water Treatment: Product and execution requirements for cleaning and chemical treatment of heating and cooling piping systems.

1.02 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.4 - Gray Iron Threaded Fittings.
3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

4. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
5. ASME B31.1 - Power Piping.
6. ASME B31.9 - Building Services Piping.
7. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
3. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
4. ASTM A536 - Standard Specification for Ductile Iron Castings.
5. ASTM B32 - Standard Specification for Solder Metal.
6. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
7. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.
8. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
9. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
10. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDRPR) Based on Controlled Inside Diameter.
11. ASTM D2310 - Standard Classification for Machine-Made "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
12. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
13. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
14. ASTM D2467 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
15. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
16. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.
17. ASTM D2680 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

18. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
19. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
20. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
21. ASTM F437 - Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
22. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
23. ASTM F439 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
24. ASTM F441/F441M - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
25. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
26. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.
27. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
28. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot-and Cold-Water Distribution Systems.
29. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

C. American Welding Society:

1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association:

1. AWWA C105 - American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems.
2. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids.
3. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

2. MSS SP 67 - Butterfly Valves.
3. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
4. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
5. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
6. MSS SP 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
7. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
8. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
9. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
10. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.03 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
- B. Provide flanges, union, and couplings at locations requiring servicing. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- C. Provide pipe hangers and supports in accordance with ASME B31.9, MSS SP 58, and MSS SP 69
- D. Use ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Use globe or ball valves for throttling, bypass, or manual flow control services.
- F. Use spring loaded check valves on discharge of chilled water and condenser water pumps.
- G. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.
- H. Flexible Connectors: Use at or near pumps and motor driven equipment where piping configuration does not absorb vibration.

1.04 SUBMITTALS

- A. Section 013323 – Shop Drawings: Submittal procedures.
- B. Shop Drawings: Indicate schematic layout of each piping system, including equipment, critical dimensions, and sizes.
- C. Product Data:
 1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.

- 3. Hangers and Supports: Submit manufacturer's catalog information including load capacity.
- D. Design Data: Indicate pipe size. Indicate load carrying capacity of trapeze, multiple pipes, and riser support hangers.
- E. Test Reports: Indicate results of each piping system pressure test.
- F. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures and isolation.
- G. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- H. Welders' Certificate: Include welders' certification of compliance with ASME Section IX.

1.05 CLOSEOUT SUBMITTALS

- A. Section 017800 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of valves, equipment and accessories.
- C. Operation and Maintenance Data: Submit instructions for installation and changing components, spare parts lists, exploded assembly views.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.
- B. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.
- C. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Fabricator or Installer: Company specializing in performing Work of this section with minimum three years' documented experience.

1.08 PRE-INSTALLATION MEETINGS

- A. Section 013119 – Project Meetings: Pre-installation meeting.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Section 016000 - Product Requirements.

1.11 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.12 WARRANTY

- A. Section 017833 – Warranties and Bonds.
- B. Furnish five-year manufacturer's warranty for valves excluding packing.
- C. Furnish ten-year manufacturer's warranty for Aquatherm piping and devices.

1.13 EXTRA MATERIALS

- A. Section 017800 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two packing kits for each size and valve type.

PART 2 – PRODUCTS

2.01 CHILLED WATER PIPING, ABOVE GROUND

- A. Manufacturer: AQUATHERM, detailed specifications at WWW.AQUATHERM.COM as in plans M0.08.
- B. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
 - 1. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
 - 2. Joints: Welded for pipe 2-1/2 inches and larger.
 - 3. Service: Condenser Water Piping & Chilled Water Piping 2-1/2 inches and larger
- C. Copper Tubing: ASTM B88, Type L Hard drawn.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 - 3. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.
 - 4. Service: Chilled Water Piping 2-inches and smaller.

2.02 ~~CONDENSER WATER PIPING, ABOVE GROUND~~ N/A

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
 - 1. Fittings: ASME B16.3, malleable iron or ASTM A234/A234M, forged steel welding type.
 - 2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

3. Service: Interior Condenser Water Piping

B. Steel Pipe: ASTM A53/A53M, Schedule 40, galvanized.

1. Fittings: ASME B16.3, galvanized malleable iron or ASTM A234/A234M, galvanized forged steel welding type.

2. Joints: Threaded for pipe 2 inch and smaller; welded for pipe 2-1/2 inches and larger.

3. Service: Exterior Condenser Water Piping.

2.03 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized.

1. Fittings: ASME B16.3, malleable iron or ASME B16.4, cast iron.

2. Joints: Threaded for pipe 2 inch and smaller; flanged for pipe 2-1/2 inches and larger.

B. Copper Tubing: ASTM B88, Type M drawn.

1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.

2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

2.04 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.

2. Copper Piping: Class 150, bronze unions with soldered joints.

3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger.

1. Ferrous Piping: Class 150 forged steel, slip-on flanges.

2. Copper Piping: Class 150, slip-on bronze flanges.

3. Gaskets: 1/16 inch thick preformed neoprene gaskets.

C. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or ASTM D2464, Schedule 80, threaded, PVC pipe.

2.05 PIPE HANGERS AND SUPPORTS

A. Refer to Section 230529 Hangers and Supports for HVAC Piping and Equipment.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.

C. Hangers for Cold Pipe Sizes 2-1/2 inches and Larger: Carbon steel, adjustable, clevis.

- D. Hangers for Hot Pipe Sizes 2 to 4 inches: Carbon steel, adjustable, clevis.
- E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- F. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks.
- G. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
- H. Vertical Support: Steel riser clamp.
- I. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- J. Copper Pipe Support: Carbon steel rings, adjustable, copper plated.
- K. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- L. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.06 VALVES

- A. Refer to Section 230523 General-Duty Valves for HVAC piping.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 232500.

3.03 INSTALLATION - INSERTS

- A. Provide inserts for placement in concrete forms.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
- D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

- E. Where inserts are omitted, drill through concrete slab from below and provide through bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.04 INSTALLATION - PIPE HANGERS AND SUPPORTS

- A. Install hangers and supports in accordance with ASME B31.9.
- B. Support horizontal piping as scheduled.
- C. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- D. Place hangers within 12 inches of each horizontal elbow.
- E. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- F. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
- G. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
- H. Provide copper plated hangers and supports for copper piping.
- I. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- K. Install pipe hangers and supports in accordance with Section 230529.

3.05 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

- A. Install chilled and condenser water piping in accordance with ASME B31.9.
- B. Route piping parallel to building structure and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipe passing through partitions, walls and floors. Refer to Section 230529.
- F. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.
- G. Install pipe identification in accordance with Section 230553.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Provide access where valves and fittings are not exposed.
- J. Slope hydronic piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe aligned.

- K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- L. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.
- M. Install valves with stems upright or horizontal, not inverted.
- N. Insulate piping and equipment; refer to Section 230700.

3.06 FIELD QUALITY CONTROL

- A. Section 017800 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Test chilled water piping system and condenser water piping system in accordance with ASME B31.9.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

HYDRONIC PIPING
(AQUATHERM)**PART 1 – GENERAL**

1.01 SUMMARY

- A. This Section includes pipe and fitting materials, joining methods and specialty items for the following:
1. ~~Hot water heating piping.~~ **N/A**
 2. Chilled Water piping.
 3. ~~Condenser water piping.~~ **N/A**
 4. Make-up water piping
 5. Air Vent piping
 6. Safety-Valve-Inlet and -Outlet Piping
 7. Air control devices – air separators / expansion tanks

1.02 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.03 REFERENCE DOCUMENTS

- A. ASTM F 2389-07 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
- B. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- C. NSF/ANSI 14 – Plastic Piping System Components and Related Materials
- D. DIN-DVS 2207-11 2017 – Welding thermoplastic materials – Heated element welding of pipes, piping parts and panels made of polypropylene

1.04 DEFINITIONS

- A. Definitions shall be in accordance with local mechanical codes and ASTM F 2389.

1.05 SUBMITTALS

- A. Material list naming each product to be used identified by manufacturer and product number, in accordance with Section 01 30 00.
- B. LEED Submittals:
1. Independent 3rd-party certified Environmental Product Declarations shall be provided for all piping systems.
 2. Health Product Declaration: For each product.

3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Third-Party Certifications: For each product.
5. Third-Party Certified Life Cycle Assessment: For each product

C. Design Submittals

1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
2. Locations of pipe anchors and alignment guides and expansion joints and loops.
3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.
4. Locations of and details for penetration and firestopping for fire- and smoke-rated wall and floor and ceiling assemblies.

D. Informational Submittals

1. Coordination Drawings: Piping layout, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - a. Suspended ceiling components.
 - b. Other building services
 - c. Structural members

E. Qualification Data for Installers

F. Field quality-control reports.

G. Preconstruction Test Reports:

1. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

H. Warranty Information

1. Submit documentation of 10-year warranty with coverage for parts, materials, labor, property damage, and personal injury.

1.06 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing hydronic piping systems with the following working-pressure ratings:

1. ~~Hot Water Piping: XXX psig at XXX deg. F~~ **N/A**
2. Chilled Water Piping: 125 psig at 100 deg. F
3. ~~Condenser Water Piping: XXX psig at XXX deg. F~~ **N/A**

1.07 QUALITY ASSURANCE

- A. Material shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.
- B. Material shall comply with manufacturer's specifications.
- C. Special Engineered products shall be certified by NSF International as complying with NSF 14.
- D. Piping Installers: Installers of Aquatherm piping shall be certified by manufacturer of pipes and fittings as having been trained and qualified to join polypropylene piping using fusion welding of the same type as specified in Drawings (socket, butt, electrofusion, fusion outlet).

1.08 DELIVERY STORAGE AND HANDLING

- A. Inspect the pipe upon receipt to ensure that it has not been damaged during shipping.
- B. Damaged pipe should be cataloged and returned for replacement following distributor's procedures for returns.
- C. Protect piping, valves, fittings, etc. before installation in accordance with manufacturer's written instructions.
- D. Always store the pipe on a flat surface. When storing the pipe on racks or supports or on the ground, they always should have at least four supports, evenly spaced, under a 19-ft length. Place plywood on top of the supports to prevent warping.
- E. Piping shall be shipped from the factory with capped ends and stored on supports off the ground with ends covered at all times to prevent nesting of insects, birds, and other animals. Any pipe found to be without end-caps or not raised off of the ground should be cleaned by the contractor prior to installation.
- F. Protect piping from accumulation of dirt and debris in and around piping/components.
- G. If the pipe is removed from its bag, or the bag has been damaged, do not store the pipe unprotected from UV rays (sunlight) for longer than six months. Pipe that is exposed to direct sunlight for longer than six months will not be covered under the warranty.
- H. Never place the forks of a forklift into the ends of the pipe. The interior of the pipe may be damaged and can cause it to crack. Handlers may use a padded rug ram inside the pipe or use a crane or lift to handle larger pipe.
- I. In cold weather, take extra care when handling the pipe. Cold temperatures reduce the pipe's flexibility, making it more susceptible to impact damage.

1.09 PRECONSTRUCTION MEETING

- A. ~~Preconstruction Testing Service: [Owner will engage] [Engage] a qualified testing agency to perform preconstruction testing on water quality. N/A~~

PART 2 – PRODUCTS

2.01 PIPE AND PIPING PRODUCTS

- A. Pipe shall be manufactured from a PP-R or PP-RP(RCT) resin (Fusiolen) meeting the short-term properties and long-term strength requirements of ASTM F 2389 or CSA B137.11. The pipe shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipe shall be made in an extrusion process. Hydronic hot water and heating piping shall contain a fiber layer (faser) to restrict thermal expansion. All pipe shall comply with the rated pressure requirements of ASTM F 2389 or CSA B137.11. All pipe shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.
- B. Pipe shall be Aquatherm® Blue Pipe® MF® RP(RCT®) SDR 11, available from Aquatherm, NA. Piping specifications and ordering information are available at www.aquatherm.com.

2.02 FITTINGS

- A. Fittings shall be manufactured from a PP-R resin (Fusiolen) meeting the short-term properties and long-term strength requirements of ASTM F 2389. The fittings shall contain no rework or recycled materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All fittings shall be certified by NSF International as complying with NSF 14, and ASTM F 2389 or CSA B137.11.
- B. Fittings shall be Aquatherm® Blue Pipe® MF® RP(RCT®) SDR 11 available from Aquatherm, NA. Fittings specifications and ordering information are available at www.aquatherm.com.

2.03 WARRANTY

- A. Manufacturer shall warrant pipe and fittings for 10 years to be free of defects in materials or manufacturing.
- B. Warranty shall cover labor and material costs of repairing and/or replacing defective materials and repairing any incidental damage caused by failure of the piping system due to defects in materials or manufacturing.
- C. Warranty shall be in effect only upon submission by the contractor to the manufacturer valid pressure/leak test documentation indicating that the system was tested and passed the manufacturer's pressure/leak test.
- D. Installers shall be trained and certified to install the pipe according to the manufacturer's guidelines. Contact your local Aquatherm representative for training.
- E. Warranty shall be extended to prefabricated parts constructed by the manufacturer.

2.04 POLYPROPYLENE VALVES

- A. Polypropylene Valves shall be manufactured in accordance with the manufacturer's specifications and shall comply with the performance requirements of ASTM F 2389 or CSA B137.11. The valves shall contain no rework or recycled thermoplastic materials except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.
- B. Polypropylene Valves shall be Aquatherm® available from Aquatherm, NA. Valve specifications and ordering information are available at www.aquatherm.com.

2.05 SMOKE AND FIRE RATINGS

- A. Where indicated on the drawings that a Plenum-rated Piping System is needed, the pipe shall be wrapped and/or insulated with standard fiberglass or mineral wool pipe insulation, minimum 1-in. thick, field installed, with bare fittings no closer than every 6 ft. of pipe. The pipe wrap or insulation as a system shall meet the requirements of CAN/ULC-S102.2-03 or ASTM E84. The system shall have a Flame Spread Classification of less than 25 and Smoke Development rating of less than 50.

2.06 UV PROTECTION

- A. Where indicated on the drawings that the pipe will be exposed to direct UV light for more than 30 days, it shall be provided with a Factory applied, UV-resistant coating or alternative UV protection.
- B. Note that molded fittings ½" – 4" do not need to have UV protection. Larger molded fittings (6"-10") and segmented fittings will need to be protected from UV.

2.07 THERMAL AND VAPOR BARRIER

- A. Insulation materials furnished and installed hereunder should meet the minimum thickness requirements of American Society of Heating, Refrigeration, and Air Conditioning Engineers ASHRAE 90.1 (current edition), "Energy Efficient Design of New Buildings." However, if other factors such as condensation control or personnel protection are to be considered, the selection of the thickness of insulation should satisfy the controlling factor.
- B. Where standard pipe insulation is indicated on the drawings or in these specifications, the contractor shall provide a thermal (radiant, conductive, and convective) and vapor barrier insulation. The insulation products shall be provided in 2" thickness covered with aluminum jacketing or as indicated on the drawings or elsewhere in these specifications. The standard pipe insulation shall be cellular glass, UV resistant, mold growth resistant and not contain asbestos, lead, mercury, or mercury compounds.
 - 1. For indoor systems operating at temperatures from 0°F (-18°C) to 200°F (93°C) and pipe sizes from ½" (20mm) to 12" (315 mm):
 - 2. Owens Corning TM Fiberglas TM Insulation for Aquatherm with ASJ Max® Positive Closure System or approved equal.
 - 3. For systems operating below ambient (32°F (0°C) to +65°F (18°C)) temperature and pipe sizes from ½" (20mm) to 12" (315 mm):
 - a. Owens Corning TM Vapor Wick® Pipe Insulation for Aquatherm or approved equal.
- C. Other approved manufacturers include:
 - 1. Owens Corning
 - 2. Johns Manville
 - 3. National Rockwool
 - 4. Approved Equal

PART 3 - EXECUTION

3.01 PIPING APPLICATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Installers shall be trained and certified to install the pipe according to the manufacturer's guidelines. Contact your local Aquatherm representative for training.
- C. Install listed pipe materials and joining methods below in the following applications:
 - 1. ~~Underground Piping: Polypropylene (MF-RP(RCT)) piping in SDR 17.6 per manufacturer's instructions and ASTM D2774.~~ **N/A**
 - 2. Aboveground: Polypropylene Aquatherm® Blue Pipe® MF® RP(RCT®) piping in SDR 11 based on the required minimum pressure rating and use temperature, in accordance with manufacturer's instructions and ASTM F2389.
- D. Installation must be accomplished with the proper tools for installing Aquatherm piping following manufacturer's instructions. Installation tools are available from your local Aquatherm representative. Tools may be purchased or rented.
- E. Install hydronic piping level and plumb.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

3.02 FUSION WELDING OF JOINTS

- A. Install fittings and joints using socket-fusion, electrofusion, or butt-fusion as applicable for the fitting or joint type. All fusion-weld joints shall be made in accordance with the pipe and fitting manufacturer's specifications and product standards.
- B. Fusion-weld tooling, welding machines, and electrofusion devices shall be as specified by the pipe and fittings manufacturer.
- C. Prior to joining, the pipe and fittings shall be prepared in accordance with ASTM F 2389 and the manufacturer's specifications.
- D. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer's specifications.
- E. Data Loggers shall be used to log each joint made. Data logger shall record at least the date, time of day and person making each joint. Data logger shall also record the required pressure/leak test for manufacturer's warranty.

3.03 VALVE APPLICATIONS

- A. Install gate valves close to the main on each branch and riser serving 2 or more equipment connections and where indicated.
- B. Install gate or ball valves on the inlet to each equipment item and elsewhere as indicated.
- C. Install drain valve at the base of each riser, at low points of horizontal runs, and where required to drain hydronic piping system.

- D. Install swing check valve on the discharge side of each pump and elsewhere as indicated.
- E. Install ball valves in each hot-water circulating loop and the discharge side of each pump.

3.04 PIPING INSTALLATIONS

- A. Fire stopping shall be provided to both be compatible with the Aquatherm Piping and meet the requirements of ASTM E 814 or ULC S115, "Fire Tests of Through-Penetration Firestops". Pipe insulations or fire resistive coating shall be removed where the pipe passes through a fire stop and, if required by the firestop manufacturer, for 3 inches beyond the firestop outside of the fire barrier.
- B. When installed in systems with pumps in excess of 3.0 HP, piping shall be protected from excessive heat generated by operating the pump at shut-off conditions. Where the possibility exists that the pump will operate with no flow, the protection method shall be a temperature relief valve or comparable level of protection, set to a maximum temperature of 185°F.
- C. If heat tracing or freeze protection is specified for the piping, it should be installed on the pipe interior or exterior. It must be suitable for use with plastic piping and be self-regulating to ensure that the surface temperature of the pipe and fittings will not exceed 70°C (158°F).

3.05 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 230548 "Vibration and Seismic Controls for HVAC and Equipment."
 - 1. Comply with requirements for pipe hanger, support products, and installation in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
 - a. Vertical Piping: MSS Type 8 or 42, clamps.
 - b. Individual, Straight, Horizontal Piping Runs:
 - i. Adjustable, steel clevis hangers.
 - ii. Clamps on strut trapeze.
 - iii. Clamps on strut attached to structure.
 - iv. Clamps are attached directly to the structure.
 - c. Base of Vertical Piping: MSS Type 52, spring hangers.
 - 2. Support vertical piping and tubing at base and 10-ft. intervals or at each floor whichever is less. For piping 2" (63mm) or smaller, install mid-story guides.
 - 3. Install hangers and supports at intervals specified in the applicable Plumbing Code and/or as recommended by pipe manufacturer.
 - 4. Hangers and supports shall also be provided within 1-foot of every change of direction and within 1-foot of any pipe fittings and valves.
 - 5. ~~For hot water piping, provide clamps and supports that are felt or rubber/vinyl coated or lined.~~ **N/A**
 - 6. For cold water piping supports and clamps may be bare metal. Ensure that the clamp or support does not have sharp edges that may scrape or gouge the piping.

7. Use care when installing riser clamps to not overtighten the clamps to cause indentation of the pipe. Riser clamps shall be isolated from the building structure by placing felt or rubber pads between the clamp, the pipe and the structure.
8. All piping support materials shall be new and manufactured for the specific purpose of supporting systems, equipment, pipes and accessories. No improvised pipe support solutions shall be allowed.
9. Piping systems shall not have direct contact with the building structure. Provide isolation at tub and shower valves and pipes passing through studs, joists or plates. Use iron pipe sizes to fit Aquatherm pipe. Acceptable manufacturers for pipe/structure isolation:
 - a. Holdrite
 - b. Oatey
 - c. Sioux Chief

3.06 EXPANSION AND CONTRACTION

- A. Provide expansion and contraction controls, guides and anchors to take into account the expansion and contraction of the pipe. Provide expansion loops or offsets as required and as indicated in the manufacturer's literature.
 1. While Aquatherm® MF®RCT® (faser) piping can absorb most of their own expansion stresses, this can cause the pipe to bow or bend.
 2. Install anchor points at least every 120 feet.
 3. Install expansion loop or offset between each anchor point. Expansion device must be able to absorb all the stresses between the two anchor points. Refer to manufacturer's published instructions, formulas and calculations at www.aquatherm.com.
 4. Non-MF® pipes used for hot applications shall have expansion controls every 30 feet of straight runs.
 5. Vertical risers of MF®RCT® piping shall be anchored at each floor.
 6. Provide anchor point at branch take-off in vertical riser of MF®RCT® piping.

3.07 PRESSURE/LEAK TESTING

- A. While still accessible all piping shall be pressure/leak tested to the manufacturer's standards.
- B. Tests shall be carried out using water, compressed air or a mixture of the two. The test pressure shall be as indicated in the pressure leak testing procedures required by the manufacturer.
- C. In the event that water is not available for testing it shall be permissible to use compressed air as a testing medium. Contact the engineering department of the manufacturer for guidance. Follow all precautionary procedures recommended by the piping manufacturer
- D. Any leaks detected shall be repaired at the contractor's expense by removing the leaking part and replacing it with new parts welded per the pipe manufacturer's guidelines. See www.aquatherm.com for additional details and forms.

3.08 INSPECTING AND CLEANING

- A. The pipes shall be flushed with cold water after finishing the installation. Flush the system until the water runs clear of debris and dirt.
- B. Inspect and test piping systems following procedures of authorities having jurisdiction and as specified by the piping system manufacturer.
- C. Clean and disinfect water distribution piping following procedures of the manufacturer and/or the authority having jurisdiction.

3.09 AQUATHERM MAINTENANCE PLAN

- A. Aquatherm pipe is pretty much “maintenance free” as an installation goes, but there are few things that need to be observed after installation of the product. Adhering to these points will ensure a long and happy life with Aquatherm pipe.
- B. The design and installation of the Aquatherm piping was carried out with anticipated temperatures and pressures. The piping chosen for the project was chosen based on these parameters. If the temperature or pressure of this Aquatherm piping system is required to change, please notify Aquatherm Engineering (engineering@aquatherm.com or call (801) 805-6657) to ensure that the proposed changes are within the limits of the installed piping.
- C. The design and installation of the Aquatherm piping was carried out with the anticipation that certain chemicals would be in the water or chemicals themselves would be carried directly by the piping. The piping chosen for the project was chosen based on these parameters. If the chemistry of the water or chemical carried by this Aquatherm piping system is required to change, please notify Aquatherm Engineering (engineering@aquatherm.com or call (801) 805-6657) to ensure that the proposed changes are within the limits of the installed piping.
- D. Aquatherm pipe, copper pipe and domestic hot chlorinated water mixed together in a recirculating system can cause problems. Please note the following parameters if copper piping is to be introduced into the Aquatherm piping system. Please refer to: 201207C – AQT TB - Integration of other systems or components with Aquatherm piping for pressure pipe applications.
 - 1. Do not mix Aquatherm pipe with other piping systems in conditions that will cause the other system or components to fail.
 - 2. The temperature of the system must not exceed 140°F
 - 3. The velocity of the system must be maintained at 3 ft./sec. or slower.
 - 4. Small amounts of copper or brass in valves and other equipment will generally not cause an issue.
 - 5. Hydraulically balance a DHWR-system and ensure the required flow rate for each area of the building
 - 6. Do not add additional chlorine, chloramine, chlorine dioxide, on-site copper ion generation or other disinfectants to the DHWR system without first consulting with Aquatherm’s Engineering Department in Lindon Utah at (801)642-4145 or engineering@aquatherm.com
 - 7. The above guidelines do not apply to hydronic heating systems.
- E. If there are flanged connections or butterfly valve connections in the Aquatherm system, please follow the guidelines noted in our technical bulletin 201405B – AQT TB – Flanges and Butterfly Installation Guidelines. Please note that flange bolts and nuts can loosen over time from expansion and contraction and may need to be periodically re-tightened. It is wise to check these connections on a regular basis to ensure that loosening has not occurred.

