Project Manual

UPGRADE BOILERS
PROJECT NO. 2648255

TIMBERCREST ELEMENTARY
2401 EUSTACE AVE
DELTONA, FL 32725

THE SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
200 NORTH CLARA AVENUE
DELAND, FLORIDA

PRIME/MECHANICAL

SABISTON ENGINEERING GROUP, INC.
322 Kentucky Blue Circle
Apopka, FL 32712

ELECTRICAL

MATERN PROFESSIONAL ENGINEERING, INC.
130 Candace Drive
Maitland, FL 32751

DATE: 9/15/2026

REVISED:

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SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA

Facility Name: Timbercrest Elementary
Project Name: Upgrade Boilers
VCS Project No.: 2648255

All references herein that conflict with processes, procedures, or other terms outlined in the Owner contracts, as associated with this Project, the Owner contracts shall take precedence.

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Note:
Project $200,000 or more, utilize the A101-2017 Standard Form of Agreement, A101-2017 Exhibit A and the A201-2017 General Conditions of the Contract (Standard Bid); project is less than $200,000 utilize the 625 Standard Form of Agreement (Proposals).

Specific documents listed above may not apply to this project. Select "N/A" for document(s) which do not apply to this project. ***Required: consult the Owner's Construction Project Manager in charge to make this determination.***

Facility Name: Timbercrest Elementary
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ADVERTISEMENT FOR BID

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 630

NOTICE is hereby given that sealed bids for: *(Facility Name)* Timbercrest Elementary, *(Project Name)* Upgrade Boilers, VCS Project Number 2648255, will be received by the School Board of Volusia County Florida, until *(date)* January 13, 2027 at *(time)* 1:00 PM**,** in the Volusia County Schools Facilities Services Building, at which time all bids will be publicly opened and read aloud. Bids received after this time will not be accepted. Bids may be mailed or hand delivered to Volusia County Schools, Facilities Services, 3750 Olson Drive, Daytona Beach Florida 32124.

A MANDATORY PRE-BID CONFERENCE is scheduled for *(date)* December 8, 2026, *(time)* 9:30 AM at *(location)* 2401 Eustace Ave. Deltona, FL 32725**. All bidders must attend**. The representative of each bidder shall be an authorized employee of the bidder and shall sign in accordingly.

Documents, including complete specifications, may be examined by appointment at the office of the Construction Project Manager of record at Facilities Services, 3750 Olson Drive, Daytona Beach Florida (386) 947-8786.

BID DOCUMENTS ARE AVAILABLE VIA THE VOLUSIA COUNTY SCHOOLS WEBSITE AT: https://www.vcsedu.org/facilities-design The documents are in PDF format and may be viewed, printed or saved to your computer.

A310 Bid Bond Included
(The following sentence applies if the A310 Bid Bond is included for this project) Bids must be accompanied by a bid bond, certified check or cashier's check in an amount equal to five (5) percent of the total bid.

Bidders for this project are required to hold a current Certificate of Prequalification issued by the School Board of Volusia County Florida at the time of bid opening. To pre-qualify contact Purchasing, 200 North Clara Avenue, DeLand Florida 32720; telephone (386)734-7190.

All bids shall be binding for a period of 60 calendar days from the date of bid opening or until School Board approval of the bid, whichever occurs first. The bid amount of the successful bidder, once approved by the School Board, shall not be subject to change or withdrawal.

All bids shall be subject to the provisions of the Solicitation, as defined in FAC Document 631, Instructions to Bidders. It is the sole responsibility of all bidders to fully comply with the provisions of the Solicitation during this bidding process.

The School Board reserves the right to reject any one or more bids as provided by law.

The School Board of Volusia County Florida

Ruben Colon, Board Chair

INSTRUCTIONS TO BIDDERS

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 631

TO BIDDERS: You are hereby invited to submit a sealed bid for the following project. Bids will be publicly opened and read aloud at the time and place designated. Bids received after this time will not be accepted.

1. PROJECT INFORMATION

FACILITY NAME:	TIMBERCREST ELEMENTARY
PROJECT NAME:	UPGRADE BOILERS
PROJECT NUMBER:	2648255
OWNER:	THE SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
ENGINEER:	SABISTON ENGINEERING GROUP, INC.
BID DATE AND TIME:	January 13, 2027 at 1:00 PM
LOCATION:	Volusia County Schools Facilities Services Bid Conference Room 3750 Olson Drive Daytona Beach, Florida 32124 Phone: 386-947-8786

MANDATORY PRE-BID CONFERENCE

DATE AND TIME:	December 8, 2026 at 9:30 AM
LOCATION:	TIMBERCREST ELEMENTARY 2401 EUSTACE AVE DELTONA, FL 32725

All Bidders must attend the pre-bid conference. The representative of each Bidder shall be an authorized employee of the Bidder and shall sign in accordingly.

CONSTRUCTION TIME:
Ninety (90) consecutive calendar days after written “Notice to Proceed”.

BID DOCUMENTS:

Documents, including drawings and specifications, may be examined at the office of:

Sabiston Engineering Group, Inc.
322 Kentucky Blue Cir.
Apopka, FL 32712
Ph: 407-884-6769
(72 hour notice required)

Bid documents are available in digital format. Bidders may view, print or save copies of the bid documents via the Volusia County Schools website at: https://www.vcsedu.org/facilities-design
(Note: documents for proposals not published online.)

BID RESULTS:

The bid results will be available on the district web site at https://www.vcsedu.org/facilities-design
(Note: proposal results not published online.)

DIRECTIONS TO SCHOOLS AND FACILITIES

Directions to School Board of Volusia County schools and facilities are available via the district website at: https://www.vcsedu.org/community-information-services/maps-and-directions.

2. DEFINITIONS

2.1 **Contract**: *(select contract applicable to Project)*
☒ Standard Form Agreement between Owner and Contractor, AIA Document A101-2017, as modified by the Owner and General Conditions of the Contract for Construction, AIA Document A201-2017, as modified by the Owner.
☐ Standard Form of Agreement Between Owner and Contractor for a Small Project, FAC Document 625.

2.2 **Contractor**: The term Contractor as used in this Solicitation shall be defined as provided in Section 489.105(3), Florida Statutes (2003) and shall be licensed to perform that work and in direct contractual relationship with Owner.

2.3 **Bidder**: Contractor which has received a certificate of prequalification by the School Board in conformance with State Board of Education Rules and School Board Policy 604. Certificate of prequalification shall only entitle a Contractor to submit a bid and shall not constitute proof of Bidder's ability to perform a contract or serve as a substitute for any of the qualifications imposed on Contractor in the Solicitation.

2.4 **Lowest Responsible Bidder**: A Contractor who has the skills, qualifications, ability and experience to perform the contract, in all respects, as required by the Solicitation and who has submitted the lowest responsible bid.

2.5 **Non-responsive bid**: Shall include, but not be limited to, submission of a subcontractor without required licensing, submission of incomplete forms or documentation, failure to demonstrate the skills, qualifications, ability and experience to perform the contract as required by the Solicitation of both the Bidder and its subcontractor(s), or any other reason provided by law.

2.6 **Self-performance**: Performance of work by the Bidder in one or more of the types of work as disclosed under FAC Document 633, List of Subcontractors, which is undertaken and completed entirely by his own forces through the use of skilled and unskilled labor, supervision and equipment owned, operated and controlled by the Bidder without the assistance, employ, contract or reliance on any third parties, individual or corporate, except that a total of not more than 10% of the cost of performing the work, that is to be self-performed, may be expended to utilize outside sources to perform the work and then only when the third party assistance is so specialized as to be commonly employed in the industry as it is otherwise not economically reasonable to maintain it internally.

2.7 **School Board**: The School Board of Volusia County Florida. The term "Owner" may be used interchangeably.

2.8 **Solicitation**: Consists of the following documents: Project Manual, Advertisement for Bid, Drawings, Addenda. The term includes what is generally defined as "Invitation to Bid" and "Request for Proposals" in Section 287.012, Fla. Stat. (2003).