- F. Aquatherm valves are popular valves to use in Aquatherm systems. The following maintenance guidelines need to be observed.
1. The valve manufacturer recommends that the valve be cleaned periodically depending on external conditions.
 2. Clean only with a damp cloth. Do not use chemicals that will corrode the housing or the seals.
 3. The valve should be checked for functionality (exercised) at least quarterly. The following are suggestions for checking the valve for functionality.
 - a. Verify the direction for turning the valve.
 - b. Verify that the valve is installed correctly. See Aquatherm Technical Bulletin No.201609A – AQTTB – Aquatherm Polypropylene Valve Installation Notes
 - c. Close the valve slowly.
 - d. Open the valve slowly
 - e. Repeat the open/close cycle at least three (3) times
- G. It is recommended that the customer add the Aquatherm piping system and piping equipment into their structured Facility Inspection and Equipment Maintenance Plans

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 23 21 16

HYDRONIC PIPING SPECIALTIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Pressure gauges.
2. Pressure gauge taps.
3. Thermometers.
4. Thermometer supports.
5. Test plugs.
6. Flexible connectors.
7. Expansion tanks.
8. Air vents.
9. Air separators.
10. Strainers.
11. Pump suction fittings.
12. Combination pump discharge valves.
13. Flow controls.
14. Flow meters.
15. Relief valves.

B. Related Sections:

1. Section 232113 - Hydronic Piping: Execution requirements for piping connections to products specified by this section.
2. Section 232123 - Hydronic Pumps: Execution requirements for piping connections to products specified by this section.

1.02 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
2. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

B. ASTM International:

1. ASTM E1 - Standard Specification for ASTM Thermometers.
2. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

C. American Water Works Association:

1. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
2. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
3. AWWA C702 - Cold-Water Meters - Compound Type.
4. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
5. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

D. Underwriters Laboratories Inc.:

1. UL 393 - Indicating Pressure Gauges for Fire-Protection Service.
2. UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service.

1.03 PERFORMANCE REQUIREMENTS

- A. Flexible Connectors: Provide at or near pumps where piping configuration does not absorb vibration.

1.04 SUBMITTALS

- A. Section 013323 - Shop Drawings: Submittal procedures.

- B. Product Data: Submit for manufactured products and assemblies used in this Project.

1. Manufacturers data and list indicating use, operating range, total range, accuracy, and location for manufactured components.
2. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
3. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each piping specialty.
4. Submit electrical characteristics and connection requirements.

- C. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures, application, selection, and hookup configuration. Include pipe and accessory elevations.

- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

- A. Section 017800 - Contract Closeout: Closeout procedures.

- B. Project Record Documents: Record actual locations of actual locations of components and instrumentation.

- C. Operation and Maintenance Data: Submit instructions for calibrating instruments, installation instructions, assembly views, servicing requirements, lubrication instruction, and replacement parts list.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Accept piping specialties on site in shipping containers with labeling in place. Inspect for damage.
- C. Provide temporary protective coating on cast iron and steel valves.
- D. Protect systems from entry of foreign materials by temporary covers, caps and closures, completing sections of the work, and isolating parts of completed system until installation.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements before fabrication.

1.09 WARRANTY

- A. Section 017800 - Contract Closeout: Product warranties and product bonds.
- B. Furnish full manufacturer's warranty for piping specialties. Minimum one-year.

1.10 MAINTENANCE SERVICE

- A. Section 017800 - Contract Closeout: Maintenance service.
- B. Furnish service and maintenance of glycol fluid and glycol charging components for one year from Date of Substantial Completion.

1.11 MAINTENANCE MATERIALS

- A. Section 017800 - Contract Closeout: Spare parts and maintenance materials.

1.12 EXTRA MATERIALS

- A. Section 017800 - Contract Closeout: Spare parts and maintenance products.

PART 2 – PRODUCTS

2.01 LIQUID FLOW METERS

- A. Measuring Station: Type 316 stainless steel pitot type flow element with safety shut-off valves and quick coupling connections.
 - 1. Support: Inserted through welded threaded couplet with isolation valve and insert-retract mechanism.

2. Pressure rating: 275 psi.
 3. Maximum temperature: 400 degrees F.
 4. Accuracy: Plus, 0.55 percent to minus 2.30 percent.
 5. Labeling: Metal tag indicating design flow rate, reading for design flow rate, metered fluid, line size, station or location number.
- B. Meter Set: Dry single diaphragm type gauge with magnetic drive, 2-1/2 inch x 6 inch dial, stainless steel wetted metal parts, and direct reading of flow rate, with two 10 foot long nylon test hoses with fittings.

2.02 PRESSURE GAUGES

- A. Gauge: ASME B40.1, UL 404 with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
1. Case: Stainless steel.
 2. Bourdon Tube: Type 316 stainless steel.
 3. Dial Size: 4 inch diameter.
 4. Mid-Scale Accuracy: One percent.
 5. Scale: Psi.

2.03 PRESSURE GAUGE TAPS

- A. Needle Valve: Stainless Steel, 1/4 inch NPT for minimum 300 psi.
- B. Ball Valve: Stainless Steel, 1/4 inch NPT for 250 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch NPT connections.
- D. Siphon: Stainless Steel, 1/4 inch NPT angle or straight pattern.

2.04 STEM TYPE THERMOMETERS

- A. Manufacturers:
1. Weiss Instruments
 2. Substitutions: Section 016000 – Materials and Equipment Requirements & 016200– Substitutions
 3. Furnish Materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The county shall be the sole judge of what is considered equal, based on the best interest of the County, and its decision regard shall be final.
- B. Thermometer: ASTM E1, digital thermometer, self-powered, lens front tube, Hi-Impact ABS case with enamel finish.
1. Size: 9 inch scale.
 2. Window: Clear Lexan.

3. Display: 1/2 inch LCD Digits.
4. Range: -50/300 °
5. Stem: Brass, 3/4 inch NPT, 3-1/2 inch long, ASME B40.3-1990.
6. Accuracy: ASTM E77 1 percent.
7. Calibration: Degrees F.
8. Waterproof cover.
9. Ambient Operating: -30/140 °F
10. Ambient Temp Error: Zero
11. Humidity: 100%
12. Sensor: Glass passivated thermistor

2.05 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.06 TEST PLUGS

- A. 1/4 inch NPT or 1/2 inch NPT stainless steel fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with:
 1. Neoprene core for temperatures up to 200 degrees F.
 2. Nordel core for temperatures up to 350 degrees F.
 3. Viton core for temperatures up to 400 degrees F.
- B. Test Kit:
 1. Carrying case, internally padded and fitted containing:
 - a. Two 2-1/2 inch diameter pressure gauges.
 - b. Two gauge adapters with 1/8 inch probes.
 - c. Two 1-1/2 inch dial thermometers.

2.07 FLEXIBLE CONNECTORS

- A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure 350 psig.

2.08 EXPANSION TANKS

- A. Manufacturers:
 - 1. TACO / CABO 125
 - 2. Substitutions: Section 016000 - Product Requirements.
 - 3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.
- B. Construction: Closed, welded steel, tested and stamped in accordance with ASME Section VIII; cleaned, prime coated, and supplied with steel support saddles; with taps for installation of accessories.
- C. Gauge Glass Set: Brass compression stops, guard, and 3/4 inch glass, maximum 24 inches length, long enough to cover tank for 2 inches above bottom to 2 inches below top.
- D. Quick Connect Air Inlet:
 - 1. Expansion Tank: Inlet tire check valve, manual air vent, tank drain, and pressure relief valve.

2.09 AIR VENTS

- A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- B. Float Type:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
- C. Washer Type:
 - 1. Brass with hydroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.10 AIR SEPARATORS

- A. Manufacturers:
 - 1. TACO / AC04-125
 - 2. Substitutions: Section 016000 - Product Requirements
 - 3. Furnish materials and equipment according to Miami Dade County Department Of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.
- B. Dip Tube Fitting: For 125 psig operating pressure; to prevent free air collected in boiler from rising into system.
- C. In-line Air Separators: Cast iron for sizes 1-1/2 inch and smaller, or steel for sizes 2 inches and larger; tested and stamped in accordance with ASME Section VIII; for 125 psig operating pressure.
- D. Combination Air Separators/Strainers: Steel, tested and stamped in accordance with ASME Section VIII; for 125 psig operating pressure, with integral galvanized steel strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.11 STRAINERS

A. Size 2 inches and Smaller:

1. Screwed brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

B. Size 2-1/2 inch to 4 inches:

1. Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

C. Size 5 inches and Larger:

1. Flanged iron body for 175 psig working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.12 PUMP SUCTION FITTINGS

A. Manufacturers:

1. TACO
2. Substitutions: Section 016000 - Product Requirements.
3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.

B. Fitting: Angle pattern, cast-iron body. Threaded for 2 inches and smaller, flanged for 2-1/2 inch and larger. Rated for 175 psig working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.

C. Accessories: Adjustable foot support, blow-down tapping in bottom, gauge tapping inside.

2.13 COMBINATION PUMP DISCHARGE VALVES

A. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psig operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.14 FLOW CONTROLS

A. Construction: Brass or bronze body with union on inlet, and outlet, temperature and pressure test plug on inlet, outlet and combination blow-down and back-flush drain.

B. Calibration: Control within 5 percent of design flow over entire operating pressure.

C. Control Mechanism: Stainless steel or nickel plated brass piston or regulator cup, operating against stainless steel helical or wave formed spring.

D. Accessories: In-line strainer on inlet and ball valve on outlet.

2.15 RELIEF VALVES

- A. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

PART 3 – EXECUTION

3.01 INSTALLATION - METERS

- A. Install liquid flow meters with shutoff valves on inlet and outlet.

3.02 INSTALLATION - THERMOMETERS AND GAUGES

- A. Install one pressure gauge for each pump, locate taps before strainers and on suction and discharge of pump: pipe to gauge.
- B. Install gauge taps in piping
- C. Install pressure gauges with pulsation dampers. Provide ball valve to isolate each gauge. Extend nipples to allow clearance from insulation.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarged pipes that are smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation.
- E. Coil and conceal excess capillary on remote element instruments.
- F. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- G. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- H. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

3.03 INSTALLATION - HYDRONIC PIPING SPECIALTIES

- A. Locate test plugs adjacent to pressure gauges and pressure gauge taps and as indicated on Drawings.
- B. Where large air quantities accumulate, provide enlarged air collection standpipes.
- C. Install manual air vents at system high points.
- D. For automatic air vents in ceiling spaces or other concealed locations, install vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide drain and hose connection with valve on strainer blow down connection.
- G. Provide pump suction fitting on suction side of base mounted centrifugal pumps. Remove temporary strainers after cleaning systems.
- H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.
- I. Support pump fittings with floor mounted pipe and flange supports.
- J. Provide radiator valves on water inlet for the following terminal heating unit types: radiation, unit heaters, and fan coil units.

- K. Provide radiator-balancing valves on water outlet for the following terminal heating unit types: radiation, unit heaters, and fan coil units.
- L. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.
- M. Select system relief valve capacity greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- N. Pipe relief valve outlet to nearest floor drain.
- O. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.

3.04 FIELD QUALITY CONTROL

- A. Section 017800 - Contract Closeout: Field inspecting, testing, adjusting, and balancing.

3.05 CLEANING

- A. Section 017800 - Contract Closeout: Requirements for cleaning.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 017800 - Contract Closeout: Requirements for protecting installed construction.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Base mounted pumps.

B. Related Sections:

1. Section 230513 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.
2. Section 230523 - General-Duty Valves for HVAC Piping: Product requirements for valves used in hydronic piping systems.
3. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment Product requirements for vibrations isolators installed with pumps.
4. Section 232113 - Hydronic Piping: Execution requirements for connection to pumps specified by this section.
5. Section 232116 - Hydronic Piping Specialties: Product and execution requirements for piping specialties installed in hydronic systems adjacent to pumps.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

B. Underwriters Laboratories Inc.:

1. UL 778 - Motor Operated Water Pumps.

1.03 PERFORMANCE REQUIREMENTS

- A. Provide pumps to operate at system fluid temperatures indicated on Drawings without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.04 SUBMITTALS

A. Section 013323- Shop Drawings: Submittal procedures.

- B. Product Data: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes, and finishes.

- C. Manufacturer's Installation Instructions: Submit application, selection, and hookup configuration with pipe and accessory elevations. Submit hanging and support requirements and recommendations.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

A. Section 017800 - Contract Closeout: Closeout procedures.

B. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.06 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years' documented experience.

1.07 PRE-INSTALLATION MEETINGS

A. Section 013119 – Project Meetings: Pre-installation meeting.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.

B. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 WARRANTY

A. Section 017800 - Contract Closeout: Product warranties and product bonds.

B. Furnish full manufacturer's warranty for pumps. Minimum one year.

1.11 EXTRA MATERIALS

A. Section 017800 - Contract Closeout: Spare parts and maintenance products.

B. Furnish one set of mechanical seals for each pump.

PART 2 – PRODUCTS

2.01 BASE MOUNTED PUMPS

A. Manufacturers:

1. ARMSTRONG / factory Daikin supplied with chiller.

2. Substitutions: Material and Equipment Requirements & 016200 – Substitutions, and product options.

3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.
- B. Optional Factory-Installed Pump Package: The pump package shall be factory mounted and wired on the chiller. The chiller controller shall provide a pump start/stop signal when operation is required. On dual pump systems, the chiller shall also provide automatic alternating of pump starts and duty/standby functionality. The package shall be equipped with:
1. Dual Pumps in a Single Casting Models 4372: single-spring inside-seal vertical, in-line, radially split-case pumps, mounted in a common casing with a common inlet connection and outlet connection and including a flapper valve to prevent recirculation when only one pump is operating. The pumps shall be designed for duty/standby, not parallel operation. Pump package shall also be equipped with:
 - a. "Y" type inlet strainer.
 - b. Pump VFD for variable chilled water flow capability.
 - c. Water pressure gauges (suction and discharge) shall be factory installed.
 - d. Combination triple-duty outlet valve having a drip-tight discharge shutoff valve, non-slam check valve, and flow throttling valve.
 - e. Combination suction guide with flow stabilizing outlet vanes and stainless-steel strainer with a disposable fine-mesh strainer for start-up.
 - f. Factory power and control wiring from the chiller to the pump package control panel.
 - g. Flow switch mounted and wired.
 - h. Interconnecting schedule 40 piping with Victaulic couplings.
 - i. Insulation of all cold surfaces.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings. For close coupled or base mounted pumps, install supports under elbows on pump suction and discharge line sizes 4 inches and over.
- C. Install pumps on vibration isolators. Refer to Section 230548.
- D. Install flexible connectors at or near pumps where piping configuration does not absorb vibration. Refer to Section 232116.
- E. Provide line sized shut-off valve and strainer, suction diffuser on pump suction, and line sized, balancing valve, shut-off valve combination pump discharge valve on pump discharge.

- F. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump so no weight is carried on pump casings. Provide support under elbows on pump suction and discharge line sizes 4 inches and larger.
- G. Provide air cock and drain connection on horizontal pump casings.
- H. Provide drains for bases and seals.
- I. Check, align, and certify alignment of base mounted pumps prior to start-up.
- J. N/A
- K. Lubricate pumps before start-up.

3.02 FIELD QUALITY CONTROL

- A. 017800 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect for alignment of base mounted pumps.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #2, Chilled Water Pumps & Installation, in the Bid Form.

END OF SECTION

SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Chemical feeder equipment including associated feeders, pumps, tanks, controls, meters and valves.

B. Related Sections:

1. Section 230513 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 SUBMITTALS

A. Section 013323 - Shop Drawings: Submittal procedures.

B. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

C. Product Data: Submit chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions: Submit placement of equipment in systems, piping configuration, and connection requirements.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

F. Manufacturers Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

1.04 CLOSEOUT SUBMITTALS

A. Section 017800 - Execution and Closeout Requirements: Closeout products.

B. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.

C. Operation and Maintenance Data: Submit data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.

1.05 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.06 WARRANTY

- A. Section 017833 – Warranties and Bonds: Product warranties and product bonds.
- B. Furnish full manufacturer warranty for pumps, valves and water meters. Minimum one year.

1.07 MAINTENANCE SERVICE

- A. Section 017800 - Execution and Closeout Requirements: Maintenance service.
- B. Furnish monthly technical service visits, for one year starting at Date of Substantial Completion, to perform field inspections and make water analysis on site. Detail findings in writing on proper practices, chemical treating requirements and corrective actions that are needed. Submit two copies of field service report after each visit. **NOTE THIS SECTION (B.) REGARDING CONDENSER WATER SHALL NOT APPLY DUE TO THIS UNIT BEING AIR-COOLED.**
- C. Furnish laboratory and technical assistance services during this maintenance period.
- D. Furnish onsite inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program and make recommendations in writing based upon these inspections.
- E. **The contractor shall provide and install all necessary initial chemical treatment as required to the chilled water system to protect the chiller and all water piping.**

1.08 MAINTENANCE MATERIALS

- A. Section 017800 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish chemicals for treatment and testing during warranty period.

PART 2 – PRODUCTS

2.01 BY-PASS (POT) FEEDER

- A. Manufacture :
 - 1. Neptune DBFC-5,
 - 2. 5.0 gal quick opening cap for working pressure of minimum 175 psig, rated 300 psig

PART 3 – EXECUTION

3.01 PREPARATION

- A. Operate, fill, start and vent systems prior to cleaning. Use water meter to record capacity in each system. Place terminal control valves in open position during cleaning.

3.02 CLEANING

- A. Concentration:
 - 1. As recommended by manufacturer.
- B. Chilled Water Systems:

1. Circulate for 48 hours, then drain systems as quickly as possible.
 2. Refill with clean water, circulate for 24 hours, then drain.
 3. Refill with clean water and repeat until system cleaner is removed.
- C. Use neutralizer agents on recommendation of system cleaner supplier and acceptance of Engineer and DTPW project manager.
- D. Flush open systems with clean water for one hour minimum. Drain completely and refill.
- E. Remove, clean, and replace strainer screens.
- F. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 CLOSED SYSTEM TREATMENT

- A. Provide one bypass feeder on each system. Install isolating and drain valves and interconnecting piping. Install around balancing valve downstream of circulating pumps.
- B. Introduce closed system treatment through bypass feeder when required or indicated by test.

3.04 DEMONSTRATION

- A. Section 017800 - Execution and Closeout Requirements: Requirements for demonstration and training.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #3, Hydronic Piping, Valves, Accessories, etc. & Installation, in the Bid Form.

END OF SECTION

SECTION 233100

HVAC DUCTS AND CASINGS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Duct materials.
2. Ductwork fabrication.
3. Duct cleaning.

B. Related Requirements:

1. Section 233300 - Air Duct Accessories: Requirements for duct accessories as specified in this Section.

1.02 REFERENCE STANDARDS

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Handbook - Fundamentals.

B. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.2 - Structural Welding Code - Aluminum.
3. AWS D9.1 - Sheet Metal Welding Code.

C. ASTM International:

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A90 - Standard Test Method for Weight of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
4. ASTM A568 - Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
5. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
7. ASTM A1008 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardened.

8. ASTM A1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
9. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
10. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
11. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
12. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. International Code Council:

1. International Energy Conservation Code (IECC).
2. International Mechanical Code (IMC).

E. NFPA:

1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air- Conditioning Systems.
3. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.

F. Sheet Metal and Air Conditioning Contractors' National Association:

1. SMACNA 016 - HVAC Air Duct Leakage Test Manual.
2. SMACNA 1767 - Kitchen Ventilation Systems and Food Service Equipment Guidelines.
3. SMACNA 1884 - Fibrous Glass Duct Construction Standards.
4. SMACNA 1966 - HVAC Duct Construction Standards - Metal and Flexible.

G. UL:

1. UL 181 - Factory-Made Air Ducts and Air Connectors.
2. 2. UL 181A - Closure Systems for Use With Rigid Air Ducts.
3. UL 1978 - Grease Ducts.

1.03 SUBMITTALS

A. Section 013323 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer information for duct materials, duct liner, duct connectors.

C. Shop Drawings:

1. Submit duct fabrication drawings, drawn to scale on sheets same size as Contract Drawings, indicating following:

- a. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other Work.
 - b. Duct layout that further indicates pressure classifications and sizes in plans view; exhaust duct systems that further indicate classification of materials handled as specified in this Section.
 - c. Fittings.
 - d. Reinforcing details and spacing.
 - e. Seam and joint construction details.
 - f. Penetrations through fire-rated and other walls.
 - g. Terminal unit, coil, and humidifier installations.
 - h. Hangers and support, including methods for vibration isolation and building and duct attachment.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for following:
1. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.
 2. Materials, fabrication, assembly, and spacing of hangers and supports.
 3. Sheet metal thicknesses.
 4. Joint and seam construction and sealing.
 5. Reinforcement details and spacing.
- G. Test and Evaluation Reports: Indicate pressure tests performed, including date, section tested, test pressure, and leakage rate according to SMACNA 016.
- H. Manufacturer Instructions:
1. Submit detailed instructions on installation requirements, including storage and handling procedures.
 2. Submit special procedures for glass-fiber ducts.
- I. Qualifications Statements:
1. Submit qualifications for manufacturer, installer, and licensed professional.
 2. Submit manufacturer's approval of installer.
 3. Welders: Qualify procedures and personnel according to AWS D1.1 for hangers and supports, AWS D1.2 for aluminum supports, and AWS D9.1 for duct joint and seam welding.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 - Contract Closeout: Requirements for submittals.
- B. Project Record Documents:
 - 1. Record actual locations of ducts and duct fittings.
 - 2. Record changes in fitting location and type.
 - 3. Show additional fittings used.

1.05 QUALITY ASSURANCE

- A. Perform Work according to SMACNA 1884 and 1966.
- B. Construct ductwork to NFPA 90A, NFPA 90B.
- C. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.
- C. Welders: AWS qualified within previous 12 months for employed weld types.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing them in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.08 AMBIENT CONDITIONS

- A. Minimum Conditions: Do not install duct sealant when temperatures are less than those recommended by sealant manufacturer.
- B. Subsequent Conditions: Maintain temperatures during and after installation of duct sealant.

1.09 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Section 017800 - Contract Closeout: Requirements for warranties.
- B. Furnish full manufacturer's warranty for ducts.

PART 2 – PRODUCTS

2.01 DUCTS

- A. Performance and Design Criteria:
 - 1. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission of Engineer.
- B. Materials:
- C. Galvanized-Steel Ducts:
 - 1. Material: ASTM A653 galvanized-steel sheet.
 - 2. Quality: Lock forming.
 - 3. Finish: G90 zinc coating according to ASTM A90.
- D. Fasteners: Rivets, bolts, or sheet metal screws.
- E. Hanger Rod:
 - 1. Material: Galvanized steel.
 - 2. Comply with ASTM A36.
 - 3. Type: Threaded both ends.

2.02 FABRICATION

- A. Rectangular Ducts:
 - 1. According to SMACNA 1966.
 - 2. Provide duct material, gauges, reinforcing, and sealing for indicated operating pressures.
- B. Round Ducts:
 - 1. According to SMACNA 1966
 - 2. Seams: Longitudinal.

3. Provide duct material, gauges, reinforcing, and sealing for indicated operating pressures.

C. Tees, Bends, and Elbows:

1. Minimum Radius:

- a. 1-1/2 times centerline duct width.
 - b. If it is not possible or if rectangular elbows are used, provide airfoil turning vanes.
2. If acoustical lining is indicated, furnish turning vanes of perforated metal with glass-fiber insulation.

D. Divergence:

1. Increase duct sizes gradually, not exceeding 15 degrees of divergence wherever possible.
2. Upstream of Equipment: Maximum 30 degrees.
3. Downstream of Equipment: Maximum 45 degrees.

E. Welding:

1. Continuously Welded Round and Oval Duct Fittings: Two gauges heavier than duct gauges according to SMACNA 1966.
2. Cemented Slip Joints:
 - a. Minimum 4 inches.
 - b. Brazed or electric welded.
3. Prime coat welded joints.

F. Takeoffs:

1. Provide standard 45-degree lateral wye takeoffs.
2. If not possible due to space limitations, provide 90-degree conical tee connections.

G. Sealing:

1. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.
2. Sealants, Mastics, and Tapes: Comply with UL 181A and provide products bearing appropriate UL 181A markings.

2.03 ACCESSORIES

A. Hangers and Supports:

1. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
2. Hanger Rods for Corrosive Environments: Stainless steel, Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

3. Strap and Rod Sizes:

- a. Comply with SMACNA 1966.
- b. Glass-Fiber-Reinforced Ducts: Comply with SMACNA 1884.

4. Trapeze and Riser Supports:

- a. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
- b. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
- c. Supports for Aluminum Ducts: Aluminum or galvanized steel, coated with zinc chromate.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Section 017800 - Contract Closeout: Requirements for installation examination.
- B. Verify sizes of equipment connections before fabricating transitions.

3.02 PREPARATION

- A. Section 017800 - Contract Closeout: Requirements for installation preparation.
- B. Obtain manufacturer's inspection and acceptance of fabrication and installation at beginning of installation.
- C. Install temporary closures of metal or taped PE on open ductwork to prevent construction dust from entering ductwork system.

3.03 INSTALLATION

- A. Install and seal ducts according to SMACNA 1966.
- B. Hanger and Supports:
 - 1. Fabricate and support ducts according to SMACNA 1884 and 1966.
 - 2. Threaded Rods: Provide double nuts and lock washers.
 - 3. Building Attachments:
 - a. Provide concrete inserts or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - b. If possible, install concrete inserts before placing concrete.
 - c. Powder-Actuated Concrete Fasteners:
 - i. Use only for slabs more than 4 inches thick.
 - ii. Install after concrete is placed and completely cured.
 - iii. Do not use powder-actuated concrete fasteners for seismic restraints.

4. Hanger Spacing:
 - a. Comply with SMACNA 1884 and 1966.
 - b. Install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
 - c. Extend strap supports down both sides of ducts and turn under bottom at least 1 inch.
 - d. Secure hanger to sides and bottom of ducts with sheet metal screws.
5. Hangers Exposed to View: Provide threaded rod and angle or channel supports.
6. Vertical Ducts:
 - a. Support with steel angles or channel secured to sides of duct with welds, bolts, sheet metal screws, or blind rivets.
 - b. Support at each floor and at maximum intervals of 16 feet.
7. Upper Attachments:
 - a. Attach to structures.
 - b. Selection and Sizing: Provide pull-out, tension, and shear capacities as required for supported loads and building materials.
8. Penetrations:
 - a. Avoid penetrations of ducts with hanger rods.
 - b. If unavoidable, provide airtight rubber grommets at penetrations.

C. Exhaust Outlet Locations:

1. Minimum Distance from Property Lines: 3 feet.
2. Minimum Distance from Building Openings: 3 feet.
3. Minimum Distance from Outside Air Intakes: 10 feet.

3.04 FIELD QUALITY CONTROL

A. Section 017800 - Contract Closeout: Requirements for testing, adjusting, and balancing.

B. Testing:

1. Ductwork Designed for 3-Inch wg above Ambient Pressure:
 - a. Pressure test minimum 25 percent of ductwork after duct cleaning but before duct insulation is applied or ductwork is concealed.
 - b. Comply with SMACNA 016.
 - c. Maximum Allowable Leakage: According to IECC.

3.05 CLEANING

- A. Section 017800 - Contract Closeout: Requirements for cleaning.
- B. Clean duct system and force air at high velocity through duct to remove accumulated dust.
- C. Vacuuming:
 - 1. Clean duct systems with high-power vacuum machines.
 - 2. Install access openings into ductwork for cleaning purposes.
- D. Protect sensitive equipment with temporary filters or bypass during cleaning.

3.06 ATTACHMENTS

- A. Ductwork Material Schedule:
 - 1. Supply - Heating Systems: Steel
 - 2. Supply - Systems with Cooling Coils: Steel
 - 3. Return and Relief : Steel
 - 4. General Exhaust: Steel
 - 5. Outside Air Intake: Steel.
 - 6. Intake and Exhaust: Steel.
- B. Ductwork Pressure Class Schedule:
 - 1. Constant Volume Supply: 1-inch wg, regardless of velocity.
 - 2. Supply - Systems with Cooling Coils: 1/2-inch wg.
 - 3. Return and Relief: 1/2-inch wg.
 - 4. General Exhaust: 1/2-inch wg.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Back-draft dampers.
2. Volume control dampers.
3. Flexible duct connections.
4. Duct test holes.

B. Related Sections:

1. Section 230900 - Instrumentation and Control for HVAC: Execution and Product requirements for connection and control of Combination Smoke and Fire Dampers for placement by this section.
2. Section 233100 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.

1.02 REFERENCES

A. Air Movement and Control Association International, Inc.:

1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. ASTM International:

1. ASTM E1 - Standard Specification for ASTM Thermometers.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
2. NFPA 92A - Recommended Practice for Smoke-Control Systems.

D. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

E. Underwriters Laboratories Inc.:

1. UL 555 - Standard for Safety for Fire Dampers.
2. UL 555C - Standard for Safety for Ceiling Dampers.
3. UL 555S - Standard for Safety for Smoke Dampers.

1.03 SUBMITTALS

- A. Section 013323 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers duct access doors and duct test holes.
- C. Product Data: Submit data for shop fabricated assemblies and hardware used.
- D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.
 - 1. Backdraft dampers.
 - 2. Flexible duct connections.
 - 3. Volume control dampers.
 - 4. Duct test holes.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 - Execution and Closeout Requirements: Closeout procedures.

1.05 QUALITY ASSURANCE

- A. Dampers tested, rated and labeled in accordance with the latest UL requirements.
- B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.
- C. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards.
- D. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Protect dampers from damage to operating linkages and blades.
- C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- D. Storage: Store materials in a dry area indoor, protected from damage.
- E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finish during handling and installation to prevent damage.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Section 017800 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for duct accessories.

PART 2 – PRODUCTS

2.01 BACK-DRAFT DAMPERS

- A. Product Description: Multi-Blade, back-draft dampers: Parallel-action, gravity-balanced, Galvanized 16 gauge thick steel, Blades, maximum 6 inch width, center pivoted, with felt or flexible vinyl sealed edges. Blades linked together in rattle-free manner with 90-degree stop, steel ball bearings, and plated steel pivot pin. Furnish dampers with adjustment device to permit setting for varying differential static pressure.

2.02 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated on Drawings.
- B. Quadrants:
 - 1. Furnish locking, indicating quadrant regulators on single and multi-blade dampers.
 - 2. On insulated ducts mount quadrant regulators on standoff mounting brackets, bases, or adapters.
 - 3. Where rod lengths exceed 30 inches furnish regulator at both ends.

2.03 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Connector: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric conforming to NFPA 90A, minimum density 30 oz per sq yd.
 - 2. Net Fabric Width: Approximately 3 inches wide.
 - 3. Metal: 3 inch wide, 24 gage galvanized steel.
- C. Lead Vinyl Sheet: Minimum 0.55 inch thick, 0.87 lbs. per sq ft, 10 dB attenuation in 10 to 10,000 Hz range.

2.04 DUCT TEST HOLES

- A. Permanent Test Holes: Factory fabricated, airtight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify rated walls are ready for fire damper installation.
- B. Verify ducts and equipment installation are ready for accessories.
- C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.02 INSTALLATION.

- A. Install in accordance with NFPA 90A and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 233100 for duct construction and pressure class.
- B. Install back-draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated on Drawings.
- C. Install permanent duct test holes required for testing and balancing purposes.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- B. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 34 00

HVAC FANS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. ~~Upblast centrifugal roof fans.~~ **N/A**
2. ~~Roof ventilators.~~ **N/A**
3. Outside air supply fan (Greenheck m# SQ-95-VG)

B. Related Sections:

1. Section 230513 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.
2. Section 230548 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for resilient mountings and snubbers for fans for placement by this section.
3. Section 230700 - HVAC Insulation: Product requirements for power ventilators for placement by this section.
4. Section 230900 - Instrumentation and Control for HVAC: Product requirements for control components to interface with fans
5. Section 230923 - Direct-Digital Control System for HVAC: Controls remote from unit.
6. Section 233100 - HVAC Ducts and Casings: Product requirements for hangers for placement by this section.
7. Section 233300 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.
8. Section 260503 - Equipment Wiring Connections: Execution and product requirements for connecting equipment specified by this section.

1.02 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:

1. AMCA 99 - Standards Handbook.
2. AMCA 204 - Balance Quality and Vibration Levels for Fans.

3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.
4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.
5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:

1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. ASTM International:

1. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

E. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.
2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. Underwriters Laboratories Inc.:

1. UL 705 - Power Ventilators.

1.03 PERFORMANCE REQUIREMENTS

- A. Wind-Borne Debris Loads: Design louvers located within 30 feet of grade to withstand ASTM E1996; large missile impact test.

1.04 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.
- C. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions: Submit fan manufacturer instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.05 CLOSEOUT SUBMITTALS

- A. Section 017000 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.06 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210.

- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- D. Balance Quality: Conform to AMCA 204.
- E. Perform Work in accordance with Miami Dade County Department of Transportation and Public Works standards.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' documented experience.

1.08 PRE-INSTALLATION MEETINGS

- A. Section 013000 - Administrative Requirements: Pre-installation meeting.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Protect motors, shafts, and bearings from weather and construction dust.

1.10 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.11 WARRANTY

- A. Section 017000 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish one-year manufacturer's warranty for fans.

1.12 MAINTENANCE SERVICE

- A. Section 017800 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Furnish service and maintenance of fans for one year from Date of Substantial Completion.
- C. Examine components monthly. Clean, adjust, and lubricate equipment.
- D. Include systematic examination, adjustment, and lubrication of fans, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data. Use parts produced by manufacturer of original equipment.
- E. Perform work without removing fans from service during building normal occupied hours.
- F. Provide emergency callback service at all hours for this maintenance period.
- G. Maintain locally, near Place of the Work, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.

- H. Perform maintenance work using competent and qualified personnel under supervision and in direct employ of manufacturer or original installer.
- I. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of Owner

1.13 EXTRA MATERIALS

- A. Section 017800 - Execution and Closeout Requirements: Spare parts and maintenance products.

PART 2 – PRODUCTS

2.01 CENTRIFUGAL FANS (**SEE SECTION 23 34 23**)

A. Manufacturers:

- 1. Greenheck SQ-95-VG
- 2. Substitutions: Section 016200 – Substitutions and Product Options.
- 3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.

- B. Fan Unit: inline mount type. direct drive, spun aluminum housing with grease tray; resilient mounted motor; aluminum wire bird screen; square base to install in outside air duct to connect to AC air handler unit.

- C. ~~Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid position; fan shaft with self-aligning pre-lubricated ball bearings.~~ **N/A**

- D. Motor: Totally enclosed fan cooled.

- E. ~~Roof Curb: aluminum construction with continuously welded seams , hinged curb adapter, and factory installed nailer strip.~~ **N/A**

- F. ~~Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor NEMA 250 Type 4 enclosure.~~ **N/A**

G. Accessories:

- 1. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked
- 2. ~~Factory Two-Speed Fan Controller~~ **N/A**

2.02 ~~GRAVITY ROOF VENTILATORS~~ **N/A**

A. Manufacturers:

- 1. Greenheck
- 2. Substitutions: Section 016200 – Substitutions and Product Options.

3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.
- B. ~~Product Description: Square type, with aluminum housing; aluminum wire bird screen; square base to suit roof curb with continuous curb gaskets. N/A~~
- C. ~~Roof Curb: aluminum construction with continuously welded seams, hinged curb adapter, and factory installed nailer strip. N/A~~

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Section 013000 - Administrative Requirements: Coordination and project conditions.

3.02 INSTALLATION

- A. Secure roof fans and gravity ventilators with stainless steel lag screws to roof curb per manufacturers recommendations to maintain high wind rating.
- B. Install backdraft dampers on inlet to roof exhaust fans.
- C. Install safety screen where inlet or outlet is exposed.
- D. Pipe scroll drains to nearest floor drain.
- E. Install backdraft dampers on discharge of exhaust fans.
- F. Provide sheaves required for final air balance.

3.03 MANUFACTURER'S FIELD SERVICES

- A. Furnish services of factory trained representative for minimum of one day to start-up, calibrate controls, and instruct Owner on operation and maintenance.

3.04 CLEANING

- A. Section 017800 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Vacuum clean coils and inside of fan cabinet.

3.05 DEMONSTRATION

- A. Section 017800 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Demonstrate fan operation.

3.06 PROTECTION OF FINISHED WORK

- A. Section 017800 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test-run under observation.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 34 23
INLINE SUPPLY FANS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: HVAC Power Ventilators
- B. Related Sections:
 - 1. 01 00 00 General Requirements
 - 2. 07 00 00 Thermal and Moisture Protection
 - 3. 09 00 00 Finishes
 - 4. 23 00 00 Heating, Ventilating, and Air-Conditioning (HVAC)
 - 5. 26 00 00 Electrical

1.02 REFERENCES

- A. Air Movement and Control Association Inc. (AMCA):
 - 1. 99 - Standards Handbook
 - 2. 200 - Publication, Air Systems
 - 3. 201-90 - Publication, Fans and Systems
 - 4. 202-88 - Publication, Troubleshooting
 - 5. 203-90 - Publication, Field Performance Measurement of Fan Systems
 - 6. 211-05 - Publication, Certified Ratings Program – Product Rating Manual for Fan Air Performance
 - 7. 300-96 - Standard Reverberant Room Method for Sound Testing of Fans
 - 8. 311-05 - Publication Certified Ratings Program – Product Rating Manual for Fan Sound Performance
 - 9. 99-0401-86 - Classification for Spark Resistant Construction
 - 10. 99-2408-69 - Operating Limits for Centrifugal Fans
- B. Air Movement and Control Association Inc. (AMCA), American National Standards Institute (ANSI):
 - 1. 204-05 - Standard Balance Quality and Vibration Levels for Fans
 - 2. 210-99 - Standard Laboratory Methods of Testing Fans for Aerodynamic Performance Rating
- C. American National Standards Institute (ANSI):
 - 1. 11-r1999 - Method of Evaluating Load Ratings of Bearings

D. American Society of Civil Engineers (ASCE):

1. 7-02 - Minimum Design Loads for Building and Other Structures

E. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE):

1. Chapter 45 - 2003 Handbook, HVAC Applications
2. Chapter 7 - 2001 Fundamentals handbook, Sound-Vibration
3. Chapter 32 - 2001 Fundamentals handbook, Duct Design
4. Chapter 18 - 1992 HVAC System and Equipment handbook, Fans

F. American Society for Testing and Materials (ASTM):

1. E330-02 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylight and Curtain Walls by Uniform Static Air Pressure Difference

G. National Fire Protection Association (NFPA):

1. 70 - National Electrical Code
2. 90A-02 - Standard for the Installation of Air-Conditioning and Ventilating Systems
3. 92A-06 - Recommend Practice for Smoke-Control System
4. 92B-05 - Standard for Smoke Management System in Malls, Atria, and Large Areas
5. 96-04 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

H. Occupational Safety and Health Administration (OSHA):

1. 1910.212 - General requirements for Machine Guarding
2. 1910.219 - General requirements for guarding safe use of mechanical power transmission apparatus
3. 1926.300 - General requirements for safe operation and maintenance of hand and power tools

I. Underwriters Laboratories (UL):

1. 507 - Electric Fans
2. 555 - Fire Dampers
3. 555S - Smoke Dampers
4. 705 - Standard Power Ventilators
5. 762 - Standard Power Roof Ventilators for Restaurant Exhaust Appliances

1.03 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00 Submittal Procedures

- B. Provide dimensional drawings and product data on each fan
- C. Provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted
- D. Provide outlet velocity and fan's inlet sound power readings for the eight octave bands, decibels, and sones
- E. Strictly adhere to QUALITY ASSURANCE requirements as stated in section 1.04 of this specification
- F. Provide manufacturer's certification that fans are licensed to bear Air Movement and Control Association (AMCA), Certified Rating Seal for FEI, Sound and Air Performance
- G. Provide fan FEI value on design documents and product submittals when operating power is greater than or equal to 1 hp
- H. Installation, Operation, and Maintenance Manual (IOM): Provide manufacturer's installation, operations, and maintenance manual, including instructions on installation, operations, maintenance, pulley adjustment, receiving, handling, storage, safety information and cleaning. A troubleshooting guide, parts list, warranty and electrical wiring diagrams

1.04 QUALITY ASSURANCE

- A. Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-16 and AMCA Standard 300-14 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for sound, air, and FEI performance seal
- B. Fans shall have a Fan Energy Index (FEI) rating that meets or exceeds requirements of the latest edition of ASHRAE 90.1
- C. Classification for Spark Resistant Construction Conform to AMCA 9
- D. Each fan shall be given a balancing analysis which is applied to wheels at the outside radius. The maximum allowable static and dynamic imbalance is 0.05 ounces (Balance grade of G6.3)
- E. Comply with the National Electrical Manufacturers Association (NEMA), standards for motors and electrical accessories
- F. The High Wind models shall be analyzed and stamped by a state license P.E. to the ASCE 7-02 Standard which meets the IBC, Florida and Miami-Dade codes
- G. Each High Wind model is subject to be certified by a third party to the ASTM E330 Static Pressure Difference Standard
- H. All High Wind models shall be analyzed using Computational Fluid Dynamics (CFD). The CFD simulates the flow of high speed (150MPH) winds over the surface of objects
- I. The Finite Element Analysis (FEA) is the results from the CFD, and it can accurately predict the stress, strain, and deflection resulting from high wind loads

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation

- B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions. For long term storage follow manufacturer's Installation, Operations, and Maintenance Manual
- C. Handling: Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer.

1.06 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
 - 1. The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturers option when returned to Manufacturer, transportation prepaid.
 - 2. Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

1.07 MAINTENANCE

- A. Refer to Manufacturer's Installation, Operation and Maintenance Manual (IOM), to find maintenance procedures

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. Greenheck, PO Box 410, Schofield, Wisconsin 54476. Phone (715) 359-6171. Fax (715)355-2399. Website: www.greenheck.com

2.02 DIRECT DRIVE INLINE FANS - GREENHECK MODEL SQ-95-VG

- A. General Description:
 - 1. Base fan performance at standard conditions (density 0.075 Lb./ft³)
 - 2. Performance capabilities up to 27,800 cubic feet per minute (cfm) and static pressure to 3.0 inches of water gauge
 - 3. Fans are available in twenty-four sizes with nominal wheel diameters ranging from 7 inches through 33 inches
 - 4. Continuous operating temperature range of -10° Fahrenheit (-23.3° Celsius) to 130° Fahrenheit (54.4° Celsius)
 - 5. Applications include supply, exhaust, return, or make-up air systems
 - 6. UL-705 certified for indoor (standard) and outdoor applications (must configure fan for outdoor use to allow outdoor installation)

7. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number

B. Wheel:

1. Constructed of [composite]
2. Wheel type to be [non-overloading, backward inclined centrifugal wheel]
3. Statically and dynamically balanced in accordance to AMCA Standard 204-05
4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency.
5. Single thickness blades are securely riveted or welded to a heavy gauge back plate and wheel cone.

C. Motor:

1. Electronically Commutated Motor
 - a. Motor enclosures: [Totally Enclosed Non-Vented]
 - b. Electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors.
 - c. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
 - d. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor or integrated variable frequency drive.
 - e. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal.
 - f. Motors can achieve up to 95% efficiency, model and horsepower dependent.

D. Housing/Cabinet Construction:

1. Construction material: [Galvanized]
2. Square design constructed of heavy gauge galvanized steel, aluminum or painted steel

E. Inlet Cone:

1. Construction material: [Galvanized]

F. Housing Supports and Drive Frame:

1. Drive Frame is constructed of structural steel with formed flanges.

G. Disconnect Switch:

1. NEMA Rated: [1]

2. Positive electrical shut-off
 3. Wired from fan motor to junction box
- H. Duct Collar:
1. [Square Duct Mounting Collar]
 - a. Inlet and discharge collars provide easy slip fit duct connection
 - b. Square design to provide a large discharge area
- I. Access Panel:
1. Two sided access panels, permit easy access to all internal components
 2. Located perpendicular to the motor mounting panel
- J. Options/Accessories:
1. Damper:
 - a. Type: [Motorized] model VCD-43
 - b. Galvanized frames with pre-punched mounting holes
 - c. Balanced for minimal resistance to flow
 2. Finishes:
 - a. Coating: [Hi-Pro Polyester]
 3. Inlet and Outlet Guards:
 - a. Metal construction to provide protection for non-ducted installations
 4. Insulated Housing
 - a. Thickness: 1 inch
 - b. For noise reduction and condensation control
 - c. Constructed of fiberglass liner
 5. Isolation:
 - a. Type: [Neoprene/Rubber Mount]
 - b. Sized to match the weight of each fan
 6. Motor Cover:
 - a. Constructed of galvanized steel
 - b. Covers motor and drives for safety

- c. Standard on unit specified with UL and ODP motor enclosures
- 7. Pressure Probe:
 - a. 1/4 inch diameter tube in fan venturi that allows hook up to manometer
- 8. Wiring Pigtail:
 - a. Direct hook-up to the power supply

PART 3 – EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions.

3.02 EXAMINATION

- A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

3.03 PREPARATION

- A. Ensure roof openings are square, accurately aligned, correctly located, and within tolerance.
- B. Ensure duct is plumb, sized correctly, and to proper elevation above roof deck. Install duct as specified in Air Distribution (Division 23).

3.04 INSTALLATION

- A. Install fan as indicated on the Installation, Operation and Maintenance Manual (IOM) & contract drawings.
- B. Install fans in accordance with manufacturer's instructions.

3.05 SYSTEM STARTUP

- A. Refer to Installation, Operation, and Maintenance Manual (IOM).

3.06 ADJUSTING

- A. Adjust exhaust fans to function properly and check wheel overlap

3.07 CLEANING

- A. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction.

3.08 PROTECTION

- A. Protect installed product and finished surfaces from damage during construction.
- B. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 23 64 00

AIR COOLED WATER CHILLER

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled scroll compressor chillers.

1.01 REFERENCES

- A. Comply with applicable Standards/Codes of AHRI 550/590, ANSI/ASHRAE 15, ETL, cETL, NEC, and OSHA as adopted by the State.
- B. Units shall meet the efficiency standards of the current version of ASHRAE Standard 90.1, and FEMP standard 2012.

1.02 SUBMITTALS

- A. Submit shop drawings and product data in accordance with the specifications.
- B. Submittals shall include the following:
 - 1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
 - 2. Summary of all auxiliary utility requirements such as electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
 - 3. Single line schematic drawing of the field power hookup requirements, indicating all items that are furnished.
 - 4. Schematic diagram of control system indicating points for field interface/connection.
 - 5. Diagram shall fully delineate field and factory wiring.
 - 6. Installation and operating manuals.

1.03 QUALITY ASSURANCE

- A. Qualifications: Equipment manufacturer must specialize in the manufacture of the products specified and have five years' experience with the type of equipment and refrigerant offered.
- B. Regulatory Requirements: Comply with the codes and standards specified.
- C. Chiller manufacturer plant must be ISO Registered.

1.05 DELIVERY AND HANDLING

- A. Chiller shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.
- B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.06 WARRANTY

- A. 1st Year Entire Unit Parts & Labor Warranty
- B. Extended Warranty: after initial warranty, another 4 Years Entire Unit Parts & Labor
- C. Refrigerant Warranty: None.
- D. Delay Warranty Start: None.