2.9 **Subcontractor**: Any person or entity under contract with a Contractor to provide services or labor for the construction, installation, or repair of an improvement of real property. For purposes of this Solicitation, this term does not include suppliers who provide only materials, equipment or supplies to a Contractor.

3. PREQUALIFICATION OF BIDDERS

The prequalification process and terms and conditions of certificates of prequalification shall be governed by Volusia County School Board Policy 604.

A Bidder's failure to hold a certificate of prequalification at the time of bid submittal shall result in the automatic rejection of that bid.

4. BID SUBMITTAL

Each Bidder, on or before the bid date and time specified above, shall sign and submit, to Volusia County Schools, Facilities Services, 3750 Olson Drive, Daytona Beach Florida 32124, one (1) original and one (1) copy of the FAC Document 632, Bid Form, of the Solicitation in the format provided herein, with all bid information completed and two (2) copies of all other required bid documentation. If bids are delivered by U.S. mail, or some other form of delivery other than hand-delivery, a return receipt may be requested. Submittals containing any condition, omissions, unexplained erasures, alterations, items not called for or irregularities of any kind may be rejected by the School Board. Any additions or deletions made before bid opening shall be made solely on FAC Document 632, Bid Form. Verbal or digital bid submittals will not be considered.

Each Bidder's submittal shall be placed in an envelope and sealed and marked with the name of the project. Required bid documents included with the Bid Form shall be assembled as follows: FAC Document 632 Bid Form, AIA Document A310 Bid Bond (if required for this project), Power of Attorney (if required for this project), FAC Document 633 List of Subcontractors and then any other documents required. Bid documents (original set and copy set) shall be stapled or paperclipped, binders of any kind as well as separation pages should not be used. Failure to submit any bid document or bid information with the bid, as specified, shall result in the bid being rejected as non-responsive.

The School Board expressly reserves the right to waive minor technicalities, and to use sufficient time to investigate the bids and the skills, qualifications, experience and ability of the Bidders and its subcontractor(s) to fully perform the contract requirements. Any refusal by a Bidder or subcontractor(s) to respond to the School Board's request for information shall deem a bid non-responsive and serve as grounds for rejection of the bid by the School Board. Any documentation requested by School Board during this investigation process shall not be deemed a supplement to a bid, but as part of its good faith investigation process. Any withdrawal of a subcontractor by a Bidder without good cause shown shall deem a bid non-responsive and serve as grounds for rejection of the bid by the School Board; however, in no event shall any substitution of a subcontractor result in an increase in the bid amount.

A Bidder's failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, shall constitute a waiver of the right to protest under Chapter 120, Florida Statutes, or by any other means.

Award of the contract will be made to the lowest responsible Bidder for the actual amount bid; however, the School Board reserves the right to reject all bids as provided by law.

All bids shall be binding for a period of 60 calendar days from the date of bid opening or until School Board approval of the bid, whichever occurs first. The bid amount of the successful Bidder, once approved by the School Board, shall not be subject to change or withdrawal.

5. AIA DOCUMENT A310, BID BOND - REQUIRED

If a Bid Bond is required, the Bid and Bid Bond must be accompanied by a certified check or cashier's check in an amount equal to five (5) percent of the total bid and shall be made payable to the "School Board of Volusia County Florida." The bond or check shall be irrevocable for 60 calendar days from the date of bid opening or until School Board approval of the bid, whichever occurs first.

All Bidders shall submit one (1) copy of the Bid Bond on form AIA Document A310 Bid Bond. Surety companies providing Bidders' bonds shall be licensed to operate in the State of Florida and shall be rated "excellent" or better by Best Insurance Rating Guide. The bond shall be signed or countersigned by a

Florida Resident Agent. You must provide a signed Power of Attorney for each copy of the bond. A Bidder may, at its option, submit a certified check from a Florida bank or a cashier's check as bid security, original and one photostat copy required.

6. SUBCONTRACTOR DISCLOSURE

Bidders shall furnish, on the FAC Document 633, List of Subcontractors form, a full disclosure of subcontractors to be utilized on the project or a clear representation of the Bidder's intent to self-perform the work, as defined, as an attachment to FAC Document 632, Bid Form.

7. EXAMINATION OF SITE

Bidders are required to visit the construction site, prior to bidding, compare the Drawings and Specifications with any work in place and inform themselves of all conditions thereof. Failure to visit site will in no way relieve the successful Bidder from furnishing materials or performing any work necessary to complete the project in accordance with the contract documents, and specifications.

8. ADDENDA

Only those Contractors who attend the mandatory pre-bid meeting will be notified via email of the issuance of Addenda for this project. All addenda will be published on the Owner's website.
(Note: addenda for proposal projects not published online.)

9. PUBLIC ENTITY CRIME INFORMATION STATEMENT

All invitations to bid as defined by Section 287.012(11), Florida Statutes, requests for proposals as defined by Section 287.012(16), Florida Statutes, and any contract document described by Section 287.058, Florida Statutes, shall contain a statement informing persons of the provisions of paragraph (2)(a) of Section 287.133, Florida Statutes, which reads as follows:

> "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 or real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list."

10. BID PROTEST BOND

As a condition precedent to filing a bid protest pursuant to Section 120.57(3)(f), Florida Statutes, a protestor shall post a bid protest bond consistent with Section 255.0516, Florida Statutes Any failure by a protestor to file a bid protest bond with the School Board at the time of filing a bid protest shall result in a dismissal with prejudice of the protest for failure to comply with Section 255.0516, Florida Statutes All bid protests must be accompanied by a bid protest bond in the form provided herein and a certified check or cashier's check in an amount consistent with that identified in Section 255.0516(1) or (2), Florida Statutes for this project.

11. CONTRACTOR ACKNOWLEDGMENT FORM

The successful Contractor shall submit an executed Contractor Acknowledgment Form (included in these specifications) to Facilities Services before work begins. On this form the Contractor acknowledges that it has been given access to and has read the asbestos survey, management plan, re-inspection report (if applicable) and/or the certificate of final inspection (if applicable) for the school it will be working in. Further, it acknowledges that the Contractor must cease work and notify the project manager and asbestos program manager in the event of encountering materials not previously identified by the aforementioned reports.

This document must be submitted with the executed contract documents.

12. CONTRACT

The successful Bidder shall execute the Contract for the amount as submitted by the Bidder and approved by the School Board, within ten (10) working days after written notification of acceptance. A binding contract exists upon the issuance of the School Board's Notice of Acceptance of Bid.

The terms and conditions of this Solicitation shall prevail over any other conflicting language until the award of the contract to the lowest responsible Bidder and issuance of the School Board's Notice of Acceptance of Bid.

13. FAC DOCUMENT 640, PERFORMANCE AND PAYMENT BOND - REQUIRED

If a Performance and Payment is required, the successful Bidder shall submit four (4) signed copies of a Performance and Payment Bond from a surety insurer authorized to do business in the State of Florida equal to one hundred percent (100%) of the total contract amount. The School Board's standard Bond Form, included herein, shall be used to submit the information. The Performance and Payment Bond shall be submitted simultaneously with the execution of the Contract. The Performance and Payment Bond shall be subject to the provisions of Section 255.05, Florida Statutes, and shall not expire until one (1) year after the date of the Certificate of Final Payment. The Performance and Payment Bond shall be executed on the same day as the Contract and shall include a Power of Attorney for each copy of the Bond.

14. LIQUIDATED DAMAGES

The parties acknowledge the School Board will suffer damages if the project has not reached Substantial Completion and Final Completion on the dates set forth in the Contract. The damages suffered by the School Board, in the event of a delay, are not readily ascertainable. Due to the difficulty in ascertaining the damages, the Contractor and the Contractor's surety shall be liable for and shall pay, as liquidated damages, the sum of five hundred dollars and no cents ($500.00) per calendar day for each calendar day or part thereof, the delay in the project continues beyond the deadline set by the terms of the Contract for Substantial Completion of the work. The parties acknowledge that these sums are not a penalty, but are the amount agreed upon by the parties as liquidated damages representing the losses to the School Board which would be incurred in the event the project is delayed by the Contractor beyond the date of Substantial Completion and the date of Final Completion as set forth in the Contract.

15. TIME OF THE ESSENCE

Any time periods provided for herein which shall end on a Saturday, Sunday, or a legal holiday shall extend to 5:00 p.m. of the next business day. Time is of the essence in this Contract.

BID FORM

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 632

TO: School Board of Volusia County Florida
Facilities Services
3750 Olson Drive, Daytona Beach Florida 32124
(386) 947-8786

The undersigned, having become familiarized with the local conditions affecting the cost of the work and with the Drawings and Specifications as prepared by Sabiston Engineering Group, Inc. hereby submits the following bid / proposal:

Facility Name:	Timbercrest Elementary
Project Name:	Upgrade Boilers
VCS Project No.:	2648255

COMPANY NAME:	
ADDRESS:	
PHONE:	

I (We) propose to furnish all labor, materials, equipment and services necessary for the completion of the above project, all in accordance with the Drawings and Specifications hereof, including any addenda issued, as indicated below.

BASE BID

Note: modify the format in the box below as needed for this project.

As shown on the drawings and specifications, the sum of:

_____ ($_____).

ALTERNATES - No alternates for this project.
(Note: A/E insert description below; add additional Alternates as needed.)

UNIT PRICES - No unit prices for this project.
(Note: A/E insert description below; add additional Unit Prices as needed.)

BID SECURITY - REQUIRED
If required, bid security in an amount equal to 5% of the total bid proposal is enclosed with the understanding that this proposal shall remain in full effect for a period of 60 days starting at the bid opening date and time.

The undersigned agrees to commence work under the Contract on or before a date to be specified in the written FAC Document 650 Notice to Proceed, and to substantially complete the project within Ninety (90) consecutive calendar days thereafter, as specified in Article 3 of AIA Document A101-2017 Agreement, or Article 2 of FAC Document 625 Agreement, which ever is applicable to this project.

The Bidder acknowledges the following addendum (addenda) is made an integral part of the bid documents:

Addendum No.	Date Issued	Addendum No.	Date Issued

In submitting this bid / proposal, the Bidder acknowledges this bid / proposal is based on all construction documents and addenda as posted on the Owner's website or otherwise provided by the Owner's representative. The Owner reserves the right to accept or reject any or all bids / proposals and is not obligated to accept the lowest responsible bid / proposal.

OFFICIAL COMPANY NAME AND ADDRESS:

_____ By: _____
(Signature)

_____

_____
(Print Name, Title)

_____

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)

BOND AMOUNT: $

PROJECT:
(Name, location or address, and Project number, if any)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Init.
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User Notes:
(3B9ADA11)

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

Init.
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User Notes:
(3B9ADA11)

LIST OF SUBCONTRACTORS

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 633

Bidder Company Name:	
Facility Name:	Timbercrest Elementary
Project Name:	Upgrade Boilers
VCS Project Number:	2648255

This form shall be considered an integral part of FAC Document 632, Bid Form, and shall be submitted with the Bid Form.

The term Subcontractor as used herein shall be used as defined in FAC Document 631, Instructions to Bidders.

For each "TYPE OF WORK" listed below, list the name of the subcontractor who will be performing any portion of that work. Use additional sheets, if needed.

Bidder may list itself to self-perform, as defined in FAC Document 631, Instructions to Bidders, a type of work when the Bidder is currently licensed to and shall perform that type of work and provides completed FAC Document 634, Bidder Project Data for Self-Performed Projects, within five (5) days to the date of this bid, for at least two (2) previously self-performed projects of comparable size and scope of this Contract for the last five (5) years.

There shall be no exceptions to a Bidder's obligation to provide the aforementioned documentation in the time frame provided. Failure to provide any of the aforementioned documentation or comply with the requirements of this form shall constitute a material deviation from the requirements of this Solicitation and shall serve as grounds for rejecting the bid as non-responsive.

(Consultant: modify the list of work in the table below as needed for the Project.)

TYPE OF WORK	SUBCONTRACTOR
1. Mechanical	
2. Electrical	
3. Boiler Manufacturer	
4. Hydronic Piping Labor	

BIDDER PROJECT DATA
FOR SELF-PERFORMED PORTIONS OF THE WORK

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 634

Facility Name: Timbercrest Elementary
Project Name: Upgrade Boilers
VCS Project No.: 2648255

Instructions to Bidder: Work completed in the past 5-years. For each type of work proposed to be self-performed by Bidder in FAC Document 633 of the Solicitation, provide full responses to this form. In the event Bidder requires additional space, Bidder is authorized to reproduce this form.

Submitted by - Firm Name: _____

Firm Address: _____

Self-performed Project No. 1

Project: _____

A. Type of Work: _____

Description: _____ Date Completed: _____

Location: _____

Value of Self-performed Work: _____ Total Project Value: _____

B. Owner: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

C. Arch. or Eng.: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

Self-performed Project No. 2

Project: _____

A. Type of Work: _____

Description: _____ Date Completed: _____

Location: _____

Value of Self-performed Work: _____ Total Project Value: _____

B. Owner: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

C. Arch. or Eng.: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

Self-performed Project No. 3

Project: _____

A. Type of Work: _____

Description: _____ Date Completed: _____

Location: _____

Value of Self-performed Work: _____ Total Project Value: _____

B. Owner: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

C. Arch. or Eng.: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

Self-performed Project No. 4

Project: _____

A. Type of Work: _____

Description: _____ Date Completed: _____

Location: _____

Value of Self-performed Work: _____ Total Project Value: _____

B. Owner: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

C. Arch. or Eng.: _____

Contact Person(s): _____ Phone: _____

Email: _____

Office Address: _____

The foregoing is a statement of fact. Any inaccurate information disclosed in this form shall constitute a major deviation from the Solicitation and result in the rejection of bid as non-responsive to the requirements of the Solicitation.

_____ _____

Print Name *Title*

_____ _____

Signature *Date*

TRENCH SAFETY ACT FORM

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 635

Facility Name: Timbercrest Elementary
Project Name: Upgrade Boilers
VCS Project No.: 2648255

This form shall be completed, signed and submitted with FAC Document 632, Bid Form. Failure to submit this form at the time of bid will constitute automatic disqualification and non-acceptance of bid proposal.

The undersigned, herein called "Bidder", has determined to his own complete satisfaction that all portions of the Florida Trench Safety Act (90-96, Laws of Florida) as the OSHA Excavation Safety Standards 29, CFR part 1926.650 Subpart P, will be fully complied with and executed properly on this project.

Bidder acknowledges that included in the various items of the proposal and in the Total Bid Price are costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) effective October 1, 1990. The bidder further identifies the costs to be summarized below:

	Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit (Quantity)	Unit Cost	Extended Cost
A.					
B.					
C.					
D.					
				Total	

In Witness whereof, the Bidder as hereunto set his signature and affixed his seal

this _____ day of _____ in the year _____

Firm: _____ *(SEAL)*

By: _____

Name and Title: _____

BID PROTEST BOND

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 636

Bond Number:
Facility Name:
Project Name:
VCS Project No.:

KNOW ALL PERSONS BY THESE PRESENTS:

That we, _____ a *(select one)* ☐ corporation ☐ joint venture ☐ partnership ☐ proprietorship ☐ limited liability company organized and existing under the laws of the State of _____, and duly authorized to do business in the State of Florida and having its principal place of business at _____ as PRINCIPAL; and _____, a surety company, organized under the laws of the State of _____, and duly authorized to do business in the State of Florida, whose principal place of business is _____ as SURETY, are held and firmly bound unto the School Board of Volusia County Florida as OBLIGEE in the amount of _____ Dollars ($_____) for the payment of which sum we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally.