1.07 MAINTENANCE

- A. Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer's instructions.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Daikin Applied
- B. (Approved Equal)

2.02 UNIT DESCRIPTION

- A. Provide and install as shown on the plans factory-assembled, factory-charged air-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of hermetic tandem scroll compressor sets, brazed plate evaporator, air-cooled condenser section, microprocessor-based control system and all components necessary for controlled unit operation.
- B. Chiller shall be functionally tested at the factory to ensure trouble free field operation

2.03 DESIGN REQUIREMENTS

- A. Flow Range: The chiller shall have the ability to support variable flow range down to 40% of nominal design (based on AHRI conditions).
- B. Operating Range: The chiller shall have the ability to control leaving chilled fluid temperature from 15F to 65F.
- C. General: Provide a complete scroll compressor packaged chiller as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes in effect.
- D. Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum percentage of full load (without hot gas bypass) of 25%. Performance shall be in accordance with AHRI Standard 550/590.
- E. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. All manufacturers shall provide the necessary sound treatment (parts and labor) to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with AHRI Standard 370.

| Sound Pressure (at 30 feet) | | | | | | | | | | | |
|-----------------------------|--------|--------|--------|---------|---------|---------|---------|-------------|--------------|--------------|--------------|
| 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz | Overall dBA | 75% Load dBA | 50% Load dBA | 25% Load dBA |
| | | | | | | | | | | | |
| Sound Power | | | | | | | | | | | |
| 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz | Overall dBA | 75% Load dBA | 50% Load dBA | 25% Load dBA |
| | | | | | | | | | | | |

2.04 CHILLER COMPONENTS

A. Compressor

1. The compressors shall be sealed hermetic, scroll type with crankcase oil heater and suction strainer. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all three phases and shall be mounted on RIS vibration isolator pads. The compressors shall be equipped with an internal module providing compressor protection and communication capability.

B. Evaporator

1. The evaporator shall be a compact, high efficiency, dual circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless-steel plates. Vent and drain connections shall be provided in the inlet and outlet chilled water piping by the installing contractor.
2. The evaporator shall be protected with an external, electric resistance heater plate. The evaporator shall be insulated with 1.5" (38mm) thick CFC and HCFC-free closed-cell flexible elastomeric foam insulation material with 100% adhesive coverage. Suction piping to the compressors shall be insulated with similar foam insulation material of 0.75" (19 mm) thickness. The insulation shall have an additional outer protective layer of 3mm thick PE embossed film to provide superior damage resistance. Insulation without the protective outer film shall not be acceptable. UV resistance level shall meet or exceed a rating of 'Good' in accordance with the UNI ISO 4892 - 2/94 testing method. This combination of a heater plate and insulation shall provide freeze protection down to -20°F (-29°C) ambient air temperature.
3. The water-side maximum design pressure shall be rated at a minimum of 469 psig (3235 kPa). Evaporators shall be designed and constructed according to, and listed by, Underwriters Laboratories (UL).

A. Condenser

1. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct-drive fan motors. The fans shall be equipped with a heavy-gauge vinyl-coated fan guard. Fan motors shall be TEAO type with permanently lubricated ball bearings, inherent overload protection, three-phase, direct-drive, 1140 rpm. Each fan section shall be partitioned to avoid cross circulation.
2. Coil shall be microchannel design and shall have a series of flat tubes containing multiple parallel flow microchannels layered between the refrigerant manifolds. Tubes shall be 9153 aluminum alloy. Tubes made of 3102 alloys or other alloys of lower corrosion resistance shall not be accepted. Coils shall consist of a two-pass arrangement. Each condenser coil shall be factory leak tested with high-pressure air under water. Condenser coils shall include baked epoxy coating providing 10,000+ hour salt spray resistance (ASTM B117-90) applied to both the coil and the coil frames.

D. Refrigerant Circuit

1. Each of the two refrigerant circuits shall include a replaceable-core refrigerant filter-drier, sight glass with moisture indicator, liquid line solenoid valve (no exceptions), expansion valve, and insulated suction line.

E. Construction

1. Unit formed sheet metal components shall be painted using a corrosion resistant paint system, for aesthetics and long-term durability. Paint system will include a base primer with a high-quality polyester resin topcoat. Painted galvanized parts shall be G60 or greater and finished, unabraded panel surfaces shall be capable to be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment.
2. Upper and lower section of unit shall have protective and decorative louvers covering the coils and unit end and have painted steel wraps enclosing the coil end sections and piping.

F. Control System

1. A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Box shall be designed in accordance with NEMA 3R rating. Power and starting components shall include factory circuit breaker for fan motors and control circuit, individual contactors for each fan motor, solid-state compressor three-phase motor overload protection, inherent fan motor overload protection and two power blocks (one per circuit) for connection to remote, contractor supplied disconnect switches. Hinged access doors shall be lockable. Barrier panels or separate enclosures are required to protect against accidental contact with line voltage when accessing the control system.
2. Shall include high short circuit current rating of 65,000 amps with single-point disconnect switch

G. Unit Controller

1. An advanced DDC microprocessor unit controller with a 5-line by 22-character liquid crystal display provides the operating and protection functions. The controller shall take preemptive limiting action in case of high discharge pressure or low evaporator pressure. The controller shall contain the following features as a minimum:
2. The unit shall be protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.
3. Shutdown Alarms
 - a. No evaporator water flow (auto-restart)
 - b. Sensor failures
 - c. Low evaporator pressure
 - d. Evaporator freeze protection
 - e. High condenser pressure
 - f. Outside ambient temperature (auto-restart)

- g. Motor protection system
 - h. Phase voltage protection (REQUIRED)
4. Limit Alarms
- a. Condenser pressure stage down, unloads unit at high discharge pressures.
 - b. Low ambient lockout shuts off unit at low ambient temperatures.
 - c. Low evaporator pressure holds stage #1 until pressure rises.
 - d. Low evaporator pressure unload shuts off one compressor.
5. Unit Enable Section
- a. Enables unit operation from either local keypad, digital input, or BAS
6. Unit Mode Selection
- a. Selects standard cooling, ice, glycol, or test operation mode
7. Analog Inputs:
- a. Reset of leaving water temperature, 4-20 mA\
 - b. Current Limit
8. Digital Inputs:
- a. Unit off switch
 - b. Remote start/stop
 - c. Flow switch
 - d. Ice mode switch, converts operation and setpoints for ice production
 - e. Motor protection
9. Digital Outputs
- a. Shutdown alarm: field wired, activates on an alarm condition, off when alarm is cleared
 - b. Evaporator pump: field wired, starts pump when unit is set to start
10. Condenser fan control - The unit controller shall provide control of condenser fans based on compressor discharge pressure.
11. Building Automation System (BAS) Interface
- a. Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® network via one of the data links / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.

- b. BACnet MS/TP master (Clause 9)
- c. BACnet IP, (Annex J)
- d. BACnet ISO 8802-3, (Ethernet)
- e. The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.
- f. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.

2.05 OPTIONS AND ACCESSORIES

A. The following options are to be included:

1. Hot Gas Bypass: allows unit operation to 10 percent of full load. Includes factory-mounted hot gas bypass valve, solenoid valve, and manual shutoff valve for each circuit.
2. Rapid Restore™: The chiller shall be equipped with the capability to restart and to reach full load more quickly than standard in case of a power interruption. The chiller shall be capable of rapidly restarting after power loss duration of up to 180 seconds. The time to restart the chiller shall be a maximum of 125 seconds, and full load shall be achieved in 220 seconds from power restoration. Fast Loading Stand-By Chiller: The chiller shall be equipped with the capability to start and to reach full load more quickly than standard in the event that the primary chiller system is disabled. The chiller shall be capable of rapidly achieving full capacity. The time to full load shall be achieved in 115 seconds.
3. Low Ambient Control: Fan VFD allows unit operation from 32°F down to -4°F (-23.3 C).
4. High Ambient Control Panel for operation from 105°F up to 125°F ambient temperatures
5. Ground Fault Protection: Factory installed circuit breaker to protect equipment from damage from line-to-ground fault currents less than those required for conductor protection.
6. Phase loss with under/over voltage protection and with LED indication of the fault type to guard against compressor motor burnout.
7. BAS interface module to provide interface with a combination of BACnet IP, BACnet MSTP, and Modbus protocols.
8. Compressor Sound Reduction - Acoustic reduction blankets shall be factory installed on each compressor.
9. The following accessories, if selected, are to be included:
 - a. Spring vibration isolators for field installation
 - b. Rubber-in-shear vibration isolators for field installation
 - c. Factory-mounted thermal dispersion type flow switch
 - d. Field-mounted, paddle type, chilled water flow switch field wired to the control panel.

- e. Wye strainer, to be installed at the evaporator inlet and sized for the design flow rate , with perforation diameter of 0.063" with blowdown valve and Victaulic couplings (factory mounted or field installed)
 - f. 115V GFI convenience outlet
- B. Optional Factory-Installed Pump Package: The pump package shall be factory mounted and wired on the chiller. The chiller controller shall provide a pump start/stop signal when operation is required. On dual pump systems, the chiller shall also provide automatic alternating of pump starts and duty/standby functionality. The package shall be equipped with:
- 1. Dual Pumps in a Single Casting Models 4372: single-spring inside-seal vertical, in-line, radially split-case pumps, mounted in a common casing with a common inlet connection and outlet connection and including a flapper valve to prevent recirculation when only one pump is operating. The pumps shall be designed for duty/standby, not parallel operation. Pump package shall also be equipped with:
 - a. "Y" type inlet strainer
 - b. Pump VFD for variable chilled water flow capability
 - c. Water pressure gauges (suction and discharge) shall be factory installed.
 - d. Combination triple-duty outlet valve having a drip-tight discharge shutoff valve, non-slam check valve, and flow throttling valve
 - e. Combination suction guide with flow stabilizing outlet vanes and stainless-steel strainer with a disposable fine-mesh strainer for start-up
 - f. Factory power and control wiring from the chiller to the pump package control panel
 - g. Flow switch mounted and wired
 - h. Interconnecting schedule 40 piping with Victaulic couplings
 - i. Insulation of all cold surfaces

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.
- B. Adjust and level chiller in alignment on supports.
- C. Coordinate electrical installation with electrical contractor.
- D. Coordinate controls with control contractor.
- E. Install a field-supplied or optional manufacturer-supplied strainer in the chilled water return line at the evaporator inlet that meets manufacturer perforation size specifications.

3.02 START-UP

Provide testing and starting of machine and instruct the Owner in its proper operation and maintenance.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #1, Air Cooled Chiller & Installation, in the Bid Form.

END OF SECTION

SECTION 23 82 00

CONVECTION HEATING AND COOLING UNITS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fan coil units.

B. Related Sections:

1. Section 230513 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.
2. Section 230700 - HVAC Insulation: Execution requirements for insulation specified by this section.
3. Section 232113 - Hydronic Piping: Execution requirements for connection of chilled water, hot water, and drain piping to units specified by this section.
4. Section 232116 - Hydronic Piping Specialties: Product requirements for hydronic piping specialties for placement by this section.
5. Section 233100 - HVAC Ducts and Casings: Execution requirements for ducts specified by this section.

1.02 REFERENCES

A. Air-Conditioning and Refrigeration Institute:

1. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.

B. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.03 SUBMITTALS

A. Section 013323 – Shop Drawings: Submittal procedures.

B. Shop Drawings: Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations. Indicate schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers.

C. Product Data: Submit coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions. Submit mechanical and electrical service locations, capacities and accessories or optional items.

D. Manufacturer's Installation Instructions: Submit assembly, support details, and connection requirements.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.04 CLOSEOUT SUBMITTALS

- A. Section 017800 - Contract Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access to valves.
- C. Operation and Maintenance Data: Submit manufacturers descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.05 QUALITY ASSURANCE

- A. Perform Work according to Miami Dade County Department of Transportation and Public Works standards.
- B. Maintain one copy of each document on site.

1.06 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years' documented experience.

1.07 PRE-INSTALLATION MEETINGS

- A. Section 013119 – Project Meetings: Pre-installation meeting.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Product storage and handling requirements.
- B. Accept units on site in factory packing. Inspect for damage. Store under roof.
- C. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 017800 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. ~~Furnish five-year~~ manufacturer's warranty for fan-coil unit and motors. **N/A existing unit to be re-installed.**

1.11 EXTRA MATERIALS

- A. Section 017800 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Furnish two sets of filters.

PART 2 – PRODUCTS

2.01 FAN COIL UNITS

- A. Manufacturers:
 - 1. Dual Air by Coldflow (Existing unit.)
 - 2. Substitutions: Section 016000 - Product Requirements.
 - 3. Furnish materials and equipment according to Miami Dade County Department of Transportation and Public Works standards. The County shall be the sole judge of equality, based on the best interest of the County, and its decision in this regard shall be final.
- B. Coils: Evenly spaced aluminum fins mechanically bonded to copper tubes, designed for 200 psi and 220 degrees F. Furnish drain pan under cooling coil, easily removable for cleaning, with drain connection.
- C. Cabinet: 0.0598 inch thick steel with exposed corners and edges rounded, easily removed panels, glass fiber insulation.
- D. Finish: Factory apply baked primer coat on visible surfaces of enclosure or cabinet.
- E. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- F. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
- G. Control: Multiple speed switch, factory wired, located in cabinet.
- H. Filter: Easily removed 2" angle type furnished with MERV 8 deep pleated panel filters., located to filter air before coil.
- I. Capacity: As indicated on Drawings.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. For recessed units, verify recess dimensions are correct size.
- B. Verify ductwork is ready for installation.
- C. Verify concealed blocking and supports are in place and connections are correctly located.

3.02 INSTALLATION

- A. Install air coils in ducts and casings in accordance with SMACNA HVAC Duct Construction Standards, Metal and Flexible. Refer to Section 233100.
- B. Support air coil sections independent of piping on steel channel or double angle frames and secure to casings. Furnish frames for maximum three coil sections. Arrange supports to avoid piercing drain pans. Install with airtight seal between coil and duct or casing.
- C. Protect coils to prevent damage to fins and flanges. Comb out bent fins.
- D. Make connections to coils with unions and flanges.

- E. On water coils, install shut-off valve on supply piping and lock shield balancing valve on return piping. Locate water supply at bottom of supply header and return water connection at top. Install float operated automatic air vents at high points complete with stop valve. Install water coils to be drainable and install drain connection at low points. Refer to Section 232113.
- F. On water heating coils, and chilled water cooling coils, connect water supply piping to leaving airside of coil (counter flow arrangement). Refer to Section 232113.
- G. For cooling coils where air velocity exceeds 500 ft/min, install six break moisture eliminators of 24 gage galvanized steel.
- H. Install insulation on air coil casings. Refer to Section 230700.
- I. Install drain pan and drain piping connection for cooling coils. Fabricate drain pan from 20 gauge galvanized steel. Extend 3 inches from face of coil entering air side, 6 inches from face of coil leaving air side, and 4 inches from face of eliminators. Pipe drain pans individually to existing drain piping with water seal trap. Refer to Section 232113.
- J. Insulate headers located outside airflow, insulate as specified for piping. Refer to Section 230700.
- K. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- L. Protection: Install finished cabinet units with protective covers during remainder of construction.
- M. Fan-Coil Units: Install at locations as indicated on Drawings. Coordinate to assure correct recess size for recessed units.
- N. Units with Cooling Coils: Install drain piping to condensate drain. Refer to Section 232113.

3.03 CLEANING

- A. Section 017800 - Execution and Closeout Requirements: Final cleaning.
- B. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.
- D. Install new filters.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #4, HVAC (FCU's, Fans, Outside air control devices, etc.) & Installation, in the Bid Form.

END OF SECTION

SECTION 26 00 10

SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Supplemental requirements generally applicable to the Work specified in Division 26. This Section is also referenced by related Work specified in other Divisions.

1.02 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. A: Ampere, unit of electrical current.
2. AC or ac: Alternating current.
3. AFCI: Arc-fault circuit interrupter.
4. AIC: Ampere interrupting capacity.
5. AL, Al, or ALUM: Aluminum.
6. ATS: Automatic transfer switch.
7. AWG: American wire gauge; see ASTM B258.
8. BAS: Building automation system.
9. BIL: Basic impulse insulation level.
10. CB: Circuit breaker.
11. CU-AL or AL-CU: Copper-aluminum.
12. DC or dc: Direct current.
13. DDC: Direct digital control (HVAC).
14. EGC: Equipment grounding conductor.
15. EMF: Electromotive force.
16. EMI: Electromagnetic interference.
17. EPS: Emergency power supply.
18. EPSS: Emergency power supply system.
19. fc: Footcandle, an internationally recognized unit of illuminance equal to one lumen per square foot or 10.76 lx. The simplified conversion 1 fc = 10 lx in the Specifications is common practice and considered adequate precision for building construction activities. When there are conflicts, lux is the primary unit; footcandle is specified for convenience.

20. FLC: Full-load current.
21. GEC: Grounding electrode conductor.
22. GFCI: Ground-fault circuit interrupter.
23. GFPE: Ground-fault protection of equipment.
24. GND: Ground.
25. HACR: Heating, air conditioning, and refrigeration.
26. HDPE: High-density polyethylene.
27. HP or hp: Horsepower.
28. HVAC: Heating, ventilating, and air conditioning.
29. Hz: Hertz.
30. IBT: Intersystem bonding termination.
31. inch: Inch. To avoid confusion, the abbreviation "in." is not used.
32. IP: Ingress protection rating (enclosures); Internet protocol (communications).
33. IR: Infrared.
34. IS: Intrinsically safe.
35. kAIC: Kiloampere interrupting capacity.
36. kcmil or MCM: One thousand circular mils.
37. kV: Kilovolt.
38. kVA: Kilovolt-ampere.
39. kVA_r or kVAR: Kilovolt-ampere reactive.
40. kW: Kilowatt.
41. kWh: Kilowatt-hour.
42. LAN: Local area network.
43. LED: Light-emitting diode.
44. Li-ion: Lithium-ion.
45. lm: Lumen, the SI derived unit of luminous flux.
46. LRC: Locked-rotor current.
47. LV: Low voltage.

48. m: Meter.
49. MCC: Motor-control center.
50. MLO: Main lugs only.
51. MV: Medium voltage.
52. MVA: Megavolt-ampere.
53. mW: Milliwatt.
54. MW: Megawatt.
55. MWh: Megawatt-hour.
56. NC: Normally closed.
57. Ni-Cd: Nickel-cadmium.
58. Ni-MH: Nickel-metal hydride.
59. NO: Normally open.
60. OCPD: Overcurrent protective device.
61. PF or pf: Power factor.
62. PLC: Programmable logic controller.
63. PLFA: Power-limited fire alarm.
64. PoE: Power over Ethernet.
65. PV: Photovoltaic.
66. PVC: Polyvinyl chloride.
67. pW: Picowatt.
68. RFI: (electrical) Radio-frequency interference; (contract) Request for interpretation.
69. RMS or rms: Root-mean-square.
70. RPM or rpm: Revolutions per minute.
71. SCADA: Supervisory control and data acquisition.
72. SCR: Silicon-controlled rectifier.
73. SPD: Surge protective device.
74. sq.: Square.
75. SWD: Switching duty.

76. TCP/IP: Transmission control protocol/Internet protocol.
77. TEFC: Totally enclosed fan-cooled.
78. TR: Tamper resistant.
79. TVSS: Transient voltage surge suppressor.
80. UL: (standards) Underwriters Laboratories, Inc.; (product categories) UL, LLC.
81. UPS: Uninterruptible power supply.
82. UV: Ultraviolet.
83. V: Volt, unit of electromotive force.
84. V(ac): Volt, alternating current.
85. V(dc): Volt, direct current.
86. VA: Volt-ampere, unit of complex electrical power.
87. VAR: Volt-ampere reactive, unit of reactive electrical power.
88. VFC: Variable-frequency controller.
89. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
90. W: Watt, unit of real electrical power.
91. Wh: Watt-hour, unit of electrical energy usage.
92. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. ARC: Aluminum rigid conduit.
2. EMT: Electrical metallic tubing.
3. NT: Electrical nonmetallic tubing.
4. FMC: Flexible metal conduit.
5. IMC: Steel electrical intermediate metal conduit.
6. LFMC: Liquidtight flexible metal conduit.
7. LFNC: Liquidtight flexible nonmetallic conduit.
8. PVC: Rigid PVC conduit.
9. SCH-40: Schedule 40 rigid PVC conduit.

10. SCH-80: Schedule 80 rigid PVC Conduit.
11. PVC-EB: Type EB rigid PVC concrete-encased underground conduit.
12. RGS: Rigid galvanized steel.
13. RMC: Rigid metallic conduit.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. AC: Armored cable.
2. CI: Circuit integrity cable.
3. CM: Communications general-purpose cable.
4. CMG: Communications general-purpose cable.
5. CMP: Communications plenum cable.
6. CMR: Communications riser cable.
7. MC: Metal-clad cable.
8. MI: Mineral-insulated, metal-sheathed cable.
9. MTW: (machine tool wiring) Moisture-, heat-, and oil-resistant thermoplastic cable.
10. MV: Medium-voltage cable.
11. OFC: Conductive optical fiber general-purpose cable.
12. OFCG: Conductive optical fiber general-purpose cable.
13. OFCP: Conductive optical fiber plenum cable.
14. OFCR: Conductive optical fiber riser cable.
15. OFN: Nonconductive optical fiber general-purpose cable.
16. OFNG: Nonconductive optical fiber general-purpose cable.
17. OFNP: Nonconductive optical fiber plenum cable.
18. OFNR: Nonconductive optical fiber riser cable.
19. PLTC: Power-limited tray cable.
20. PLTC-ER: Power-limited tray cable, exposed run.
21. PV: Photovoltaic cable.
22. RHH: (high heat) Thermoset rubber, heat-resistant cable.
23. RHW: Thermoset rubber, moisture-resistant cable.

- 24. SE: Service-entrance cable.
- 25. SER: Service-entrance cable, round.
- 26. TC: Tray cable.
- 27. THW: Thermoplastic, heat- and moisture-resistant cable.
- 28. THHN: Thermoplastic, heat-resistant cable with nylon jacket outer sheath.
- 29. THHW: Thermoplastic, heat- and moisture-resistant cable.
- 30. THWN: Thermoplastic, moisture- and heat-resistant cable with nylon jacket outer sheath.
- 31. XHH: Cross-linked polyethylene, heat-resistant cable.
- 32. XHHW: Cross-linked polyethylene, heat- and moisture-resistant cable.

1.03 COORDINATION

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data:
 - 1. Provide emergency operation, normal operation, and preventive maintenance manuals for electrical equipment.
 - 2. Include the following information:
 - a. Manufacturer's operating specifications.
 - b. User's guides for software and hardware.
 - c. Schedule of maintenance material items recommended to be stored at Project site.
 - d. Detailed instructions covering operation under both normal and abnormal conditions.
 - e. Time-current curves for overcurrent protective devices and manufacturer's written instructions for testing and adjusting their settings.
 - f. List of load-current and overload-relay heaters with related motor nameplate data.
 - g. Manufacturer's instructions for setting field-adjustable components.

PART 2 – PRODUCTS

2.01 SUBSTITUTION LIMITATIONS FOR ELECTRICAL EQUIPMENT

- A. Substitution requests for electrical equipment will be entertained under the following conditions:
1. Substitution requests may be submitted for consideration prior to the Electrical Preconstruction Conference if accompanied by value analysis data indicating that substitution will comply with Project performance requirements while significantly increasing value for Owner throughout life of facility.
 2. Substitution requests may be submitted for consideration concurrently with submission of power system study reports when those reports indicate that substitution is necessary for safety of maintenance personnel and facility occupants.
 3. Contractor is responsible for sequencing and scheduling power system studies and electrical equipment procurement. After the Electrical Preconstruction Conference, insufficient lead time for electrical equipment delivery will not be considered a valid reason for substitution.

PART 3 – EXECUTION

3.01 INSTALLATION OF ELECTRICAL WORK

- A. Unless more stringent requirements are specified in the Contract Documents or manufacturers' written instructions, comply with NFPA 70 and NECA NEIS 1 for installation of Work specified in Division 26. Consult Engineer for resolution of conflicting requirements.