THIS BOND is issued under provisions of Section 255.0516, Florida Statutes. The above-named principal has initiated an administrative protest pursuant to Section 120.57, Florida Statutes, regarding the School Board of Volusia County's (Board) bid solicitation, bid rejection or contract award for the above-referenced project, which protest is conditioned upon the posting of a bond. The bond shall be conditioned upon the payment of all costs and attorneys' fees which may be adjudged against the person filing the protest in the administrative hearing in which the action is brought and any subsequent appellate court proceeding.

NOW, THEREFORE, if the Principal, after conclusion or termination of the administrative hearing process, and/or any appellate court proceedings regarding the protest, shall satisfy all attorneys' fees, costs and interest thereon, rendered by final order and/or judgment, in favor of the Board as the prevailing party, then the obligation shall be null and void; otherwise this bond shall remain in full force and effect.

The Board may bring an action in a proper court on this bond for the amount of such liability, including all additional costs and attorneys' fees associated with a claim against the bond.

PRINCIPAL _____

BY _____

TITLE _____ (CORPORATE SEAL)

ATTEST _____

TITLE _____

SURETY _____

BY _____ (CORPORATE SEAL)

TITLE _____

Florida Licensed Insurance Agent _____

NOTE: Power of attorney showing authority of Surety's agent or Attorney in fact must be attached.

AIA Document A101 – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the _____ day of _____ in the year _____.
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

School Board of Volusia County Florida
200 North Clara Avenue, DeLand Florida 32720

Document mailing address: 3750 Olson Drive, Daytona Beach Florida 32124

and the Contractor:
(Name, legal status, address and other information)

_____

for the following Project:
(Name, location and detailed description)

_____

The Architect:
(Name, legal status, address and other information)

_____

The Owner and Contractor agree as follows.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTIONS

7 TEMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONSTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9. Contract documents include the Contractor's bid or proposal.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1. The date of commencement of the Work shall be:

[ ] The date of this Agreement.

[X] A date set forth in a notice to proceed issued by the Owner.

[ ] Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

_____

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[X] Not later than _____ (_____) consecutive calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	**Substantial Completion Date**

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be _____ ($ _____), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	**Price**

~~§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.~~
~~*(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)*~~

~~**Item**~~	~~**Price**~~	~~**Conditions of Acceptance**~~

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	**Price**

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	**Units and Limitations**	**Price per Unit ($0.00)**

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

The parties acknowledge the Owner will suffer damages if the project has not reached Substantial Completion and Final Completion on the dates set forth in the Contract. The damages suffered by the Owner, in the event of a delay, are not readily ascertainable. Due to the difficulty in ascertaining the damages, the Contractor and the Contractor's surety shall be liable for and shall pay, as liquidated damages, the sum of dollars cents ($) per calendar

day for each calendar day or part thereof, the delay in the project continues beyond the deadline set by the terms of the Contract for Substantial Completion of the work. The parties acknowledge that these sums are not a penalty, but are the amount agreed upon by the parties as liquidated damages representing the losses to the Owner which would be incurred in the event the project is delayed by the Contractor beyond the date of Substantial Completion as set forth in the Contract. Time is of the essence. Any such liquidated damages may, at the option of the Owner, be withheld and deducted from any unpaid portion of the Contract sum.

§ 4.6 Other:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

_____

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Document.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

_____

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the first day of a month and certified to the Owner by the seventh day of the month, the Owner shall make payment of the amount certified to the Contractor not later than the last day of the same month. If an Application for Payment is received by the Architect and certified to the Owner after the application date fixed above, payment of the amount certified shall be made by the Owner not later than thirty (30) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect and Owner may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment. The Contractor shall not make changes in the Schedule of Values without prior approval of the Architect and Owner.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing.~~; and~~

~~.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.~~

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Retainage, not to exceed five percent (5%), shall be withheld from each progress payment to the Contractor for Projects with a total cost of construction services identified in the contract of more than two hundred thousand dollars ($200,000.00), 218.735 F.S.

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

_____

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

_____

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

_____

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 applicable for Final Payment along with all warranties, guarantees, close out documents including all as built drawings in paper document and digital combined PDF format, transmitted via FTP or other Owner accepted protocol, and items required under the Contract Documents as submitted to the Architect or Engineer for review and transmittal to the Owner; and

.3 Board acceptance of the Certificate of Final Inspection (CFI); and

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.4 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made ~~no later than~~ 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

_____

~~§ 5.2 Interest~~
~~Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.~~
~~*(Insert rate of interest agreed upon, if any.)*~~

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017~~, unless the parties appoint below another individual, not party to this Agreement, to serve as the Initial Decision Maker~~.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

_____

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[X] Litigation in a court of competent jurisdiction

[ ] Other *(Specify)*

_____

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

~~§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:~~
~~*(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*~~

_____

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

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§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

_____

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

_____

§ 8.4 ~~Neither the Owner's nor the Contractor's representative shall be changed without ten days prior notice to the other party.~~ The Contractor's representative shall not be changed without prior written approval by the Owner.

§ 8.5 Insurance and Bonds
§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Other provisions:

_____

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS
§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor
.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds
.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 Drawings

Exhibit	**Title**	**Date**
B	List of Drawings	

.5 Specifications

Exhibit	**Title**	**Date**
C	List of Specifications	

.6 Addenda, if any:

Number	**Date**	**Pages**

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.7 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

Supplemental and other Conditions of the Contract:

_____

.8 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™–2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

This Agreement entered into as of the day and year first written above.

School Board of Volusia County Florida

OWNER *(Signature)*	CONTRACTOR *(Signature)*
, Board Chair *(Printed name and title)*	*(Printed name and title)*
WITNESS *(Signature)*	WITNESS *(Signature)*
, Superintendent *(Printed name and title)*	*(Printed name and title)*

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Exhibit A – Insurance and Bonds
to AIA Document A101 – 2017 Agreement

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the _____ day of _____ in the year _____.
(In words, indicate day, month, and year.)

for the following PROJECT:
(Name and location or address)

_____

THE OWNER:
(Name, legal status and address)

School Board of Volusia County Florida
200 North Clara Avenue, DeLand Florida 32720

Document mailing address: 3750 Olson Drive, Daytona Beach Florida 32124

THE CONTRACTOR:
(Name, legal status and address)

_____

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction. The Owner, at its discretion, may modify this document at any time during the preparation of the Contract to conform to the Project.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under ~~this Article~~ Section A.2.2 and, upon the Contractor's request, provide a copy of the ~~property~~ insurance policy or policies required ~~by Section A2.3~~. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability and Property Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability and property insurance.

§ A.2.3 Required Property Insurance

§ A.2.3.1 ~~Unless this obligation is placed on the~~ The Contractor, pursuant to Section A.3.3.2.1, ~~the Owner~~ shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The ~~Owner's~~ Contractor's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 Causes of Loss. The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:
(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss	**Sub-Limit**

§ A.2.3.1.2 Specific Required Coverages. The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:
(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage	**Sub-Limit**

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the ~~Owner~~ Contractor shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 Deductibles and Self-Insured Retentions. If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the ~~Owner~~ Contractor shall be responsible for all loss not covered because of such deductibles or retentions. Deductibles in excess of $50,000 shall not be permitted.

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the ~~Owner~~ Contractor shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Contractor shall be responsible for all co-insurance penalties.

§ A.2.4 Optional Extended Property Insurance.

The ~~Owner~~ Contractor shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the ~~Owner~~ Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

[ ] § 2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.

[X] § 2.4.2 Ordinance or Law Insurance, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

[ ] § 2.4.3 Expediting Cost Insurance, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

[ ] § 2.4.4 Extra Expense Insurance, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

[ ] § 2.4.5 Civil Authority Insurance, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

[ ] § 2.4.6 Ingress/Egress Insurance, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

[ ] § 2.4.7 Soft Costs Insurance, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

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(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[X] § 2.5.1 Cyber Security Insurance for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

[ ] § 2.5.2 Other Insurance
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	**Limits**

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits. Failure of the contractor to obtain and maintain required insurance shall be grounds for termination of the Contract by the Owner. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured, including a copy of the additional insured form attached to the certificate of insurance, on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies. Umbrella excess liability shall be provided for Projects with a contract sum in excess of one million dollars ($1,000,000); not less than one million dollars ($1,000,000) over primary insurance; and retention for self-insured hazards for one million dollars ($1,000,000).

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. The Contractor, for your Work, shall maintain completed operations coverage for itself and each additionally insured for at least five (5) years or the Florida Statute of Repose whichever is greater. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies, rated by A.M. Best "A-" or better, lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ 3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than one million dollars ($1,000,000) each occurrence, one million dollars ($1,000,000) per claimant, two million dollars ($2,000,000) general aggregate, and two million dollars ($2,000,000) aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;

.2 personal injury and advertising injury;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of completed operations; ~~and~~

.5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions;

.6 contractual liability for bodily injury and property damage not less than one million dollars ($1,000,000) per claimant and each occurrence; and for property damage two million dollars ($2,000,000) general aggregate; and

.7 property damage liability shall provide X, C and U coverage.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

.3 Claims for bodily injury other than to employees of the insured.

.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

.8 Claims related to roofing, if the Work involves roofing.

.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

.10 Claims related to earth subsidence or movement, where the Work involves such hazards.

.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ 3.2.3 Automobile Liability covering vehicles owned, hired, leased and non-owned vehicles used, by the Construction Manager, with policy limits of not less than one million dollars ($1,000,000) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage. The Owner is to be named as additionally insured. The State of Florida has no-fault automobile insurance requirements; the Contractor shall be certain coverage is provided which conforms to any specific stipulation in this law.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

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§ A.3.2.5 Workers' Compensation at State, Chapter 440 Florida Statutes, and Federal, e.g. Longshoremen's Statute, statutory limits with policy limits not less than one million dollars ($1,000,000.00) each accident, each employee and policy limit.

§ A.3.2.5.1 In the event the Contractor is using leased employees (PEO arrangement), provide the same workers' compensation policy limits as Section 3.2.5; and a waiver of subrogation in favor of alternate employers' endorsement showing the subcontractor as the alternate employer.

§ 3.2.6 Employers' Liability with policy limits not less than one million dollars ($1,000,000) each accident, one million dollars ($1,000,000) each employee, and one million dollars ($1,000,000) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks.

§ 3.2.8 If the Construction Manager is required to furnish professional services as part of the Work, the Construction Manager shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than one million dollars ($1,000,000) per claim and one million dollars ($1,000,000) in the aggregate.

§ 3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Construction Manager shall procure Pollution Liability insurance, with policy limits of not less than one million dollars ($1,000,000) per claim and one million dollars ($1,000,000) in the aggregate.

§ 3.2.10 Coverage under Sections 3.2.8 and 3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than _____ ($ _____) per claim and _____ ($ _____) in the aggregate.

§ 3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than _____ ($ _____) per claim and _____ ($ _____) in the aggregate.

§ 3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than _____ ($ _____) per claim and _____ ($ _____) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:
(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ 3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section 3.3.1.
(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[X] § 3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance ~~except insurance required by Section A.2.3.1.3 and Section A.2.3.3~~. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle

the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below.
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

[ ] § 3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than _____ ($ _____) per claim and _____ ($ _____) in the aggregate, for Work within fifty (50) feet of railroad property.

[ ] § 3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than _____ ($ _____) per claim and _____ ($ _____) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

[X] § 3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site, including scaffolding and other equipment used on the Project, on an "all-risks" completed value form.

[ ] § 3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Construction Manager and used on the Project, including scaffolding and other equipment.

[ ] § 3.3.2.6 Other Insurance
(List below any other insurance coverage to be provided by the Construction Manager and any applicable limits.)

Coverage **Limits**

§ A.3.4 Performance Bond and Payment Bond
§ A.3.4.1 The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located~~, as follows:~~.
~~*(Specify type and penal sum of bonds.)*~~

~~Payment and Performance Bonds shall be AIA Document A312, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312, current as of the date of this Agreement.~~

§ A.3.4.2 Unless otherwise agreed in writing prior to beginning Work, the Contractor shall furnish and pay for a Performance and Payment Bond on the Project in the amount of one-hundred percent (100%) of the Contract Price. The liability under said Bond shall be coextensive with the Contractor for all damages arising out of Contractor's breach of this agreement or failure to perform, including, but not limited to, delay damages, liquidated damages (if any), completion of punch lists and the Contractors responsibilities under Section 12.2.2.1 of the General Conditions. "Conditional" Payment Bonds under Florida Statutes, Section 713.245, shall not be acceptable. Proper Power of Attorney shall accompany said bonds.

§ A.3.4.3 The Contractor shall provide a Public Construction Bond as required by 255.05 F.S.; the Performance and Payment Bonds shall be on forms provided and approved by the Owner.

§ A.3.4.4 Bonds shall be secured through sources acceptable to the Owner. To be acceptable to the Owner as Surety for Performance and Payment Bonds, a Surety Company shall comply with the following provisions:

.1 the Surety Company must be authorized to do business in the State of Florida; and

.2 the Surety Company shall have been in business and have a record of successful continuous operations for at least five years; and

.3 the Surety Company shall have at least A.M. Best Company Policyholder's Rating of "A-" and "Financial Size Category" of class XI or an equivalent rating from the Insurance Commissioner if not rated by A.M. Best.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

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AIA Document A201 – 2017

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

_____

THE OWNER:
(Name, legal status and address)

School Board of Volusia County Florida
200 North Clara Avenue, DeLand Florida 32720

Document mailing address: 3750 Olson Drive, Daytona Beach Florida 32124

THE ARCHITECT:
(Name, legal status and address

_____

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

All references herein to "Contractor" shall mean "Construction Manager" for Construction Management contract Projects in lieu thereof. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (A201-2017 General Conditions of the Contract as modified by Owner hereinafter "A201-2017", Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, ~~(3) a Construction Change Directive,~~ or (3) a written order for a minor change in the Work issued by the Architect. ~~Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.~~

§ 1.1.2.1 Three (3) original Contract documents shall be signed by both parties with one (1) signed document delivered to Contractor after Owner approval.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Architect ~~Initial Decision Maker~~ is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.1.9 Third Party Beneficiary

Nothing contained in the Contract Documents shall create a contractual relationship between the Owner and any third party; however, it is understood and agreed that the Owner is an intended third-party beneficiary of all contracts for design or engineering services, all subcontracts, purchase orders as well as all agreements between the Contractor and third parties. The Contractor shall incorporate the obligations of this Contract into its respective subcontracts, supply agreements and purchase orders.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended ~~indicated~~ results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.2.4 The term "Provide", as used in the Contract Documents, includes furnishing all labor, supervision, tools, materials, supplies, equipment, shop drawings, product data and samples, together with all services, accessories and costs associated with performance of the work, for production of an item or system usable in the completed project.

§ 1.2.5 Where conflict or discrepancies exists within or between the Contract Documents or between the Contract Documents and applicable industry standards or applicable codes, ordinances, or other legal requirements, the more stringent requirements shall apply; otherwise, the following order of precedence shall be used.

.1 The Agreement
.2 Supplementary Conditions, if any
.3 These General Conditions
.4 Addenda, if any, with those of later date having precedence over those of earlier date
.5 Specifications
.6 Drawings

§ 1.2.6 Any organization's document referred to, unless otherwise specified in the Specifications, shall mean the latest edition of such document adopted and published prior to the date of the Specifications, and such documents shall be a part of the Specifications with the same effect as if written therein in full.

§ 1.2.7 Dimensions indicated on any Drawings are required dimensions, regardless of measurement per given scale. The Contractor shall verify at the Site necessary levels, measurements, etc., for proper and complete fabrication, assembly and installation of Work. Where dimensions are not indicated, and exact location is not apparent, the Contractor shall notify the Owner and Architect. Inadvertent discrepancies or omissions of details, figures or notes on one drawing, where another drawing correctly sets forth such information, shall not be cause for additional charges or claims.