3.02 CLOSEOUT ACTIVITIES

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will not be separately measured for payment.

4.02 PAYMENT:

- A. No separate measurement or payment will be made for SUPPLEMENTAL REQUIREMENTS FOR ELECTRICAL, and this will be paid for as part of the overall Contract Lump Sum for that particular item of Work, listed in the BID FORM, as applicable.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Copper building wire.
2. Metal-clad cable, Type MC.
3. Fire-alarm wire and cable.
4. Connectors and splices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 – PRODUCTS

2.01 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Belden Inc.
2. Cerro Wire LLC.
 - a. General Cable; Prysmian Group North America.
3. Southwire Company, LLC.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors

E. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
3. Type XHHW-2: Comply with UL 44.

2.02 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. AFC Cable Systems; Atkore International.
2. Belden Inc.
3. General Cable; Prysmian Group North America.
4. Southwire Company, LLC.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel, interlocked.

I. Jacket: PVC applied over armor.

2.03 FIRE-ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Allied Wire & Cable Inc.
 - 2. CommScope, Inc.
 - 3. Comtran Corporation.
 - 4. Superior Essex Inc.; subsidiary of LS Corp.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
- C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG.
 - 1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600 V rated, 75 deg C, color coded insulation, and complying with requirements in UL 2196 for a two-hour rating.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
 - 3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NRTL listed for fire-alarm and cable tray installation, plenum rated.

2.04 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. 3M Electrical Products.
 - 2. ABB, Electrification Business.
 - 3. AFC Cable Systems; Atkore International.
 - 4. Hubbell Utility Solutions; Hubbell Incorporated.
 - 5. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
 - 6. TE Connectivity Ltd.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
 - 1. Material: Copper.
 - 2. Type: One hole with standard barrels.
 - 3. Termination: Compression.

PART 3 – EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders:
 - 1. Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
 - 2. Copper for feeders that are smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors must be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits:
 - 1. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
 - 2. Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN- 2, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway Metal-clad cable, Type MC.
- F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.

3.03 INSTALLATION, GENERAL

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.04 INSTALLATION OF FIRE-ALARM WIRE AND CABLE

- A. Comply with NFPA 72.
- B. Wiring Method: Install wiring in metal pathway according to Section 270528.29 "Hangers and Supports for Communications Systems."
 - 1. Install plenum cable in environmental airspaces, including plenum ceilings.
 - 2. Fire-alarm circuits and equipment control wiring associated with fire-alarm system must be installed in a dedicated pathway system.
 - a. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
 - 3. Fire-Rated Cables: Use of two-hour fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.
 - 4. Signaling Line Circuits: Power-limited fire-alarm cables may be installed in the same cable or pathway as signaling line circuits.
- C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.
- E. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.
- F. Risers: Install at least two vertical cable risers to serve the fire-alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent receipt or transmission of signals from other floors or zones.

- G. Wiring to Remote Alarm Transmitting Device: 1 inch (25 mm) conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.05 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than un-spliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.06 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

3.07 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.08 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors.
 - 2. Perform each of the following visual and electrical tests:
 - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
 - b. Test bolted connections for high resistance using one of the following:
 - i. A low-resistance ohmmeter.
 - ii. Calibrated torque wrench.
 - iii. Thermographic survey.
 - c. Inspect compression-applied connectors for correct cable match and indentation.
 - d. Inspect for correct identification.
 - e. Inspect cable jacket and condition.

- f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable for a one-minute duration.
 - g. Continuity test on each conductor and cable.
 - h. Uniform resistance of parallel conductors.
3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
- a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- B. Cables will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports to record the following:
- 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Grounding and bonding conductors.
2. Grounding and bonding clamps.
3. Grounding and bonding bushings.
4. Grounding and bonding hubs.
5. Grounding and bonding connectors.
6. Grounding and bonding busbars.
7. Grounding (earthing) electrodes.

A. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

A. Product Data:

1. For each type of product indicated.

PART 2 – PRODUCTS

2.01 GROUNDING AND BONDING CONDUCTORS

A. Equipment Grounding Conductor:

1. General Characteristics: 600 V, THHN/THWN-2 or THWN-2, copper or tinned copper wire or cable, green color, in accordance with Section 260519 "Low- Voltage Electrical Power Conductors and Cables."

B. Isolated Equipment Grounding Conductor:

1. General Characteristics: 600 V, THHN/THWN-2 or THWN-2, copper or tinned copper wire or cable, green color with one or more yellow stripes, in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. ASTM - Bare Copper Grounding and Bonding Conductor:

1. Manufacturers: Subject to compliance with requirements, available manufacturer offering products that may be incorporated into the Work include, but are not limited to the following:

- a. ERICO; brand of nVent Electrical plc.
 - b. Harger Lightning & Grounding; business of Harger, Inc.
2. Referenced Standards: Complying with one or more of the following:
- a. Soft or Annealed Copper Wire: ASTM B3
 - b. Concentric-Lay Stranded Copper Conductor: ASTM B8.
 - c. Tin-Coated Soft or Annealed Copper Wire: ASTM B33.
 - d. 19-Wire Combination Unilay-Stranded Copper Conductor: ASTM B787/B787M.

2.02 GROUNDING AND BONDING CLAMPS

- A. Description: Clamps suitable for attachment of grounding and bonding conductors to grounding electrodes, pipes, tubing, and rebar. Grounding and bonding clamps specified in this article are also suitable for use with communications applications; see Section 270526 "Grounding and Bonding for Communications Systems," for selection and installation guidelines.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
- 1. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
 - 1. Listing Criteria:
 - a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
 - b. Grounding and Bonding Equipment for Communications: UL CCN KDSH; including UL 467.
- C. UL KDER and KDSH - U-Bolt-Type Pipe and Rod Grounding and Bonding Clamp
- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Cooper B-line; brand of Eaton, Electrical Sector.
 - b. Crouse-Hinds; brand of Eaton, Electrical Sector.
 - c. ERICO; brand of nVent Electrical plc.
 - d. Harger Lightning & Grounding; business of Harger, Inc.
 - e. ILSCO.
 - f. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
 - g. Panduit Corp.

1. General Characteristics:

- a. Clamp Material: Aluminum.
 - b. Listed for outdoor use.
- D. UL KDER and KDSH - Strap-Type Pipe and Rod Grounding and Bonding Clamp:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Burndy; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - b. Crouse-Hinds; brand of Eaton, Electrical Sector.
 - c. ERICO; brand of nVent Electrical plc.
 - d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
 - e. Panduit Corp.
 2. General Characteristics:
 - a. Clamp Material: Aluminum, Copper or Tinned copper.
 - b. Listed for outdoor use.
- F. UL KDER - Beam Grounding and Bonding Clamp:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Panduit Corp.
 1. General Characteristics: Mechanical-type, terminal, ground wire access from four directions; with dual, tin-plated or silicon bronze bolts.
- G. UL KDER - Exothermically Welded Connection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ERICO; brand of nVent Electrical plc.
 - b. Harger Lightning & Grounding; business of Harger, Inc.
 1. General Characteristics: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.03 GROUNDING AND BONDING BUSHINGS

- A. Description: Bonding bushings connect conduit fittings, tubing fittings, threaded metal conduit, and unthreaded metal conduit to metal boxes and equipment enclosures and have one or more bonding screws intended to provide electrical continuity between bushing and enclosure. Grounding bushings have provision for connection of bonding or grounding conductor and may or may not also have bonding screws.
- B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

1. Listing Criteria:

- a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

D. UL KDER - Grounding Bushing:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Crouse-Hinds; brand of Eaton, Electrical Sector.
- b. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
- c. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

1. General Characteristics: Threaded bushing with insulated throat and mechanical type wire terminal.

2.04 GROUNDING AND BONDING HUBS

A. Description: Hubs with certified grounding or bonding locknut.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

- a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.

2.05 GROUNDING AND BONDING BUSBARS

A. Description: Miscellaneous grounding and bonding device that serves as common connection for multiple grounding and bonding conductors.

B. Source Limitations: Obtain products from single manufacturer.

C. Performance Criteria:

1. Regulatory Requirements:

- a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2. Listing Criteria:

- a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
- D. UL KDER - Equipment Room Grounding and Bonding Busbar:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Chatsworth Products, Inc.
 - b. Cooper B-line; brand of Eaton, Electrical Sector.
 - c. ERICO; brand of nVent Electrical plc.
 - d. Harger Lightning & Grounding; business of Harger, Inc.
 - e. Panduit Corp.
 - 2. General Characteristics:
 - a. Bus: Rectangular bar of annealed copper.
 - b. Mounting Stand-Off Insulators: Lexan or PVC.
 - i. Comply with UL 891 for use in 600 V switchboards, impulse tested at 5000 V.
 - 3. Options:
 - a. Dimensions: 1/4 by 4 inch in cross section; length as indicated on Drawings.
 - b. Predrilled Hole Pattern: 9/32 inch holes spaced 1-1/8 inch apart.
 - c. Mounting Hardware: Stand-off brackets that provide 2 inch clearance to access rear of bus. Brackets and bolts must be stainless steel.

2.06 GROUNDING (EARTHING) ELECTRODES

- A. Description: Grounding electrodes include rod electrodes, ring electrodes, metal underground water pipes, metal building frames, concrete-encased electrodes, and pipe and plate electrodes.
- B. Source Limitations: Obtain products from single manufacturer.
- C. Performance Criteria:
 - 1. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
 - 2. Listing Criteria:
 - a. Grounding and Bonding Equipment: UL CCN KDER; including UL 467.
- D. UL KDER - Rod Electrode :
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. ERICO; brand of nVent Electrical plc.
 - b. Harger Lightning & Grounding; business of Harger, Inc.
2. General Characteristics: Copper-clad Stainless steel; 3/4 inch by 10 ft (19 mm by 3 m).

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine facility's grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of electrical system.
- B. Inspect test results of grounding system measured at point of electrical service equipment connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of electrical service equipment only after unsatisfactory conditions have been corrected.

3.02 SELECTION OF BUSBARS

- A. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

3.03 SELECTION OF GROUNDING AND BONDING CONDUCTORS

- A. Conductors: Install solid conductor for 8 AWG and smaller, and stranded conductors for 6 AWG and larger unless otherwise indicated.
 1. Bury at least 30 inches below grade.
 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

3.04 SELECTION OF CONNECTORS

- A. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.

3.05 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
 - 1. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.
 - 2. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
 - 1. Conductors:
 - a. Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
 - 2. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.
 - a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - b. Make connections with clean, bare metal at points of contact.
 - c. Make aluminum-to-steel connections with stainless steel separators and mechanical clamps.
 - d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
 - f. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - i. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate adjacent parts.
 - ii. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - iii. Use exothermic-welded connectors for outdoor locations, if disconnect-type connection is required, use bolted clamp.
 - g. Grounding and Bonding for Piping:
 - i. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances

to building. Connect grounding conductors to main metal water service pipes; use bolted clamp connector or bolt lug-type connector to pipe flange by using one of lug bolts of flange. Where dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

- ii. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with bolted connector.
 - iii. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
 - h. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
 - i. Grounding for Steel Building Structure: Install driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 ft (18 m) apart.
3. Electrodes:
- a. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - i. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - ii. Use exothermic welds for below-grade connections.
 - b. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Section 260543 "Underground Ducts and Raceways for Electrical Systems," and must be at least 12 inches deep, with cover.
 - i. Install at least one test well for each service unless otherwise indicated. Install at ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
 - c. Concrete-Encased Electrode (Ufer Ground):
 - i. Fabricate in accordance with NFPA 70; use minimum of 20 ft (6 m) of bare copper conductor not smaller than 4 AWG.
 - ii. If concrete foundation is less than 20 ft (6 m) long, coil excess conductor within base of foundation.
 - iii. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
 - iv. Fabricate in accordance with NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 ft (6.0 m) long. If reinforcing is in multiple pieces, connect together by usual steel tie wires or exothermic welding to create required length.
4. Grounding at Service:
- a. Equipment grounding conductors and grounding electrode conductors must be connected to ground bus. Install main bonding jumper between neutral and ground buses.

5. Grounding Separately Derived Systems:

- a. Generator: Install grounding electrode(s) at generator location. Electrode must be connected to equipment grounding conductor and to frame of generator.

6. Equipment Grounding:

- a. Install insulated equipment grounding conductors with feeders and branch circuits.
- b. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - i. Feeders and branch circuits.
 - ii. Lighting circuits.
 - iii. Receptacle circuits.
 - iv. Single-phase motor and appliance branch circuits.
 - v. Three-phase motor and appliance branch circuits.
 - vi. Flexible raceway runs.
 - vii. Armored and metal-clad cable runs.
- c. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

3.06 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system, before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with calibrated torque wrench in accordance with manufacturer's published instructions.

B. Nonconforming Work:

1. Grounding system will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective components and retest.

3.07 PROTECTION

- A. After installation, protect grounding and bonding cables and equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Support, anchorage, and attachment components.
2. Fabricated metal equipment support assemblies.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Slotted support systems, hardware, and accessories.
 - b. Clamps.
 - c. Hangers.
 - d. Fasteners.
 - e. Anchors.
2. Include rated capacities and furnished specialties and accessories.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Flame Rating: Class 1.
- B. Self-extinguishing according to ASTM D635.

2.02 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inches on center in at least one surface.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. Allied Tube & Conduit; Atkore International.
 - b. Cooper B-line; brand of Eaton, Electrical Sector.
 - c. Unistrut; Atkore International.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Material for Channel, Fittings, and Accessories: Stainless steel, Type 316.
 4. Channel Width: Selected for applicable load criteria.
 5. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32 inch (10 mm) diameter holes at a maximum of 8 inches (200 mm) on center in at least one surface.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Eaton.
 - b. Flex-Strut Inc.
 - c. Unistrut; Atkore International.
 2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 3. Channel Material: 6063-T5 aluminum alloy.
 4. Fittings and Accessories Material: 5052-H32 aluminum alloy.
 5. Channel Width: Selected for applicable load criteria.
 6. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Conduit and Cable Support Devices: Stainless steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated stainless steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - i. Hilti, Inc.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: Stainless steel springhead type.
7. Hanger Rods: Threaded steel.

2.03 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 – EXECUTION

3.01 SELECTION

- A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:
 1. NECA NEIS 101
 2. NECA NEIS 102.
 3. NECA NEIS 105.
 4. NECA NEIS 111.
- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as scheduled in NECA NEIS 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size must be 1/4 inch (6 mm) in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps.

- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1- 1/2 inch (38 mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.02 INSTALLATION OF SUPPORTS

- A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.
- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To New Concrete: Bolt to concrete inserts.
 - 2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 3. To Existing Concrete: Expansion anchor fasteners.
 - 4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs are less than 4 inches thick.
 - 5. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - 6. To Light Steel: Sheet metal screws.
 - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M. Submit welding certificates.

3.04 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000 psi, 28-day compressive-strength concrete.
- C. Anchor equipment to concrete base as follows:

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.05 PAINTING

A. Touchup:

1. Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

- #### B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- #### A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- #### A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Type EMT raceways and elbows.
2. Type ENT raceways and fittings.
3. Type FMC raceways.
4. Type IMC raceways.
5. Type LFMC raceways.
6. Type LFNC raceways.
7. Type PVC raceways and fittings.
8. Fittings for conduit, tubing, and cable.
9. Threaded metal joint compound.
10. Wireways and auxiliary gutters.
11. Metallic outlet boxes, device boxes, rings, and covers.
12. Termination boxes.
13. Cabinets, cutout boxes, junction boxes, pull boxes, and miscellaneous enclosures.
14. Cover plates for device boxes.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260519 "Low-Voltage for Electrical Power Conductors and Cables" for nonmetallic underground conduit with conductors (Type NUCC).

1.02 ACTION SUBMITTALS

A. Product Data: For the following:

1. Wireways and auxiliary gutters.
2. Cabinets, cutout boxes, and miscellaneous enclosures.

PART 2 – PRODUCTS

2.01 TYPE EMT RACEWAYS AND ELBOWS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 797 and UL Category Control Number FJMX.

B. Steel Electrical Metal Tubing (EMT) and Elbows:

1. Material: Steel.
2. Options:
 - a. Exterior Coating: Zinc.
 - b. Interior Coating: Zinc.
 - c. Minimum Trade Size: Metric designator 21 (trade size 3/4).
 - d. Colors: As indicated on Drawings.

2.02 TYPE ENT RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1653 and UL Category Control Number FKHU.

B. Electrical Nonmetallic Tubing (ENT) and Fittings:

1. Options:
 - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
 - b. Fittings:
 - i. Mechanically Attached Fittings: UL 1653.
 - ii. Solvent-Attached Fittings: UL 651.

2.03 TYPE FMC AND TYPE FMC-A RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1 and UL Category Control Number DXUZ.

B. Steel Flexible Metal Conduit (FMC):

1. Material: Steel.
2. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - b. Maximum allowable length is six feet..

2.04 TYPE IMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1242 and UL Category Control Number DYBY.

B. Steel Electrical Intermediate Metal Conduit (IMC):

1. Options:
 - a. Exterior Coating: Zinc.
 - b. Interior Coating: Zinc.
 - c. Minimum Trade Size: Metric designator 21 (trade size 3/4).

2.05 TYPE LFMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 360 and UL Category Control Number DXHR.

B. Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Material: Steel.
2. Options:
 - a. Minimum Trade Size: Metric designator 16 (trade size 1/2).
 - b. Maximum length is six feet.

2.06 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: UL 651 and UL Category Control Number DZYR.
- B. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:
1. Dimensional Specifications: Schedule 40.
 2. Options:
 - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
 - b. Markings: For use with maximum 90 deg C wire.

- C. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:
1. Dimensional Specifications: Schedule 80.
 2. Options:
 - a. Minimum Trade Size: Metric designator 21 (trade size 3/4).
 - b. Markings: For use with maximum 90 deg C wire.

2.07 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

B. Fittings for Type IMC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number DWTT.
2. Options:
 - a. Material: Steel.
 - b. Coupling Method: Compression coupling.
 - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
 - d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

C. Fittings for Type EMT Raceways:

1. General Characteristics: UL 514B and UL Category Control Number FKAV.
2. Options:
 - a. Material: Steel.
 - b. Coupling Method: Compression coupling.
 - c. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.

d. Expansion and Deflection Fittings: UL 651 with flexible external bonding jumper.

D. Fittings for Type FMC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number ILNR.

E. Fittings for Type LFMC and Type LFNC Raceways:

1. General Characteristics: UL 514B and UL Category Control Number DXAS.

2.08 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT COMPOUNDS FOR THREADED CONDUIT

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: UL 2419 and UL Category Control Number FOIZ.

2.09 SOLVENT CEMENTS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: As recommended by conduit manufacturer in accordance with UL 514B and UL Category Control Number DWTT.

3. Sustainability Characteristics:

2.10 WIREWAYS AND AUXILIARY GUTTERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

2. General Characteristics: UL 870 and UL Category Control Number ZOYX.

B. Metal Wireways and Auxiliary Gutters:

1. Additional Characteristics:

a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

b. Finish: Manufacturer's standard enamel finish.

2. Options:

a. Degree of Protection: Type 3R(wet location) Type 12 unless otherwise indicated.

b. Wireway Covers: Hinged type unless otherwise indicated.

2.11 METALLIC OUTLET BOXES, DEVICE BOXES, RINGS, AND COVERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 514A and UL Category Control Number QCIT.

B. Metallic Outlet Boxes:

1. Description: Box having pry out openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
2. Options:
 - a. Material: Sheet steel.
 - b. Sheet Metal Depth: Minimum 2 inches.

C. Metallic Conduit Bodies:

1. Description: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.

D. Metallic Device Boxes:

1. Description: Box with provisions for mounting wiring device directly to box.
2. Options:
 - a. Material: Sheet steel.
 - b. Sheet Metal Depth: minimum 2 inches.

E. Metallic Extension Rings:

1. Description: Ring intended to extend sides of outlet box or device box to increase box depth, volume, or both.

2.12 TERMINATION BOXES

- A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.

B. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1773 and UL Category Control Number XCKT.

2.13 CABINETS, CUTOFF BOXES, JUNCTION BOXES, PULL BOXES, AND MISCELLANEOUS ENCLOSURES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:
 - a. Non-Environmental Characteristics: UL 50.
 - b. Environmental Characteristics: UL 50E.

B. Indoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Options:
 - a. Degree of Protection: Type 1.

C. Indoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:
 - a. Degree of Protection: Type 1.

D. Outdoor Sheet Metal Cabinets:

1. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung.
2. Additional Characteristics: UL Category Control Number CYIV.
3. Options:
 - a. Degree of Protection: Type 4X.

E. Outdoor Sheet Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUZ.
3. Options:
 - a. Degree of Protection: Type 4X.

F. Outdoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.
2. Additional Characteristics: UL Category Control Number BGUI.
3. Options:
 - a. Degree of Protection: Type 4X.

2.14 COVER PLATES FOR DEVICES BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:
 - a. Reference Standards: UL 514D and UL Category Control Numbers QCIT and QCMZ.
 - b. Wall plate-Securing Screws: Metal with head color to match wall plate finish.

B. Metallic Cover Plates for Device Boxes:

1. Options:
 - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
 - b. Wall plate Material: 0.032 inch thick Type 302/304 non-magnetic stainless steel with brushed finish

PART 3 – EXECUTION

3.01 SELECTION OF RACEWAYS

- A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.
- B. Outdoors:
 1. Exposed and Subject to Physical Damage: IMC.
 2. Exposed and Not Subject to Physical Damage: Corrosion-resistant EMT or PVC- 40.
 3. Concealed Aboveground: IMC.
 4. Direct Buried: PVC-40
 5. Concrete Encased in Trench: PVC-40.
 6. Connection to Vibrating Equipment (Including Transformers and Hydraulic,
 7. Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.

C. Indoors:

1. Exposed and Subject to Physical Damage: IMC. Subject to physical damage includes the following locations:
 - a. Locations less than 2.5 m (8 ft) above finished floor.
 - b. Stub-ups to above suspended ceilings.
 - c. Mechanical rooms.
2. Exposed and Not Subject to Physical Damage: EMT.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Damp or Wet Locations: IMC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

D. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.02 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

- a. Type 4X unless otherwise indicated.
- b. Locations in-Ground or Exposed to Corrosive Agents: Type 4X.
- c. Locations in-Ground or Exposed to Corrosive Agents Where Mechanism Must Operate When Ice Covered: Type 3SX.

2. Indoors:

- a. Type 1 unless otherwise indicated.
- b. Damp or Dusty Locations: Type 12.
- c. Surface Mounted in Kitchens and Other Locations Exposed to Oil or Coolants: Type 12.

3.03 INSTALLATION OF RACEWAYS

A. Installation Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.

2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
3. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
4. Comply with NECA NEIS 101 for installation of steel raceways.
5. Comply with NECA NEIS 102 for installation of aluminum raceways.
6. Comply with NECA NEIS 111 for installation of nonmetallic raceways.
7. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one quarter turn more.
8. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
9. Raceway Terminations at Locations Subject to Moisture or Vibration:
 - a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG. Install insulated throat metal grounding bushings on service conduits.

B. General Requirements for Installation of Raceways:

1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
3. Install no more than equivalent of three 90-degree bends in conduit run. Support within 12 inches of changes in direction.
4. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
5. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
6. Support conduit within 12 inches of enclosures to which attached.
7. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
8. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

- b. Where an underground service raceway enters a building or structure.
 - c. Conduit extending from interior to exterior of building.
 - d. Conduit extending into pressurized duct and equipment.
 - e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 - f. Where otherwise required by NFPA 70.
9. Do not install raceways or electrical items on "explosion-relief" walls or rotating equipment.
10. Do not install conduits within 2 inches of the bottom side of a metal deck roof.
11. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.
12. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
13. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb. tensile strength. Leave at least 12 inches of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- C. Requirements for Installation of Specific Raceway Types:
- 1. Do not install aluminum raceways or fittings in contact with concrete or earth.
 - 2. Type IMC:
 - a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
 - 3. Types FMC, LFMC, and LFNC:
 - a. Comply with NEMA RV 3. Provide a maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 4. Types PVC:
 - a. Do not install Type PVC or Type EPEC conduit where ambient temperature exceeds 122 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.
 - b. Comply with manufacturer's written instructions for solvent welding and fittings.
- D. Raceways Embedded in Slabs:
- 1. Run raceways larger than metric designator 27 (trade size 1) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place raceway close to slab support. Secure raceways to reinforcement at maximum 10 ft intervals.