§ 1.2.8 The interrelation of the Specifications, the Drawings and the Schedules is as follows: The Specifications determine the nature of the setting of the various materials; the Drawings establish the quantities, dimension and details; and the Schedules give the locations. Should the Drawings disagree in themselves, or with the Specifications, the better quality or greater quantity of work or materials shall be estimated upon and, unless otherwise ordered by the Architect in writing, shall be performed or furnished. Explanatory notes on Drawings take precedence over Specifications. Figures given on Drawings take precedence over scaled measurements, and large-scale details take precedence over small Drawings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 Unless otherwise provided in the Owner's Agreement with the Architect, the Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.6.3 Written notice requirements of this Contract imposed upon the Contractor shall be strictly construed and such requirements are a condition precedent to Contractor pursuing any rights or remedies hereunder. Contractor expressly waives its rights to claim any waiver by the Owner of such notice requirements based upon the Owner having actual knowledge, implied, verbal or constructive notice, suffering lack of prejudice or any other grounds as substitute for the failure of the Contractor to comply with the express written notice requirements herein.

§ 1.7 Digital Data Use and Transmission

§ 1.7.1 The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. ~~The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.~~

§ 1.7.2 The Owner, at its discretion and direction, intends to utilize Procore Construction Management software platform which is licensed to the Owner. Access to the platform shall be provided to the Contractor at no cost to the Contractor.

.1 The Procore Certification Program, as applicable to the Contractor's software access, shall be provided to those deemed necessary by the Contractor and Owner for the Project. The program is a self-paced webinar format intended to familiarize the user with the software. Time will be allotted to the Contractor for this purpose.

.2 The Contractor shall perform the following:

.1 upload pertinent documents and files within the Procore software as established by the Owner; and

.2 utilize Procore Tools to manage specific data based documents and information; and

.3 collaborate and communicate with the Owner and Consultants within the Procore software; and

.4 modify the drawings within the Procore software throughout the Project in order to create as built drawings; and

.5 other Owner assigned and/or required Procore software processes necessary for the successful completion of the Project.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model ~~and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form,~~ shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

§ 1.9 Public Records Compliance

§ 1.9.1 If the Contractor has 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 (386) 734-7190 extension 20119, custserv@volusia.k12.fl.us or 200 North Clara Avenue, DeLand Florida 32720. The Contractor shall:

.1 Keep and maintain public records required by the school district to perform the service; and

.2 Upon request from the school district's custodian of public records, provide the school district with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law; and

.3 Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the Contractor does not transfer the records to the school district; and

.4 Upon completion of the contract, transfer, at no cost, to the school district all public records in possession of the Contractor or keep and maintain public records required by the school district to perform the service. If the Contractor transfers all public records to the school district upon completion of the contract, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the contract, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the school district, upon request from the school district's custodian of public records, in a format that is compatible with the information technology systems of the school district.

§ 1.9.2 Failure of the Contractor to abide by the terms of this provision shall be deemed a material breach of this agreement and the School District of Volusia County may enforce the terms of this provision in the form of a court proceeding and shall, as a prevailing party, be entitled to reimbursement of all attorney's fees and costs associated with that proceeding. This provision shall survive termination or expiration of the contract.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative, who shall be the Superintendent or designee. The Owner's Representative is authorized to act on the Owner's behalf as provided herein and in applicable law, regulation or ordinance. The Owner's Representative has the authority to reject unsatisfactory work and to stop the work if necessary to ensure its proper execution. Failure of the Owner's Representative, in any one or more instances, to insist on strict performance of any of the terms of the Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment of future insistence of any such terms or options. ~~Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.~~

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information

shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information. ~~Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.~~

~~§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.~~

~~§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~

~~§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.~~

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner ~~shall~~ may, at Owner's sole discretion, retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner ~~shall~~ may employ a successor ~~to whom the Contractor has no reasonable objection and~~ whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys to the extent available to the Owner, without being responsible for the accuracy of completeness of same, describing physical characteristics, legal limitations and utility locations for the site of the

Project, and a legal description of the site. ~~The Contractor shall be entitled to rely on the accuracy of such survey information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.~~

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

§ 2.4.1 If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. The Owner shall incur no liability for delays occasioned by any stop-work order issued in accordance with this paragraph.

§ 2.4.2 If, after consultation with the Architect, suspension of the Work is warranted by reason of unforeseen conditions which may adversely affect the quality of the Work if such Work were continued, the Owner may suspend the Work by written notice to the Contractor. In such event, the Contract Time shall be adjusted accordingly, and the Contract Sum shall be adjusted to the extent, if any, that additional costs are incurred by reason of such suspension. If the Contractor, in its reasonable judgment, believes that a suspension is warranted by reason of unforeseen circumstances which may adversely affect the quality of the Work if the Work were continued, the Contractor shall immediately notify the Owner and the Architect of such belief and describe with particularity the reasons therefor.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ~~five~~ ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, ~~correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect~~ commence and continue to carry out the Work. The Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. ~~If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.~~ The right of Owner to stop the Work pursuant to this Section 2.5 shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

ARTICLE 3 CONTRACTOR

§ 3.1. General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

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§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become ~~generally~~ familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents. Familiarity with local conditions shall include, without limitation, (1) the condition and layout of the Project site and surrounding locale, (2) available labor supply and costs, (3) available subcontractors and suppliers, (4) the prevailing climate, including the impact of rain and saltwater environment, (5) available material and equipment and costs, and (6) other similar issues. Extra payments will not be authorized for Work that could have been foreseen by careful examination of the Site. Execution of the Contract shall constitute acceptance, by the Contractor, of existing Site conditions as a part of the requirements for this Work, except as to concealed and unknown conditions as provided in Section 3.7.4. Contractor shall make no claim for additional time or money based upon its failure to comply with this Paragraph.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention and in accordance with all local and Florida licensing requirements and Florida Building Code. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. The Contractor agrees to remove from the Project any employee, Subcontractor, or Subcontractor employee that commits any breach of the Contract Documents or any breach of the Owner's written rules and regulations regarding jobsite conduct.

§ 3.3.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. The Contractor shall require all construction personnel to maintain a neat general appearance at all times. Shirts, trousers and proper shoes are required apparel. The display of vulgar words, signs or figures is prohibited. Sandals and flip-flops are prohibited on the Project site. The use of radios, sound producing devices and the like are prohibited on the Project site. The Contractor shall not be permitted to use restrooms or other sanitary facilities within the Owner's existing buildings or on-site facilities.

§ 3.3.4 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work. Neither the presence or absence of the Owner or Architect shall relieve the Contractor from any requirements of the Contract Documents.

§ 3.3.5 The Contractor will be responsible for all building grades, lines, levels, etc., required for layout of the Work.

§ 3.3.6 If required by Owner on a Project where applicable, at the earliest possible time after the commencement of the Work on the Project site, the Contractor shall have all property corners and benchmarks verified or established by a state-licensed land surveyor, shall locate the Project on the Project site, establishing necessary reference marks and axes from which the Work accurately can progress, shall furnish Architect evidence of such verification and shall report at once any errors discovered during the process of such verification.

§ 3.3.7 If any of the Work is required to be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed. No inspection performed or failed to be performed by the Owner hereunder shall be a waiver of any of the Contractor's obligations hereunder or be construed as an approval or acceptance of the Work or any part thereof.

§ 3.3.8 The Contractor acknowledges that it is the Contractor's responsibility to hire all personnel for the proper and diligent prosecution of the Work and the Contractor shall use its best efforts to maintain labor peace for the duration of the Project. In the event of a labor dispute of the Contractor, its subcontractors or suppliers, the Contractor shall not be entitled to any increase in the Contract Sum.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Equal Opportunity

§ 3.4.2.1 ~~Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.~~ The Contractor shall maintain policies of employment as follows: (1) the Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, gender, religion, national origin, ethnicity, sexual orientation, age or disability; (2) the Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, gender, religion, national origin, ethnicity, sexual orientation, age or disability.

§ 3.4.3 The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order of other appropriate written directive by the Owner ~~shall enforce strict discipline and~~

~~good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them~~.

§ 3.4.4 Value Engineering Incentive

§ 3.4.4.1 Any proposal initiated and developed by the Contractor for variation from contractual requirements, which to be acceptable under the Contract would necessitate issuance of a contractual change and which reduces the cost of performing the Contract, without degrading operational functions: e.g., performance, reliability or maintainability of the item. Such proposals would be submitted by the Contractor to the Architect in the same form as prescribed for any other proposal, which would likewise necessitate a change in the contractual requirements but would include a statement that they are a proposed Value Engineering Change subject to the operation of this clause.

§ 3.4.4.2 The Architect will be the sole judge of acceptability, and no substitute will be ordered, installed, used or initiated without the Architect's prior written acceptance which will be evidenced by Change Order. However, any Value Engineering Change accepted by the Architect shall not result in any increase in the Contract Price or Contract Time. By making a request for a Value Engineering Change, the Contractor agrees to pay directly to the Architect all Architect's fees and charges related to the Architect's review of the request for Value Engineering Change, whether or not the Architect accepts the request. The Owner may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any substitute approved after award of the Contract.

§ 3.4.5 Owner Direct Purchase

§ 3.4.5.1 The Owner is tax exempt and may wish to exercise its right to purchase directly various construction materials, supplies and equipment that may be part of the Contract. The Owner will, via its purchase orders, purchase that material and the Contractor shall assist the Owner in the preparation of purchase orders. The Owner may direct the Contractor to prepare the purchase order on the Owner's form and make ready for verification and execution by the Owner. The materials shall be purchased from the vendors and or suppliers originally selected by the Contractor, for the price originally negotiated by the Contractor. Within thirty (30) days of the Notice to Proceed (NTP) the Contractor shall prepare a complete list of materials, supplies and equipment, including the cost of each item, for the Project and the Owner will advise the Contractor in writing which items from the list the Owner wishes to purchase directly.

§ 3.4.5.2 At a time deemed acceptable to the Owner, the Contract amount shall be reduced by the net, undiscounted amount of the purchase order, plus all sales taxes and surtax as levied. Issuance of the purchase orders by the Owner does not change any of the Contractor's responsibilities regarding material purchases, or installations, with the exception of the payments for the materials purchased. The Contractor remains responsible for coordination, correct quantities ordered, submittals, protection, storage, scheduling, shipping, security, expedition, receiving and unloading, certifying the accuracy of shipping tickets and invoices, installation, cleaning, all applicable warranties and that all materials purchased meet the requirements of the Contract Documents. The Contractor shall certify all invoices as accurate and acceptable and forward to the Owner the certified invoices for payment by the Owner.

§ 3.4.5.3 In the event that materials, supplies or equipment purchased under this option are defective or rejected for any reason whatsoever, and it becomes necessary in the opinion of the Contractor to initiate legal action against the responsible party, the Owner agrees to assign and subordinate to the Contractor any claims the Owner has against the responsible party resulting from the purchase order and to execute any legal documents necessary to accomplish the assignment, subordination or subrogation of such claims, and to cooperate with the Contractor in such legal action.

§ 3.4.5.4 The Contractor agrees to execute the Owner's document "Contractor's Direct Material Purchase Affidavit" and to submit the affidavit to the Owner along with the above described list of materials, supplies and equipment, as agreed to between the Owner and Contractor. Tax savings will be returned to the Owner via Change Order.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not

executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect or Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work in accordance with the laws of the state and other taxing authorities in the jurisdiction where the Project is located ~~provided by the Contractor~~ that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. The Contractor shall procure all certificates of inspection, use, occupancy, permits and licenses, pay all charges and fees and give all notices necessary and incidental to the due and lawful prosecution of the Work. Certificates of inspection, use and occupancy shall be delivered to the Owner upon completion of the Work in sufficient time for occupation of the Project in accordance with the approved schedule for the Work. The costs of such procurement, payment and delivery are included within the Contract Sum.

§ 3.7.1.1 Certain permits, regulations and fees may apply to work involved in this Project when such work takes place beyond the limits of the school site. This may include but not be limited to hauling and disposal of materials and debris resulting from demolition. The Contractor shall obtain any such permits, comply with all applicable regulations and pay the cost of any and all fees required by such offsite work.

§ 3.7.1.2 The Owner's building department is the authority having jurisdiction for building code compliance unless otherwise provided in the Contract Documents. The Owner's building permit is required to be issued before construction may commence and will be furnished to the Contractor at no cost upon compliance with permit application requirements.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. The Contractor shall comply with all applicable federal, state and county, and city statutes, safety regulations, codes, ordinances and orders, including the Occupational Safety and Health Administration Act of 1970 (OSHA) as amended from time to time.

§ 3.7.3 If the Contractor performs Work ~~knowing it to be~~ contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions (Excluding Claims for Unsuitable Soils)

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. No adjustment in Contract Sum or Contract Time shall be allowed pursuant to this Article to the extent the concealed or unknown condition should have been reasonably discovered by the Contractor during pre-bid site inspections, review, or preconstruction services. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.7.6 Claims for Unsuitable Soils "Unsuitable soil" does not include soil with high or low moisture content or soil adversely affected by weather conditions and no claim for additional cost will be accepted based solely on the moisture content of excavated material. If the excavated material is unsatisfactory for the specified use on the project solely because of either high or low moisture content or the soil is adversely affected by weather conditions, the Contractor may, in its discretion, either (1) process the material to adjust the moisture content to the specified condition or an acceptable condition if not specified, or (2) remove the material and replace it with satisfactory material. Contractor's election of either option will be at Contractor's expense with no additional cost to the Owner.

§ 3.7.7 E-Verify

§ 3.7.7.1 State of Florida, Office of the Governor, Executive Order 11-116 (superseding Executive Order 11-02) requires all agencies under the direction of the Governor to verify the employment eligibility of all new employees through the U.S. Department of Homeland Security's E-Verify system. Further, in conjunction with Section 448.095 F.S., the Contractor is directed to include as a condition of all contracts for the provision of goods or services to the School Board of Volusia County in excess of nominal value, an express requirement that the Contractor utilizes the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Contractor during the contract term, and an express requirement that the Contractor include in such subcontracts the requirement that subcontractors performing work or providing services pursuant to the state contract utilize the E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term. To enroll in the E-Verify system employers should visit www.e-verify.gov.

§ 3.7.7.2 Failure to comply shall be cause for termination of contract by the Owner, at its sole discretion. The Contractor is liable for any additional costs incurred as a result of the termination of Contract, Section 448.095(2) F.S.

§ 3.7.7.3 The Contractor is required to submit to the Owner FAC Document 639, Contractor E-Verify Affidavit, upon contract execution.

§ 3.7.8 Use of Coercion for Labor and Services

§ 3.7.8.1 Section 787.06(13) F.S., requires all nongovernmental entities executing, renewing or extending a contract with a governmental entity to provide an affidavit signed by an officer or representative of the nongovernmental entity under penalty of perjury that the nongovernmental entity does not use coercion for labor or services as defined in that statute. The School Board of Volusia County Florida is a governmental entity for purposes of this statute. Unless otherwise directed by the Owner, said affidavit shall be submitted as part of the Contractor's Pre-qualification via the School District's Purchasing Department.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during all performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case. The superintendent shall be satisfactory to the Owner in all respects, and Owner shall have the right to require Contractor to dismiss from the Project any superintendent whose performance is not satisfactory to Owner, and to replace such superintendent with a superintendent satisfactory to Owner. The Contractor shall not replace the superintendent without the written consent of the Owner.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.9.4 If required by Owner, a list of all supervisory personnel, including the project manager and superintendent, that the Contractor intends to use on the Project and a chain-of-command organizational chart shall be submitted to the Owner for approval. The Contractor shall not engage supervisory personnel or utilize an organization and chain-of-command other than as approved by Owner in writing and shall not change such personnel or form of organization without the written approval of the Owner.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, ~~promptly~~ within thirty (30) days after ~~being awarded~~ execution of the Contract, shall submit for the Owner's and Architect's ~~information~~ written approval a Contractor's construction schedule for the Work. The construction schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the Owner and conditions of the Work and Project.