2. Arrange raceways to cross building expansion joints with expansion fittings at right angles to the joint.
 3. Arrange raceways to ensure that each is surrounded by a minimum of 1 inch of concrete without voids.
 4. Do not embed threadless fittings in concrete unless locations have been specifically approved by Architect.
 5. Change from ENT to IMC before rising above floor.
- E. Stub-ups to Above Recessed Ceilings:
1. Provide EMT, IMC, or ERMC for raceways.
 2. Provide a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- F. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.
1. ERMC-S-PVC: Provide only fittings listed for use with this type of conduit. Patch and seal joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Provide sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 2. EMT: Provide compression, steel fittings. Comply with NEMA FB 2.10.
 3. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.
- G. Expansion-Joint Fittings:
1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC and EMT conduit that are located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.
 2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 4. Install expansion fittings at locations where conduits cross building or structure expansion joints.

5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

H. Raceways Penetrating Rooms or Walls with Acoustical Requirements:

1. Seal raceway openings on both sides of rooms or walls with acoustic rated putty or firestopping.

3.04 INSTALLATION OF BOXES AND ENCLOSURES

- A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
- B. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- C. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
- D. Horizontally separate boxes mounted on opposite sides of walls, so they are not in the same vertical channel.
- E. Locate boxes so that cover or plate will not span different building finishes.
- F. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
- G. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
- H. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
- I. Set metal floor boxes level and flush with finished floor surface.
- J. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- K. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.
- M. Boxes and Enclosures in Areas or Walls with Acoustical Requirements:
 1. Seal openings and knockouts in back and sides of boxes and enclosures with acoustically rated putty.
 2. Provide gaskets for wall plates and covers.

3.05 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

3.06 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.07 CLEANING

- A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor mounted enclosures before installing wall plates, covers, and hoods.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Labels.
2. Cable ties.
3. Miscellaneous identification products.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.

1.02 ACTION SUBMITTALS

A. Product Data:

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1 and IEEE C2.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

1. Fire-protection and fire-alarm equipment, including raceways, must be finished, painted, or suitably marked safety red.
2. Ceiling-mounted hangers, supports, cable trays, and raceways must be finished, painted, or suitably marked safety yellow where less than 7.7 ft above finished floor.

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

- D. Comply with NFPA 70E requirements for arc-flash warning labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 1000 V or Less:
 - 1. Black letters on orange field.
 - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded conductors.
 - 1. Color must be factory applied or field applied for sizes larger than 8 AWG if authorities having jurisdiction permit.
 - 2. Colors for 208Y/120 V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - 3. Colors for 240 V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - 4. Colors for 480Y/277 V Circuits:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - 5. Color for Neutral: White or gray.
 - 6. Color for Equipment Grounds: Green or Green with yellow stripe.
 - 7. Colors for Isolated Grounds: Green with two or more yellow stripes.
- C. Warning Label Colors:
 - 1. Identify system voltage with black letters on orange background.

- D. Warning labels and signs must include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 3 FEET MINIMUM."
- E. Equipment Identification Labels:
 - 1. Black letters on white field.

2.03 LABELS

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
- B. Self-Adhesive Wraparound Labels: Preprinted, 3 mil thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
 - 1. Self-Lamination: Clear; UV-weather and chemical-resistant; self-laminating, protective shield over legend. Labels sized such that clear shield overlaps entire printed legend.
 - 2. Marker for Labels:
 - a. Permanent, waterproof, black ink marker recommended by tag manufacturer.
 - b. Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.04 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to 185 + deg F.
 - 4. Color: Black, except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F in accordance with ASTM D638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to 185 + deg F.
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
 - 1. Minimum Width: 3/16 inch.

2. Tensile Strength at 73 deg F in accordance with ASTM D638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to 284 + deg F.
5. Color: Black.

2.05 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.02 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
 1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 1000 V: Identification must completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
 1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

- J. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.
- K. Accessible Fittings for Raceways: Identify cover of junction and pull box of the following systems with wiring system legend and system voltage. System legends must be as follows:
 - 1. "EMERGENCY POWER."
 - 2. "POWER."
 - 3. "UPS."
- L. Vinyl Wraparound Labels:
 - 1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
 - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.
- M. Self-Adhesive Labels:
 - 1. Install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high.
- N. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.
- O. Marker Tapes: Secure tight to surface at location with high visibility and accessibility.
- P. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.
- Q. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's instructions.
- R. Metal Tags:
 - 1. Place in location with high visibility and accessibility.
 - 2. Secure using UV-stabilized cable ties.
- S. Nonmetallic Preprinted Tags:
 - 1. Place in location with high visibility and accessibility.
 - 2. Secure using UV-stabilized cable ties.
- T. Baked-Enamel Signs:
 - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
 - 2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inches high.

U. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inches high.

V. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inches high.

W. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.03 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Concealed Raceways, Duct Banks, More Than 1000 V, within Buildings: Tape and stencil. Stencil legend "DANGER - CONCEALED HIGH-VOLTAGE WIRING" with 3-inch high, black letters on 20 inch centers.
1. Locate identification at changes in direction, at penetrations of walls and floors, and at 10 ft maximum intervals.
 2. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.
- D. Accessible Fittings for Raceways and Cables within Buildings: Identify cover of junction and pull box of the following systems with self-adhesive labels containing wiring system legend and system voltage. System legends must be as follows:
1. "EMERGENCY POWER."
 2. "POWER."
 3. "UPS."
- E. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- F. Concealed Raceways and Duct Banks, More Than 1000 V, within Buildings: Apply floor marking tape to the following finished surfaces:

1. Floor surface directly above conduits running beneath and within 12 inches of floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in building or concealed above suspended ceilings.
- G. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in direction of access to live parts. Workspace must comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- H. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.
- I. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Metal backed, butyrate warning signs.
1. Apply to exterior of door, cover, or other access.
 2. For equipment with multiple power or control sources, apply to door or cover or equipment, including, but not limited to, the following:
 - a. Power-transfer switches.
 - b. Controls with external control power connections.
- J. Arc Flash Warning Labeling: Self-adhesive labels.
- K. Equipment Identification Labels:
1. Indoor Equipment: Metal-backed butyrate signs.
 2. Outdoor Equipment: Stenciled legend 4 inches high.
 3. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in location provided by panelboard manufacturer. Panelboard identification must be in form of self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Enclosed switches.
 - e. Enclosed circuit breakers.
 - f. Enclosed controllers.
 - g. Variable-speed controllers.
 - h. Push-button stations.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.
4. Electronic-grade panelboards.

1.02 DEFINITIONS

- A. ATS: Acceptance testing specification.
- B. GFCI: Ground-fault circuit interrupter.
- C. GFEP: Ground-fault equipment protection.
- D. HID: High-intensity discharge.
- E. MCCB: Molded-case circuit breaker.
- F. SPD: Surge protective device.
- G. VPR: Voltage protection rating.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.

5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for series rating of installed devices.
7. Include evidence of NRTL listing for SPD as installed in panelboard.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Include time-current coordination curves for each type and rating of overcurrent protective
11. device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and GFEP Types: Four spares for each panelboard.
 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; ~~install temporary electric heating (250 W per panelboard) to prevent condensation. N/A~~
- B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.07 FIELD CONDITIONS

- A. Environmental Limitations:
 1. Do not deliver or install panelboards until spaces are enclosed and weather tight, wet work in spaces is complete and dry, work above panel boards is complete, and ~~temporary~~-HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 2. Rate equipment for continuous operation.

- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
 - 2. Do not proceed with interruption of electric service without Owner's written permission.
 - 3. Comply with NFPA 70E.

1.08 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
 - 1. Panelboard Warranty Period: 18 months from date of Substantial Completion.
- B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.
 - 1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 – PRODUCTS

2.01 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

- A. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NEMA PB 1.
- D. Comply with NFPA 70.
- E. Enclosures: Flush and Surface-mounted, dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1 (unless plans specify otherwise)
 - b. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5 (unless plans specify otherwise).
 - 2. Height: 84 inches maximum.
 - 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 - 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
7. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Same finish as panels and trim.

F. Incoming Mains:

1. Location: Bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

G. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount is electrically isolated from enclosure. Do not mount neutral bus in gutter.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Terminations shall allow use of 75 deg C rated conductors without derating.
2. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
3. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
4. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

2.02 PERFORMANCE REQUIREMENTS

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Subject to compliance with Contract Documents, the following Manufacturers are acceptable:
 - 1. Eaton / Cutler Hammer
 - 2. Schneider Electrical Square D
 - 3. Siemens
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.
- E. Contactors in Main Bus: NEMA ICS 2, Class A, mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
- F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front mounted, field-adjustable trip setting.
 - 3. Electronic Trip Circuit Breakers:
 - a. RMS sensing.
 - b. Field-replaceable rating plug or electronic trip.
 - c. Field-Adjustable Settings:
 - i. Instantaneous trip.
 - ii. Long- and short-time pickup levels.
 - iii. Long and short time adjustments.
 - iv. Ground-fault pickup level, time delay, and I squared T response.
 - 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - 5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).

6. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
8. Sub-feed Circuit Breakers: Vertically mounted.
9. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.05 IDENTIFICATION

- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.06 ACCESSORY COMPONENTS AND FEATURES

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Comply with NECA 1.
- C. Install panelboards and accessories according to NEMA PB 1.1.
- D. Equipment Mounting:
 - 1. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- F. Mount panelboard cabinet plumb and rigid without distortion of box.
- G. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
 - 2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.
- H. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- I. Install filler plates in unused spaces.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.04 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 28 16

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Non-fusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Project requirements applicable to Work specified in this Section.

1.02 DEFINITIONS

A. GFEP: Ground-fault circuit-interrupter for equipment protection.

B. GFLS: Ground-fault circuit-interrupter for life safety.

1. Electrical" for additional abbreviations, definitions, sub.
2. SPDT: Single pole, double throw. Submittals, qualifications, testing agencies, and other.

1.03 ACTION SUBMITTALS

A. Product Data:

1. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
2. Enclosure types and details for types other than UL 50E, Type 1.
3. Current and voltage ratings.
4. Short-circuit current ratings (interrupting and withstand, as appropriate).
5. Include evidence of qualified electrical testing laboratory listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
7. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

- B. Shop Drawings: For enclosed switches and circuit breakers.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include wiring diagrams for power, signal, and control wiring.

1.04 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts: Furnish to Owner spare parts, for repairing enclosed switches and circuit breakers, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.05 WARRANTY

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed enclosed switches and circuit breakers perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.
 - 1. Extended-Warranty Period: Two years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain products from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.02 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton.
 - 2. Siemens Industry, Inc., Energy Management Division.
 - 3. Square D; Schneider Electric USA.
- B. Type HD, Heavy Duty:
 - 1. Single throw.
 - 2. Three pole.
 - 3. 600 V(ac).

4. 1200 A and smaller.
5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses.
6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors. Provide for all switches indicated to contain neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Service-Rated Switches: Labeled for use as service equipment.
5. Hook-stick Handle: Allows use of hook-stick to operate handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material, unless noted otherwise.

2.03 NON-FUSIBLE SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; Schneider Electric USA.

B. Type HD, Heavy Duty, Three Pole, Single Throw, 600 V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded, labeled for copper and aluminum neutral conductors. Provide for all switches indicated to contain neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Service-Rated Switches: Labeled for use as service equipment.
5. Hook-stick Handle: Allows use of hook-stick to operate handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material, unless noted otherwise.

2.04 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Electric Type TFJ & TFK. *These are the existing breakers at Central Bus Administration Building.*

2. Eaton.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; Schneider Electric USA.
- B. Circuit breakers must be constructed using glass-reinforced insulating material. Current carrying components must be completely isolated from handle and accessory mounting area.
 - C. Circuit breakers must have toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. Circuit-breaker handle must be over center, be trip free, and reside in tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon must be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with push-to- trip button, located on face of circuit breaker to mechanically operate circuit-breaker tripping mechanism for maintenance and testing purposes.
 - D. Maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings must be clearly marked on face of circuit breaker. Circuit breakers must be 100 percent rated.
 - E. MCCBs must be equipped with device for locking them in isolated position.
 - F. Lugs must be suitable for 90 deg C rated wire, sized in accordance with 75 deg C temperature rating in NFPA 70.
 - G. Standard: Comply with UL 489 with required interrupting capacity for available fault currents.
 - H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, RMS sensing, with the following field-adjustable settings:
 1. Instantaneous trip.
 2. Long- and short-time pickup levels.
 3. Long- and short-time time adjustments.
 4. Ground-fault pickup level, time delay, and I-squared t response.
 - K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
 - L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
 - M. GFLS Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6 mA trip).
 - N. GFEP Circuit Breakers: With Class B ground-fault protection (30 mA trip).

O. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads: Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
4. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
5. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three phase, zero-sequence current transformer/sensor.
6. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

2.05 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, UL 50E, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: Enclosure must be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (UL 50E Type 1), gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (UL 50E Types 3R, 12) or a brush finish on Type 304 stainless steel (UL 50E Type 4-4X stainless steel).
- C. Conduit Entry: UL 50E Types 4, 4X, and 12 enclosures may not contain knockouts. UL 50E Types 7 and 9 enclosures must be provided with threaded conduit openings in both end walls.
- D. Operating Mechanism: Circuit-breaker operating handle must be externally operable with operating mechanism being integral part of box, not cover. Cover interlock mechanism must have externally operated override. Override may not permanently disable interlock mechanism, which must return to locked position once override is released. Tool used to override cover interlock mechanism must not be required to enter enclosure in order to override interlock.
- E. Enclosures designated as UL 50E Type 4, 4X stainless steel, 12, or 12K must have dual cover interlock mechanism to prevent unintentional opening of enclosure cover when circuit breaker is ON and to prevent turning circuit breaker ON when enclosure cover is open.
- F. UL 50E Type 7/9 enclosures must be furnished with breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Commencement of work will indicate Installer's acceptance of areas and conditions as satisfactory.

3.02 SELECTION OF ENCLOSURES

- A. Indoor, Dry and Clean Locations: UL 50E, Type 1.
- B. Outdoor Locations: UL 50E, Type 4X.
- C. Other Wet or Damp, Indoor Locations: UL 50E, Type 4X.
- D. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: UL 50E, Type 12.

3.03 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Special Techniques:
 - 1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
 - 2. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
 - 3. Comply with mounting and anchoring requirements specified in Section 260548 "Seismic Controls for Electrical Systems."
 - 4. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
 - 5. Install fuses in fusible devices.

3.04 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, components and provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.05 FIELD QUALITY CONTROL

- A. Tests and Inspections for Switches:
 - 1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that unit is clean.
 - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - e. Verify that fuse sizes and types match the Specifications and Drawings.
 - f. Verify that each fuse has adequate mechanical support and contact integrity.

- g. Inspect bolted electrical connections for high resistance using one of the following methods:
 - i. Use low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.
 - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on Drawings.
- i. Verify correct phase barrier installation.
- j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with low resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
- b. Measure contact resistance across each switchblade fuse holder. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
- c. Perform insulation-resistance tests for one minute on each pole, phase-to- phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
- d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
- e. Perform ground fault test in accordance with NETA ATS Section 7.14 "Ground Fault Protection Systems, Low-Voltage."

B. Tests and Inspections for Molded-Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data are as described in the Specifications and shown on Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.

- d. Verify that unit is clean.
- e. Operate circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the following methods:
 - i. Use low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.
 - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.
- g. Inspect operating mechanism, contacts, and chutes in unsealed units.
- h. Perform adjustments for final protective device settings in accordance with coordination study.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
- b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
- c. Perform contact/pole resistance test. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.

C. Nonconforming Work:

- 1. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- 2. Remove and replace defective units and retest.

D. Collect, assemble, and submit test and inspection reports.

- 1. Test procedures used.
- 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
- 3. List deficiencies detected, remedial action taken, and observations after remedial action.

E. Manufacturer Services:

1. Engage factory-authorized service representative to support field tests and inspections.

3.06 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as directed by the Engineer.

3.07 PROTECTION

- A. After installation, protect enclosed switches and circuit breakers from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.08 MAINTENANCE

- A. Infrared Scanning of Enclosed Switches and Breakers: Two months after Substantial Completion, perform infrared scan of joints and connections. Remove covers so joints and connections are accessible to portable scanner. Take visible light photographs at same locations and orientations as infrared scans for documentation to ensure follow-on scans match same conditions for valid comparison.
 1. Instruments and Equipment: Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 2. Follow-up Infrared Scanning: Perform two follow-up infrared scans of enclosed switches and breakers, one at four months and another at 11 months after Substantial Completion.
 3. Instrument: Use infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.
 4. Report: Prepare certified report that identifies units checked and that describes scanning results. Include notation of deficiencies detected, remedial actions taken, and scanning observations after remedial action.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

SECTION 26 29 13

MANUAL AND MAGNETIC MOTOR CONTROLLERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Combination full-voltage magnetic motor controllers.
 - 2. Enclosures.
 - 3. Accessories.
 - 4. Identification.

1.02 DEFINITIONS

- A. CPT: Control power transformer.
- B. MCCB: Molded-case circuit breaker.
- C. MCP: Motor circuit protector.
- D. NC: Normally closed.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SCPD: Short-circuit protective device.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each type of magnetic controller.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
 - 3. Wire Termination Diagrams and Schedules: Include diagrams for signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field installed wiring.
 - 4. Include features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

C. Product Schedule: List the following for each enclosed controller:

1. Each installed magnetic controller type.
2. NRTL listing.
3. Factory-installed accessories.
4. Nameplate legends.
5. SCCR of integrated unit.
6. For each combination magnetic controller include features, characteristics, ratings, and factory setting of the SCPD and OCPD.
 - a. Listing document proving Type 2 coordination.
7. For each series-rated combination state the listed integrated short-circuit current (withstand) rating of SCPD and OCPDs by an NRTL acceptable to authorities having jurisdiction.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For magnetic controllers to include in operation and maintenance manuals.
 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Routine maintenance requirements for magnetic controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
 - e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.06 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

2. Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
3. Indicating Lights: Two of each type and color installed.
4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.07 ~~QUALITY ASSURANCE~~ **N/A**

~~A. Testing Agency Qualifications: Accredited by NETA.~~ **N/A**

1. ~~Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.~~ **N/A**

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.09 FIELD CONDITIONS

- A. Ambient Environment Ratings: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 1. Ambient Temperature: Not less than 23 deg F and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet for electromagnetic and manual devices.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4-1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

2.02 ENCLOSED FULL-VOLTAGE MAGNETIC MOTOR CONTROLLERS

- A. Description: Across-the-line start, electrically held, for nominal system voltage of 600- VAC and less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ABB, Electrification Business.
 2. Eaton.
 3. Siemens Industry, Inc., Energy Management Division.
 4. Square D; Schneider Electric USA.

- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Non-reversing.
- E. Contactor Coils: Pressure-encapsulated type with coil transient suppressors when indicated.
 - 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:
 - 1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. Spare CPT Capacity as Indicated on Drawings: 100 VA.
- G. Overload Relays:
 - 1. Thermal Overload Relays:
 - a. Inverse-time-current characteristic.
 - b. Class 10 tripping characteristic.
 - c. Heaters in each phase shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - d. Ambient compensated.
 - e. Automatic resetting.

2.03 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

- A. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCPD and OCPD, in a single enclosure.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ABB, Electrification Business.
 - 2. Eaton.
 - 3. Siemens Industry, Inc., Energy Management Division.
 - 4. Square D; Schneider Electric USA.
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Non-reversing.
- E. Contactor Coils: Pressure-encapsulated type with coil transient suppressors when indicated.
 - 1. Operating Voltage: Manufacturer's standard, unless indicated.
- F. Control Power:

1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - a. Spare CPT Capacity as Indicated on Drawings: 100 VA.

G. Overload Relays:

1. Thermal Overload Relays:
 - a. Inverse-time-current characteristic.
 - b. Class 10 tripping characteristic.
 - c. Heaters in each phase shall be matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - d. Ambient compensated.
 - e. Automatic resetting.

H. Non-fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, non-fusible switch.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

2.04 ENCLOSURES

- A. Comply with NEMA 250, type designations as indicated on Drawings, complying with environmental conditions at installed location.
- B. The construction of the enclosures shall comply with NEMA ICS 6.
- C. Controllers in hazardous (classified) locations shall comply with UL 1203.

2.05 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons, Pilot Lights, and Selector Switches: Standard-duty, except as needed to match enclosure type. Heavy-duty or oil-tight where indicated in the controller schedule.
 - a. Push Buttons: As indicated in the controller schedule.
 - b. Pilot Lights: As indicated in the controller schedule.
 2. Elapsed Time Meters: Heavy duty with digital readout in hours; resettable.

2.06 IDENTIFICATION

- A. Controller Nameplates: Baked enamel signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.02 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install magnetic controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with
- C. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- E. Setting of Overload Relays: Select and set overloads on the basis of full-load current rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for motors that are high-torque, high-efficiency, and so on.

3.03 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

- ~~A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. N/A~~
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections:
 - 1. Comply with the provisions of NFPA 70B, "Testing and Test Methods" Chapter.
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with drawings and specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, and grounding.
 - d. Verify the unit is clean.
 - e. Inspect contactors:

- i. Verify mechanical operation.
 - ii. Verify contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
- f. Motor-Running Protection:
- i. Verify overload element rating is correct for its application.
 - ii. If motor-running protection is provided by fuses, verify correct fuse rating.
- g. Inspect bolted electrical connections for high resistance using one of the two following methods:
- i. Use a low-resistance ohmmeter. Compare bolted connection resistance values with values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- h. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
3. Electrical Tests:
- a. Perform insulation-resistance tests for one minute on each pole, phase-to- phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS Table 100.1. In the absence of manufacturer's published data, use Table 100.5. Values of insulation resistance that are less than those of this table or manufacturer's recommendations shall be investigated and corrected.
 - b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - c. Test motor protection devices according to manufacturer's published data.
 - d. Test circuit breakers as follows:
 - i. Operate the circuit breaker to ensure smooth operation.
 - ii. For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
 - e. Perform operational tests by initiating control devices.
4. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove all necessary covers prior to the inspection.
- a. Comply with the recommendations of NFPA 70B, "Testing and Test Methods" Chapter, "Infrared Inspection" Article.
 - b. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of each motor controller.

- c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor controller 11 months after date of Substantial Completion.
 - d. Report of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the following results:
 - i. Description of equipment to be tested.
 - ii. Discrepancies.
 - iii. Temperature difference between the area of concern and the reference area.
 - iv. Probable cause of temperature difference.
 - v. Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - vi. Load conditions at time of inspection.
 - vii. Photographs and thermograms of the deficient area.
 - viii. Recommended action.
 - e. Equipment: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1 deg C at 30 deg C. The equipment shall detect emitted radiation and convert detected radiation to a visual signal.
 - f. Act on inspection results and recommended action, and considering the recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.
- E. Motor controller will be considered defective if it does not pass tests and inspections.
 - F. Prepare test and inspection reports.

3.05 SYSTEM FUNCTION TESTS

- A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality control tests have been completed and all components have passed specified tests.
 - 1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 - 2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 - 3. Verify the correct operation of sensing devices, alarms, and indicating devices.
- B. Motor controller will be considered defective if it does not pass the system function tests and inspections.
- C. Prepare test and inspection reports.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain switchgear.

PART 4 – MEASUREMENT AND PAYMENT

4.01 MEASUREMENT:

- A. Work under this Section will be separately measured for payment.

4.02 PAYMENT:

- A. Work under this section will be paid for as part of the Contract lump sum bid price for Pay Item #7, Electrical, in the Bid Form.

END OF SECTION

TRAILBLAZER® Air-Cooled Scroll Chiller with Pump Package



| Job Information | | Technical Data Sheet | |
|------------------|-----------------------------|----------------------|--|
| Job Name | Miami Central Bus | | |
| Date | 11/3/2025 | | |
| Submitted By | David Diaz | | |
| Software Version | 17.40 | | |
| Unit Tag | ACCH-90T with Pump Pack_R01 | | |



Image may not represent ordered unit

| Unit Overview | | | | | |
|---|--------------|----------------------|--|------------------------------|---|
| Model Number | Capacity ton | Voltage | Unit Starter Type | ASHRAE 90.1 | LEED Enhanced Refrigerant Management Credit |
| AGZ006F | 93.35 | 460 v / 60 Hz / 3 Ph | Across the Line | '07, '10, '13, '16, '19, '22 | Pass |
| Unit Type | | | Platform | | Unit Revision |
| Air-Cooled Scroll Compressor Chiller | | | Standard Efficiency Packaged + Pump Package | | 0B |
| Display | | | Tubing | | |
| Door Mounted Display | | | EEXV, Repl FD, Liq/Disch Shutoff, HS Relief, Suction Shutoff, HGBP | | |
| Fan Type | | | Refrigerant Type | | Refrigerant Weight |
| AC Fan Motors & DC (First Fans DC/Circuit) - DV | | | R32 | | 64 lb (per unit) |
| Compressor | | | Approval | | |
| USNNLLNN | | | ETL/cETL, AHRI & ASHRAE 90.1 | | |

Actual refrigerant charge depends on the final unit construction, refer to unit nameplate.

| Evaporator | |
|-------------------|--|
| Evaporator Model: | PPA240H194 |
| Water Volume: | 6.9 gal |
| Connection Hand: | Universal, 1-Pass, Grooved, Standard Head |
| Connection Size: | 3.0 in |
| Insulation: | Double Layer Insulation on Evaporator & Single on Suction Piping |

| Entering Fluid Temperature | Leaving Fluid Temperature | Fluid Type | Fluid Flow | Fluid Flow Min / Max | Pressure Drop | Pressure Drop Min / Max | Fouling Factor |
|----------------------------|---------------------------|------------|------------|----------------------|--------------------------|---------------------------------|------------------------------------|
| 54.00 °F | 44.00 °F | Water | 223.4 gpm | 120.0/ 360.0 gpm | 9.40 ft H ₂ O | 4.00 / 19.5 ft H ₂ O | 0.000100 °F.ft ² .h/Btu |

Note: Minimum flow is based on a Constant Flow Pumping System Type.

| Condenser | | | |
|--------------------------------|---|--------------|------------------------------------|
| Coil Fins: | MicroChannel (Epoxy Coating) | | |
| Guards: | Condenser Coil Louvers & Base Frame Louvers | | |
| Design Ambient Air Temperature | Altitude | Fan Diameter | Minimum Design Ambient Temperature |
| 95.0 °F | 0.000 ft | 31.5 in | 32.0 °F |

TRAILBLAZER® Air-Cooled Scroll Chiller with Pump Package



Unit Performance

| Design | | | |
|-----------|-------------|------------------|----------------|
| Capacity | Input Power | Efficiency (EER) | IPLV/IP (EER)* |
| 93.35 ton | 100.9 kW | 11.10 Btu/W.h | 17.42 Btu/W.h |

| Performance Points rated at AHRI Ambient Relief | | | | | | | | | | |
|---|--------|--------------|----------------|--------------------------|----------------|-----------------------------------|-------------------|------------------|----------------|-------------|
| Point # | % Load | Unit | | | Evaporator | | | | Condenser | |
| | | Capacity ton | Input Power kW | Efficiency (EER) Btu/W.h | Fluid Flow gpm | Pressure Drop ft H ₂ O | Entering Fluid °F | Leaving Fluid °F | Ambient Air °F | Altitude ft |
| 1 | 100.0 | 93.35 | 100.9 | 11.10 | 223.4 | 9.40 | 54.00 | 44.00 | 95.0 | 0.000 |
| 2 | 75.0 | 70.01 | 55.89 | 15.03 | 223.4 | 9.40 | 51.50 | 44.00 | 80.0 | 0.000 |
| 3 | 50.0 | 46.67 | 29.81 | 18.79 | 223.4 | 9.40 | 49.00 | 44.00 | 65.0 | 0.000 |
| 4 | 25.0 | 23.34 | 13.22 | 21.18 | 223.4 | 9.40 | 46.50 | 44.00 | 55.0 | 0.000 |

| Performance Points rated at AHRI Standard Conditions | | | | |
|--|--------|--------------|----------------|--------------------------|
| Point # | % Load | Capacity ton | Input Power kW | Efficiency (EER) Btu/W.h |
| 1 | 100 | 93.35 | 100.9 | 11.10 |
| 2 | 75 | 70.01 | 55.89 | 15.03 |
| 3 | 50 | 46.67 | 29.81 | 18.79 |
| 4 | 25 | 23.34 | 13.22 | 21.18 |

* IPLV reflects AHRI standard rating conditions with water and does not change with user defined conditions

Sound (with insulation)

| Sound Pressure (at 30 feet) | | | | | | | | |
|-----------------------------|-----------|-----------|-----------|----------|----------|----------|----------|-------------|
| 63 Hz dB | 125 Hz dB | 250 Hz dB | 500 Hz dB | 1 kHz dB | 2 kHz dB | 4 kHz dB | 8 kHz dB | Overall dBA |
| 43 | 51 | 54 | 58 | 59 | 59 | 51 | 46 | 64 |

| Sound Power | | | | | | | | |
|-------------|-----------|-----------|-----------|----------|----------|----------|----------|-------------|
| 63 Hz dB | 125 Hz dB | 250 Hz dB | 500 Hz dB | 1 kHz dB | 2 kHz dB | 4 kHz dB | 8 kHz dB | Overall dBA |
| 70 | 78 | 81 | 85 | 86 | 86 | 78 | 73 | 91 |

Octave band is non 'A' weighted and overall readings are 'A' weighted. Sound data rated in accordance with AHRI Standard-370.

Physical

| Unit | | | | |
|---------|--------|--------|------------------|-------------------|
| Length* | Height | Width* | Shipping Weight* | Operating Weight* |
| 160 in | 99 in | 88 in | 5796 lb | 5856 lb |

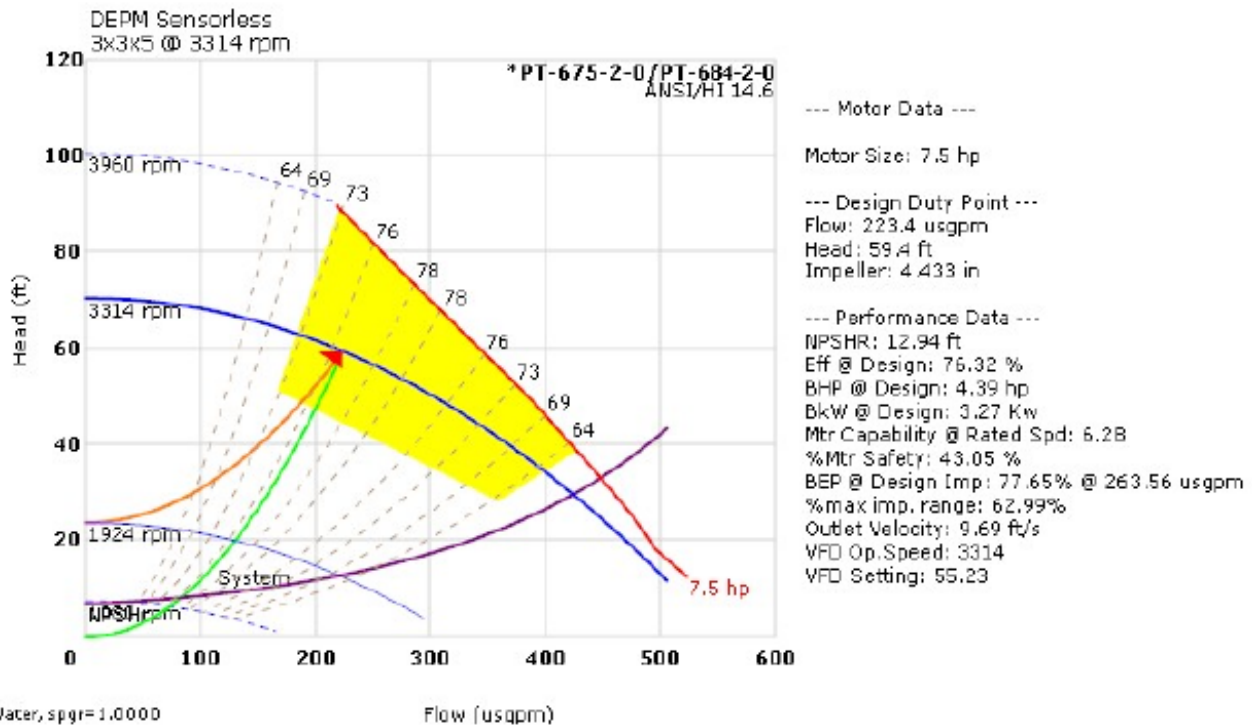
* Shipping and operating weights are based on 'worst case' unit configuration variations but do not include the weights of any Options or Accessories. Contact Chiller Applications for additional information.

TRAILBLAZER® Air-Cooled Scroll Chiller with Pump Package



| Pump Package | | | | |
|---|---------------------|-----------------------------|------------|--------------------------|
| Pump Type | Power Supply | Pump Starter Type | | Motor FLA |
| Dual | Unit Supplied | Variable Speed (Sensorless) | | 11.0 A |
| Motor RPM | Motor Horsepower | Final Impeller Diameter | Total Flow | Total Head Pressure* |
| 3600 rpm | 7.5 hp | 4.43 in | 223.4 gpm | 59.4 ft H ₂ O |
| Pump Package Options | | | | |
| Suction Valve | Included (Standard) | | | |
| Discharge Valve | Included (Standard) | | | |
| Strainer | Included (Standard) | | | |
| Pressure Gauges | Included | | | |
| Pump Package Notes | | | | |
| Sound data and chiller performance data do not include operation with Pump Package. | | | | |
| See Certified Drawing for Connection Piping Sizing. | | | | |
| Maximum Pump Operating Conditions: 175 psig at 150°F, 140 psig at 250°F. | | | | |
| Pump Curve | | | | |

Series 4372



| Electrical | | | |
|--|--|--------------------|-----------------------|
| Unit Electrical Data | | | |
| Voltage | Starter Type | Fan Motor Quantity | FLA Fan Motors (each) |
| 460 V / 60 Hz / 3 Ph | Across the Line | 6 | 3.3 A |
| Power Connection Type: | Single Point Disconnect Switch | | |
| Short Circuit Current Rating: | 65 kA | | |
| Phase Voltage: | Phase & Under/Over Voltage Protection with LED | | |
| Note: Input voltage must be within ±10% of nameplate voltage, and the voltage unbalance between phases must not exceed 2%. | | | |



| Single Point Power Connection | |
|--|---------------------|
| Minimum Circuit Ampacity (MCA): | 212 A |
| Recommended Overcurrent Protection Size: | 250 A |
| Maximum Overcurrent Protection Size(MOCP): | 250 A |
| Lug Connection Size: | (2) #2 AWG - 500MCM |

Note: Wiring, fuse, and wire size must be in accordance with the National Electrical Code® (NEC).

| Compressor Electrical Data | | |
|----------------------------|---------------------|-----------------|
| Compressor Type | Compressor Quantity | Starter Type |
| Scroll | 4 | Across the Line |

| Circuit #: | 1 | | 2 | |
|------------------------|-------|-------|-------|-------|
| Compressor #: | 1 | 3 | 2 | 4 |
| Rated Load Amps (RLA): | 65 A | 43 A | 27 A | 27 A |
| Inrush Current: | 389 A | 263 A | 197 A | 197 A |

Options

| Basic Unit | |
|-------------------------|--|
| Control Box Ambient: | High Ambient with Exhaust Fans (125°F maximum) |
| Suction Shut-off Valve: | Included |
| Tubing: | High Stage Relief Valve |
| Hot Gas Bypass: | With Hot Gas |

| Control | |
|----------------|--|
| Communication: | Combination of Modbus, BACnet MS/TP, BACnet IP |
| RapidRestore®: | Included |

| Electrical | |
|-----------------------|------------------------------|
| Ground Fault: | Unit Ground Fault Protection |
| Unit Options: | 115V Convenience Outlet |
| Water Flow Indicator: | Included |

Warranty

| | |
|-------------------------|---|
| Unit Startup | Domestic |
| Standard Warranty: | 1st Year Entire Unit Parts & Labor |
| Extended Unit Warranty: | Entire Unit; Extended 4 years parts & labor (5 Years Total) |

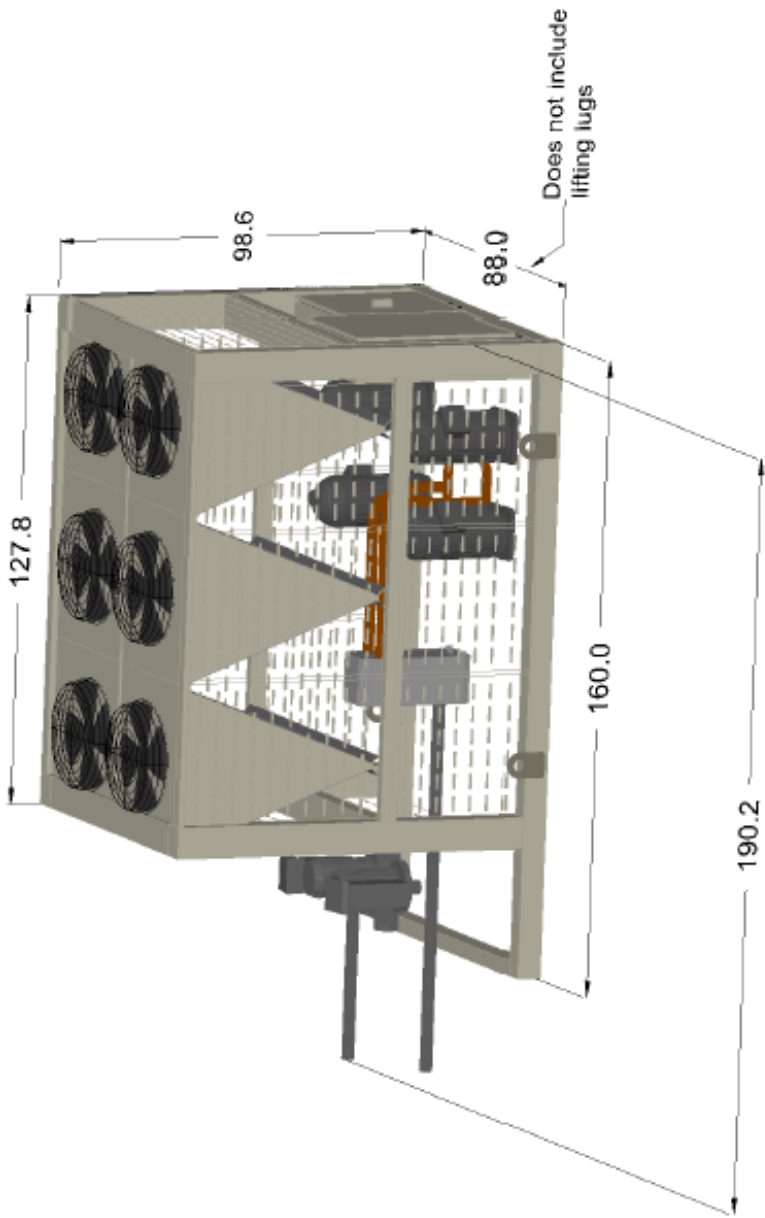
AHRI Certification



Certified in accordance with the AHRI Air-Cooled Water-Chilling Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) and AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.

Accessories

| Mandatory | |
|-------------|----------------------------|
| Part Number | Description |
| 334767505 | RIS Isolator Kit; BrownRP4 |
| 334767504 | RIS Isolator Kit; BlackRP3 |
| 334767506 | RIS Isolator Kit; RedRP4 |



NOTE: A water strainer must be installed at the inlet of the evaporator to protect it from damage. Please refer to the IOM for additional details.

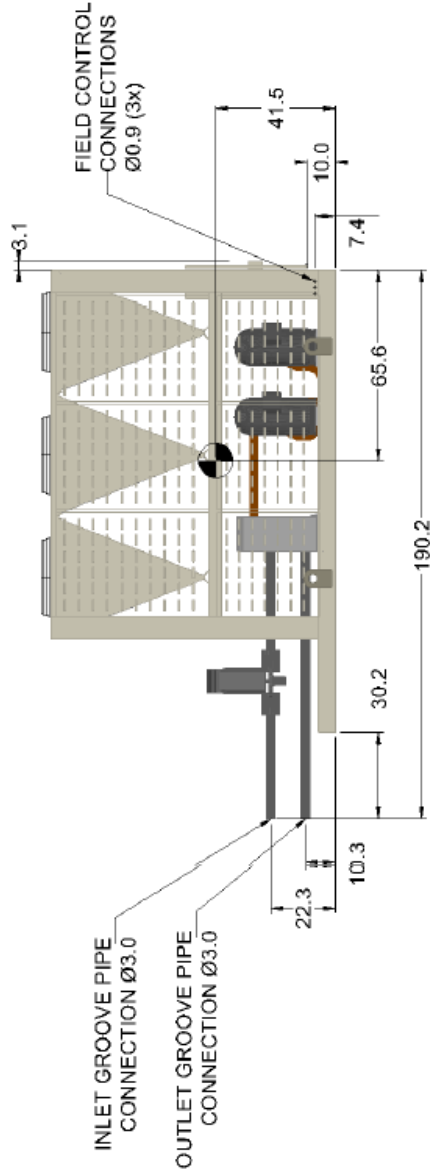
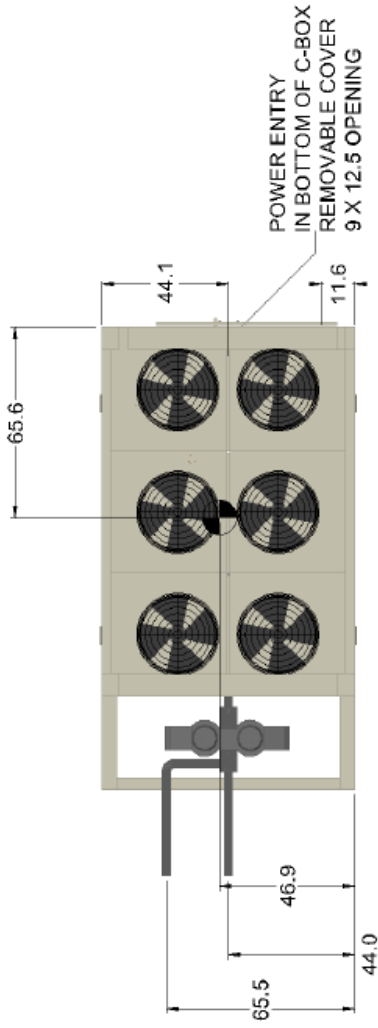
| | | |
|---|---------------------------------|--|
| Trailblazer® Air-Cooled Scroll | Unit Tag: ACCH-90T with Pump | Sales Office: Dalkin Applied South Florida |
| Product: Trailblazer® Air-Cooled Scroll | Project Name: Miami Central Bus | Sales Engineer: David Diaz |
| Model: AGZ006F | Nov. 03, 2023 | Scale: NTS |
| | Ver/Rev: | Tolerance: +/- 0.25" |
| | Sheet: 1 of 1 | Dwg Units: (in) |



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No change to this drawing may be made unless approved in writing by Dalkin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.

TOP VIEW



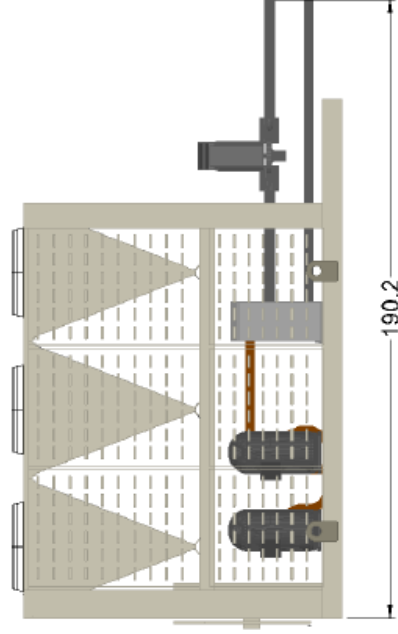
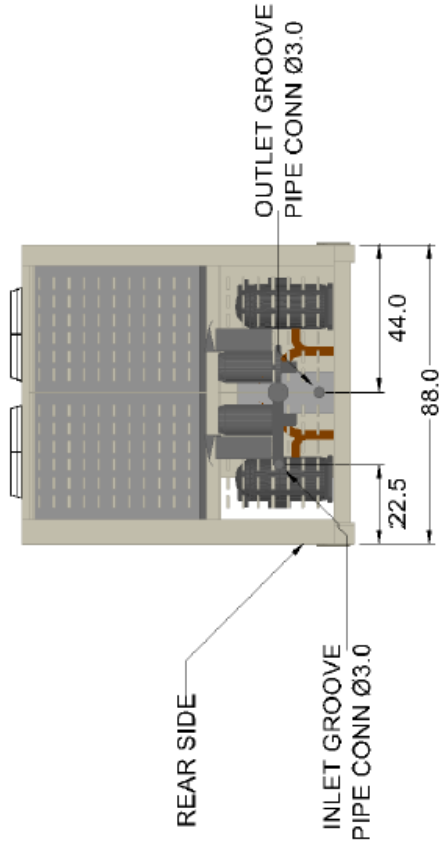
FRONT VIEW

| | | |
|---|---------------------------------|---|
| Trailblazer® Air-Cooled Scroll | Unit Tag: ACCH-90T with Pump | Sales Office: Daikin Applied South Florida |
| Product: Trailblazer® Air-Cooled Scroll | Project Name: Miami Central Bus | Sales Engineer: David Diaz |
| Model: AGZ006F | Nov. 03, 2025 Ver/Rev: | Scale: NTS Tolerance: +/- 0.25" Dwg Units: (in) |
| Sheet: 1 of 1 | | |
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LEFT VIEW



REAR VIEW

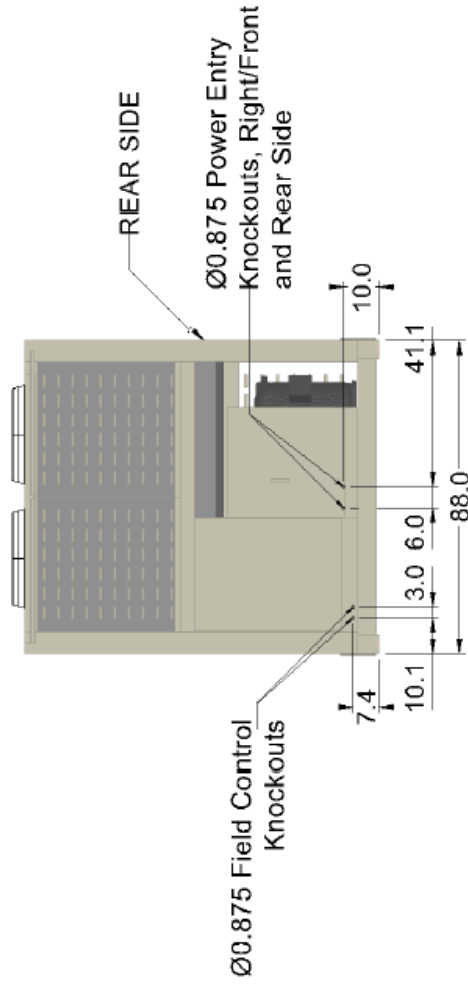
| | | | |
|---|-------------------------------------|--|----------------------|
| Trailblazer® Air-Cooled Scroll | Unit Tag: ACCH-90T with Pump | Sales Office: Daikin Applied South Florida | |
| Product: Trailblazer® Air-Cooled Scroll | Project Name: Miami Central Bus | Sales Engineer: David Diaz | |
| Model: AGZ006F | Nov. 03, 2025 Ver/Rev: | Scale: NTS | Tolerance: +/- 0.25" |
| | Sheet: 1 of 1 | Dwg Units: (in) | |



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Right VIEW



Sales Office: Daikin Applied South Florida
 Sales Engineer: **David Diaz**
 Scale: NTS Tolerance: +/- 0.25" Dwg Units: (in)

Unit Tag: ACCH-90T with Pump
 Project Name: **Miami Central Bus**
 Nov. 03, 2025 Ver/Rev: Sheet: 1 of 1

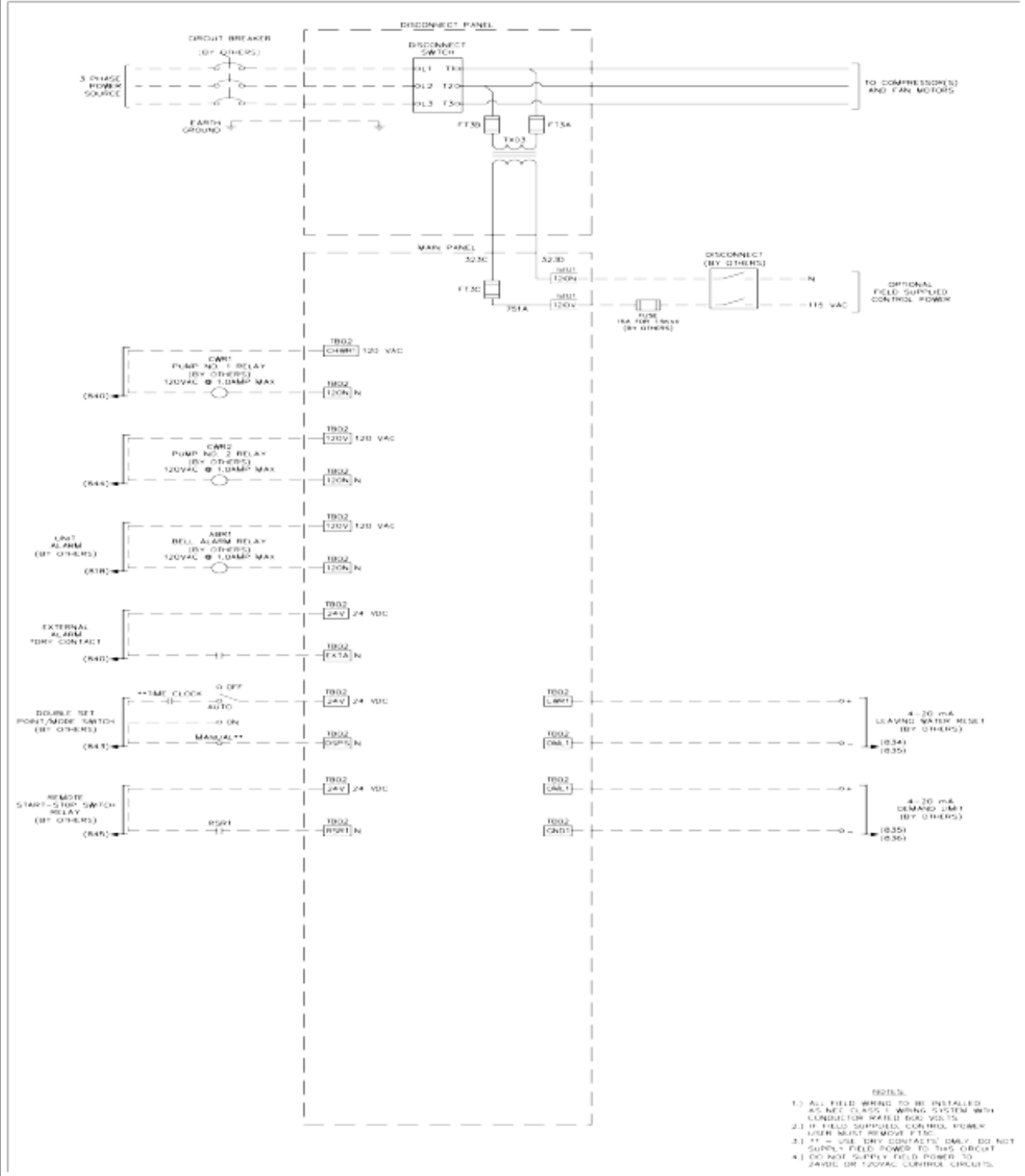
Trailblazer® Air-Cooled Scroll
 Product: Trailblazer® Air-Cooled Scroll
 Model: AGZ006F

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AGZ-F Single-Point Connection Field Wiring Diagram

08



- NOTES:
1. ALL FIELD WIRING TO BE INSTALLED ACCORDING TO CLASS 1 WIRING SYSTEM WITH CONDUCTOR RATED 90°C WET.
 2. IF FIELD SUPPLIED CONTROL POWER USER MUST REMOVE FUSE.
 3. TT = USE DRY CONTACTS ONLY. DO NOT SUPPLY FIELD POWER TO THIS CIRCUIT.
 4. DO NOT SUPPLY FIELD POWER TO 24VAC OR 120VAC CONTROL CIRCUITS.

| | | |
|---|---------------------------------------|--|
| Field Wiring Diagram | Unit Tag: ACCH-90T with Pump Pack_R01 | |
| Product: Trailblazer® Air-Cooled | Project Name: Miami Central Bus | |
| Model :AGZ006F Single-Point Connection | Sales Office: Daikin Applied South | 13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 17.40 |
| Sales Engineer: David Diaz | Nov. 03, 2025 | Ver/Rev: Sheet 1 of 1 |
| No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications. | | |

Trailblazer® Air-Cooled Scroll AGZ-F Service Clearance

00

| Recommended Minimum Clearances | | | Distance "C" | Unit Operation | Service Clearance | Coil Removal Service area Either Side |
|--------------------------------|--------------------------|-------------------------|--------------------------------|-------------------------|-------------------------|---|
| # of Fans | Coil Side "A" ft. (m) | Distance "B" ft. (m) | ft. (m) Operational/Service | Opposite End ft. (m) | Opposite End ft. (m) | |
| 4-14 | 4 (1.2) / 8 (2.4) | 8 (2.4) | 4 (1.2) / 8 (2.4) | 4 (1.2) | 4 (1.2) | |

Note (1): One Side for Compressor removal and the other side for Compressor/Coil removal


Note (1): One Side for Compressor removal and the other side for Compressor/Coil removal.

Coil Side "A" This is the dimension from the side of the unit for air clearance to coil and for service access to the compressors and major components - See Note (1) above.

Distance "B" This is the dimension between two units mounted side by side
Clearance to the opposite side of the units must be also this distance or greater.
Provide air space at each end of unit also equal to this distance or use partially open wall.

Distance "C" This is the dimension from the side of the unit to a enclosure wall
If wall height exceeds the unit height - more distance or open wall must be provided
Provide air space at each end of unit also equal to this distance or use partially open wall.

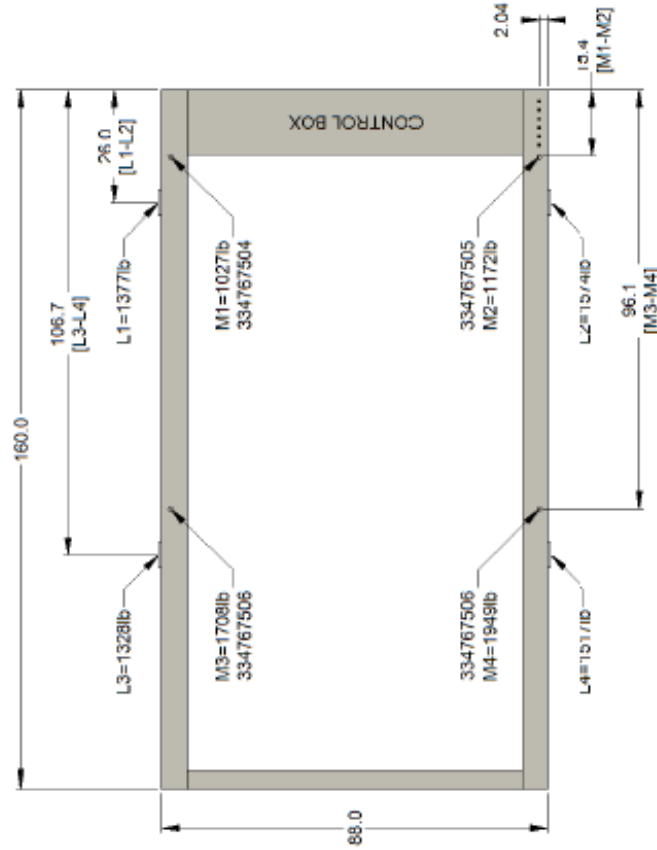
Opposite End Service access is required to both ends of the unit.
Safety codes require a minimum of 4 ft clearance at the control box end
End opposite the control box requires clearance for access to unit components

| | | | | | | |
|----------------------------------|---------------------------------------|----------|--------------|---|--------------------|--------------------|
| Product Drawing | Unit Tag: ACCH-90T with Pump Pack_R01 | | |  13600 Industrial Park Blvd. Minneapolis, MN 55441 www.DaikinApplied.com Software Version: 17.40 | | |
| Product: Trailblazer® Air-Cooled | Project Name: Miami Central Bus | | | | | |
| Model: AGZ006F | Sales office: Daikin Applied South | | | Scale: NTS | Tolerance: +/-1.0" | Dwg Units: in [mm] |
| Sales Engineer: David Diaz | Nov. 03, 2025 | Ver/Rev: | Sheet 1 of 1 | | | |

No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications.

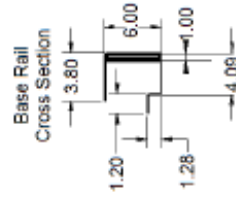
Mounting and Lifting

BASE FRAME TOP VIEW



NOTES:

- 1) L = LIFTING WEIGHT
- 2) M = MOUNTING LOAD
- 3) UNIT SHIPPING WEIGHT = 5796lb
- 4) UNIT OPERATING WEIGHT = 6856lb
- 5) MOUNTING HOLE SIZE = .75"
- 6) MOUNTING HOLES ONLY ON BOTTOM OF BASE
- 7) OUTRIGGING LIFTING ASSEMBLIES ARE PROVIDED TO MAKE RIGGING EASIER AND THEIR USE IS RECOMMENDED OUTRIGGING MAY BE REMOVED AFTER INSTALLATION AND REPLACED WITH A LOW PROFILE LIFTING LUG KIT PART NUMBER 334147111 TO ALLOW FOR FUTURE LIFTING.



| | | |
|---|--|---|
| Trailblazer® Air-Cooled Scroll | Unit Tag: ACCH-90T with Pump | Sales Office: Daikin Applied South Florida |
| Product: Trailblazer® Air-Cooled Scroll | Project Name: Miami Central Bus | Sales Engineer: David Diaz |
| Model: AGZ006F | Nov. 03, 2023 Ver/Rev: | Scale: NTS Tolerance: +/- 0.25" Dwg Units: (in) |
| No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications. | | |



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TECHNICAL DATA SHEET

GENERAL DESCRIPTION
— SUBJECT TO CHANGES OR DEVIATIONS

Insitu[®] Spray Coat ES² Spray-Applied, Anti-Corrosion Coil and Cabinet Coating

PRODUCT DESCRIPTION

Insitu[®] Spray Coat ES² is a water-based and water-reducible synthetic flexible polymer anti-corrosion coating specifically designed for the protection of HVAC&R coils and components. Insitu[®] Spray Coat ES² is formulated with (embedded stainless steel) pigments to improve adhesion, moisture resistance UV protection and corrosion durability. The product is applied at our facilities or on-site at your premises after HVAC&R units have been manufactured.

SPECIFICATIONS

Heat exchanger (HX) coils, cabinets and optional internal HVAC components shall have a water-based synthetic polymer coating with ES² pigment spray-applied with no material bridging between fins. The spray coating process will ensure a uniform dry film thickness of 15-30 µm (0.6-1.2 mils) and meet 5B rating crosshatch adhesion per ASTM D3359. Corrosion durability will be confirmed through testing to no less than 10,000 hours salt spray resistance per C5-I and DIN 53167 (ASTM B117) using aluminum test coupons.

APPLICATIONS IDEALLY SUITED FOR INSITU[®] SPRAY COAT

- Heat exchanger coils (water, condenser, evaporator, DX)
- Mini-splits
- Packaged Rooftops
- Condensing Units
- Modular Air-handlers
- Air-cooled Chillers
- Interior & exterior HVAC cabinetry and copper piping

TECHNICAL PROPERTIES

| PROPERTY | TEST METHOD | PERFORMANCE |
|------------------------------|---------------------|----------------------|
| Salt Spray | DIN 53167/ASTM B117 | Exceeds 10,000 hours |
| Water Immersion | ASTM D870 | 500 hours minimum |
| Pencil Hardness | ASTM D3363 | HB-F |
| Cross Hatch Adhesion | ASTM D3359 | 5B |
| Humidity | ASTM D2247 | 500 hours minimum |
| UV Resistance | ASTM D4587 | 500 hours minimum |
| Mandrel Bend (Flexibility) | ASTM D522M | Pass |
| Mold Resistance | ASTM G21 | Pass |
| C5-I Continuous Condensation | ISO 6270 | Pass |
| C5-I Salt Spray | ISO 7523 | Pass |
| C5-I Chemical Resistance | ISO 2812-1 | Pass |

RESISTANCE TO:

CORROSION RESISTANCE

ES² pigments are made from a high-performance stainless alloy and resistant to corrosive conditions. ES² pigments are therefore suitable for even the most corrosive environments and will maintain their appearance after many years exposure. ES² pigments help to reduce the effect of thermal loss / degradation by enhancing heat transfer thru the coating. Typical transfer loss is \leq 1%.

UV DEGRADATION

ES² pigments form a multi-layer structure throughout the paint film. This creates a barrier layer which reflects sunlight away from the paint film preventing ultraviolet rays from penetrating. As a result, UV degradation of individual polymer molecules is eliminated, the film integrity is maintained, and the pigment particles are well anchored to the substrate.

The resultant smooth, hard finish stops dirt from accumulating.

MOISTURE

The multi-layer structure of the ES² pigments slows the passage of water molecules into the film and acts as an effective moisture barrier. This prevents subsequent swelling and deterioration of the protective film.

TECHNICAL DATA SHEET

GENERAL DESCRIPTION
– SUBJECT TO CHANGES OR DEVIATIONS

Insitu[®] CLEAR Spray Coat, Spray-Applied, Anti-Corrosion Components and Cabinet Coating

PRODUCT DESCRIPTION

Insitu[®] Clear Spray Coat is a water-based and water reducible synthetic flexible polymer anti-corrosion coating specifically designed for the protection of HVAC&R cabinetry and components. Insitu[®] Clear is formulated to improve adhesion, moisture resistance UV protection and corrosion durability. The product is applied at our facilities or on-site at your premises after HVAC&R units have been manufactured.

SPECIFICATIONS

HVAC/R cabinets and optional internal HVAC components shall have a water-based synthetic polymer coating spray-applied with no runs or sags. The spray coating process will ensure a uniform dry film thickness of 10-36 μm (0.4-1.4 mils) and meet 5B rating crosshatch adhesion per ASTM D3359. Corrosion durability will be confirmed through testing to no less than 10,000 hours salt spray resistance per C5-I and DIN 53167 (ASTM B117) using aluminum test coupons.

APPLICATIONS IDEALLY SUITED FOR INSITU[®] SPRAY COAT

- Mini-splits
- Packaged Rooftops
- Condensing Units
- Modular Air-handlers
- Air-cooled Chillers
- Interior & exterior HVAC cabinetry and copper piping

TECHNICAL PROPERTIES

| PROPERTY | TEST METHOD | PERFORMANCE |
|------------------------------|---------------------|----------------------|
| Salt Spray | DIN 53167/ASTM B117 | Exceeds 10,000 hours |
| Water Immersion | ASTM D870 | 1000 hours minimum |
| Pencil Hardness | ASTM D3363 | HB-F |
| Cross Hatch Adhesion | ASTM D3359 | 5B |
| Humidity | ASTM D2247 | 1000 hours minimum |
| UV Resistance | ASTM D4587 | 1000 hours minimum |
| Mandrel Bend (Flexibility) | ASTM D522M | Pass |
| Mold Resistance | ASTM G21 | Pass |
| C5-I Continuous Condensation | ISO 6270 | Pass |
| C5-I Salt Spray | ISO 7523 | Pass |
| C5-I Chemical Resistance | ISO 2812-1 | Pass |

RESISTANCE TO:

CORROSION RESISTANCE

Insitu® Clear has a very robust synthetic multi-polymer resin backbone that is suitable for even the most corrosive environments and will maintain their appearance after many years exposure.

UV DEGRADATION

Built-in UV inhibitors form a protective barrier layer which reflects sunlight away from the paint film preventing ultraviolet rays from penetrating. As a result, UV degradation of individual polymer molecules is eliminated, the film integrity is maintained, and the pigment particles are well anchored to the substrate. The resultant smooth, hard finish stops dirt from accumulating.

MOISTURE

The multi-layer structure of the ES² pigments slows the passage of water molecules into the film and acts as an effective moisture barrier. This prevents subsequent swelling and deterioration of the protective film.

GLOSS RETENTION

A high gloss finish is applied that is smooth, limits dirt and debris buildup, and allows for easy equipment cleaning.

SECTION 7: SPECIAL PROVISIONS

SPECIAL PROVISIONS

SPECIAL PROVISIONS
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1. GENERAL REQUIREMENTS

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APPENDIX "A" TO SPECIAL PROVISIONS

Authorization Agreement for Automatic Deposit

1. GENERAL REQUIREMENTS

1.01 MISCELLANEOUS CONSTRUCTION CONTRACTS (MCC) PLAN. GENERAL TERMS AND CONDITIONS AND SPECIAL CONDITIONS

1. Division 01 (General Requirements) of the DTPW Specifications amends the MCC Plan, and other provisions of the Contract Documents. All requirements of the MCC Plan, Resolution and amendments, or portions thereof, which are not specifically modified, deleted, or superseded by Division 01, remain in full effect. In the event a conflict between these two complementary portions of the Contract Documents occurs, Division 01 will prevail and Engineer will provide a clarification and final determination. These Special Provisions also amend, complement, modify or delete items from the DTPW Construction Specifications of these Solicitation and Contract Documents.

The contractor must obtain and submit all permits prior to performing any work. The contractor must obtain all permits and submit copies to the project manager prior to performing any work and complete all work required to properly commission the equipment described for installation within 240 days from the date of the notice to proceed.

1.02 SCOPE OF WORK

1. The Scope of Work for this project includes, but is not limited to, furnishing all labor, The scope of the project includes the installation of a new air-cooled chiller rated at 92.25 TON in the old cooling tower courtyard, with its corresponding supports (refer to structural drawings). New chilled water piping will be extended from the new chiller courtyard up to the old chiller room and at the point of connection as shown and depicted on the submitted drawings. A new air separator, expansion tank, and chemical pot feeder have been specified accordingly. Chiller system will remain stand-alone; no controls are part of this scope of work. Power connections are to be provided for the new chiller from existing panel "MDP2" as depicted on drawings.

A new vertical floor mounted AHU has been specified. Existing ceiling mounted AHU-1 shall be removed. Scope of work includes the demolition, chilled water and ductwork modifications (inclusive of new added O/A supply in-line fan) and related ceiling work as depicted on drawings. New AHU-1 shall be powered from the existing AHU power feeder and new SF-1 shall be powered from existing panel "ILC" as depicted on drawings.

2. 3300 NW 32 Ave. Miami FL 33142.
3. Contractor shall be responsible for restoring any damage to the existing finished surfaces and building components caused by the execution of this work.

1.03 LOCATION OF WORK

1. Work is located at Miami Dade Transit Central Administration Building 3300 NW 32 Ave. Miami FL 33142. The facilities and buildings therein are owned by Miami-Dade County Department. Contractor is responsible for obtaining all permits that may be required from them and meeting all requirements of the Owner.

1.04 TIME FOR COMPLETION

1. The Work must be substantially completed within 240 days after the date when the Contract Time commences to run as provided in subarticle 1.06 N of the General Requirements (Division 1), and all requirements of the Contract Documents completed and ready for final payment within 210 days after the date when the Contract Time commences to run.
2. The effective date of the "Notice to Proceed" will be established during the Preconstruction Conference which is held shortly after the Award of Contract and which is attended by members of Department of Transportation and Public Works, the Contractor, representatives of utility companies, and others affected by the Work. The effective date shall be set as a date no later than 30 calendar days after the date of execution of the Contract Documents unless a later date acceptable to both parties is agreed upon in writing.

WORK PERFORMED:

- A. Monday thru Friday from 7:00 a.m. to 4:00 p.m., additional times and weekends can be arranged with the DTPW project manager to expedite the installation. All work must be scheduled with DTPW personnel. The contractor may be required when using crane services to operate after hours and on weekends and will be included as part of this bid.

APPENDIX "A" TO SPECIAL PROVISIONS
AUTHORIZATION AGREEMENT FOR AUTOMATIC DEPOSIT



ACH AUTHORIZATION AGREEMENT FOR AUTOMATIC DIRECT DEPOSIT OF MIAMI-DADE COUNTY WARRANTS

INSTRUCTIONS

Please contact us at (305) 375-5111 or email at FIN-ACHN@miamidade.gov if you have any questions or need assistance with this form.

You may obtain blank copies of this form at : http://www.miamidade.gov/finance/library/ach_form.pdf

At our Vendor Payment Inquiry (VPI) website you can obtain payment information as well as status of invoices, payment due date and other important information. You can reach the VPI site at :

<https://w85exp.miamidade.gov/VInvoice/login.do>

Section 1

Transaction Type

New : If vendor is currently not on ACH deposits with Miami-Dade County.

Change : If vendor is currently on ACH deposits with Miami-Dade County and would like to make changes to their information (example : change of financial institution, account number, etc.)

Terminate : If vendor is currently on ACH deposits with Miami-Dade County and would like to switch to either Check or AP Control disbursement type)

Federal Identification Number : Enter your Federal Employer Identification Number (FEIN) or Social Security Number (SSN) used to register you as a vendor with Miami-Dade County. Name and FEIN/SS must be exactly as provided on IRS Form W-9.

Vendor Name : Enter the name of your business or individual name used to register you as a vendor with Miami-Dade County.

DBA (Doing Business As) : If you have registered a DBA for your business or for you as an individual, please enter it here.

Fiscal Officer Name, Title and E-Mail : Name of Authorized Corporate officer, Title and E-Mail address to be contacted to. Corporate officer signing this form must be an authorized signatory in the corporate bank account listed on this form.

ACH Notification E-Mail : This is the E-Mail address where payment information will be sent to.

Section 2

This section must be completed in full and legible manner by your banking institution in order to prevent delays in processing change to ACH.

Both acknowledgment statements must be checked off by Bank Official signing and dating the form.

Section 3

This section will be completed by Miami-Dade County Finance Department.

ORIGINAL FORM AND VOIDED CHECK OR REDACTED STATEMENT MUST BE MAILED TO :

Accounts Payable Manager

Miami-Dade County Finance Department

111 NW First Street, Suite 2620

Miami, Florida 33128

Terms and Conditions

Completed form should not contain any changes (scratched off /white out) or altered information; otherwise, form will not be accepted.

Processing time is approximately fifteen (15) days from receipt of complete form and voided check or redacted Bank statement.

Providing account information does not authorize Miami-Dade County to access bank account activity.

ACH deposits can be made into **only** one (1) bank account. Payments can not be split between multiple accounts.

Notification E-mail providing payment information can be sent to one (1) single E-mail address **only**.

Proper verification will be conducted by Miami-Dade County Finance Department Staff, via a telephone call to confirm the information being provided is accurate.

This authorization shall remain in effect until terminated in writing with sufficient notice to Miami-Dade County Finance Department.

Miami-Dade County will not be responsible for any loss that may arise solely by reason of error, mistake or fraud regarding information provided on this ACH Authorization Agreement Form.