§ 3.10.2 Within thirty (30) days of Notice to Proceed (NTP), the Contractor shall prepare, for the Architect's approval, and thereafter keep current, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals. No payment shall be due until this schedule is submitted and approved. ~~The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.~~

§ 3.10.3 The Contractor shall perform the Work in ~~general accordance~~ conformity with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 If the Contractor submits a schedule indicating an intention to achieve completion of the Work prior to contractually required dates, including milestones, no liability of the Owner to the Contractor for any failure of the Contractor to complete early shall be created, whether or not the Owner approve such schedule.

§ 3.10.5 At the Owner's option, the Contractor shall provide a schedule utilizing critical path techniques to measure the progress of the Work. Such schedules shall be subject to the Owner's and Architect's written approval.

§ 3.10.6 Float or slack is not for the exclusive use or benefit of either the Owner or the Contractor. Extensions of time for performance will be granted only to the extent that the equitable time adjustments for the activity or activities affected exceed the total float along the activity chain involved at the time the change was ordered or the delay occurred. Notwithstanding the above, the Contractor shall only be entitled to an extension of the time for an excusable delay to the critical path of the Work that delays completion of the Project beyond the completion date stated in the Agreement.

§ 3.10.7 The Contractor acknowledges that the Owner may retain the services of a scheduling consultant at the Owner's expense. The Contractor shall cooperate with any such scheduling consultant at the Owner's direction, including, without limitation, with regard to the preparation of the Project schedule.

§ 3.11 As Built Drawings, Documents and Samples at the Site

§ 3.11.1 As Built drawings shall be updated monthly, which shall be a condition precedent to all Progress Payments, and shall provide as much accuracy as possible. As built drawings of the completed Project are precedent to final payment and shall be submitted in paper document and combined PDF, or other Architect and Owner acceptable digital format, on CD, DVD or other approved file transfer protocol (FTP), transmitted from the Contractor to the Architect for review and acceptance ~~as-built drawings to the Owner shall be a condition precedent to Final Payment. Completed as-built drawings shall be submitted as paper documents and on CD or DVD in combined PDF format~~.

§ 3.11.2 The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, ~~Construction Change Directives,~~ and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form ~~or~~ and paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.3 The Contractor shall maintain all approved permit drawings in a manner so as to make them accessible to governmental inspectors and other authorized agencies. All approved drawings shall be appropriately identified and delivered to the Owner within sixty (60) days of final completion of the Work.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents ~~may~~ shall be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with

the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor shall be returned by the Architect without action.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order ~~or Construction Change Directive~~ has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional in Florida, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 3.12.11 The Contractor shall assemble for the Architect's approval two (2) complete binders of all operating and maintenance data from all manufacturers whose equipment is or will be installed in the Work.

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§ 3.12.12 The Contractor shall submit to Owner one copy of all submissions made to the Architect pursuant to this Section 3.12.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Contractor shall be responsible for the permitting, erection, maintaining and removal of all construction signage. The Contractor must submit all sign copy for approval prior to erecting or displaying. The Contractor and Owner shall meet promptly after execution of the Agreement to determine reasonable requirements for ingress and egress from the site. Reasonable locations for staging, parking and a single construction entrance shall be designated by the Contractor, subject to the Owner's approval.

§ 3.13.2 The Contractor shall assure free, convenient, unencumbered and direct access to properties neighboring the Project site for the owners of such properties and their respective tenants, agents, invitees and guests.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. The Contractor shall prevent paint, mortar and concrete splatter on concrete sidewalks and stair tower floors. Any such splatter shall be immediately removed so no evidence of splatter remains. All construction debris shall be removed in a timely manner. Surrounding graded and grassed areas shall be regularly magnetically scanned to collect miscellaneous nails and other sharp objects; the Contractor shall remove such objects from the construction site. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 Immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises utilizing a licensed cleaning service. Concrete and ceramic surfaces shall be cleaned and washed. Woodwork and resilient shall be dusted and cleaned. Sash, fixtures and equipment shall be thoroughly cleaned. Stains, spots, dust, marks and smears shall be removed from all surfaces. Hardware and metal surfaces shall be cleaned and polished. Glass and plastic surfaces shall be thoroughly cleaned by professional window cleaners. All damaged, broken or scratched glass or plastic shall be replaced by the Contractor at the Contractor's expense.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect at all times with access to the Work in preparation and progress wherever located.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings,

Specifications, or ~~other documents~~ Instruments of Service prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 For one hundred dollars ($100.00), which is included in the contract price, the other good and valuable considerations, receipt of which is hereby acknowledged by the Contractor as consideration for the indemnity herein; said Contractor hereby agrees to defend and indemnify the Owner and the Architect/Engineer and their Agents and employees, from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of Work, provided that any such claim, damage, loss or expense is (1) attributed to bodily injury, sickness, disease or death, or to injury to, or destruction of tangible property, other than the work itself, including the loss of use resulting therefrom, and (2) caused in whole or in part by any act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which otherwise exist as to any party or person described in this Article. ~~To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.~~

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.18.3 The Contractor acknowledges that for one hundred dollars ($100.00) of the Contract Price, as recited in Paragraph 3.18.1 above, and other good and valuable consideration from the Owner and Architect/Engineer, constitutes consideration for giving the Owner and the Architect/Engineer, respectively, the indemnifications required in this Agreement and the Contract Documents. The limit of dollar amount of Contractor's indemnity obligations required by the Agreement and the Contract Documents specifically for those claims caused in whole or in part by the Owner and Architect/Engineer shall be $1,000,000 or the Contract Sum of the Project, whichever is more. The parties agree that the indemnity provided herein bears a reasonable commercial relationship to the Agreement and is incorporated by this reference into the Project specifications and bid documents, if any.

§ 3.18.4 Notwithstanding the above and without monetary limitation, the Contractor hereby indemnifies and holds harmless the Owner, their officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of the Contractor and persons employed or utilized by the Contractor in the performance of the construction Contract.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until final payment is due and with the Owner's authorization, from time to time during the one-year period for correction of Work described in Section 12.2. ~~the date the Architect issues the final Certificate for Payment~~. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner ~~reasonably~~ informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) ~~known~~ deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies ~~observed~~ in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect, if any, in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner and Contractor shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders ~~and Construction Change Directives~~, or other appropriate written directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing no later than fifteen (15) days after receipt of the request ~~within any time limits agreed upon or otherwise with reasonable promptness~~.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

§ 4.2.15 Upon request of the Owner, claims, disputes and other matters in question relating to the execution or progress of the Work or the interpretation of the Contract Documents may be referred to the Architect for initial decision, which the Architect shall render in writing within a reasonable time, not to exceed fifteen (15) days after the date on which such request is made.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Subcontractors must be properly licensed in accordance with Florida law. ~~Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14 day period shall constitute notice of no reasonable objection.~~

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable ~~and timely~~ objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected ~~if~~ without due cause ~~unless the Owner or Architect makes reasonable objection to such substitution~~. The Owner may require the Contractor to change any Subcontractor, person, or entity in situations where the Owner determines that their Work is inadequate and adversely affects the Project.

§ 5.2.5 The Contractor shall disclose the existence and extent of any financial interest, whether direct or indirect, it has in any subcontractors or material suppliers which it proposes for the Project.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 or Termination for Convenience by the Owner pursuant to Paragraph 14.4 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

§ 5.4.1.3 When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract subsequent to the date of acceptance of the assignment; however, in no event shall the Owner's acceptance of such an assignment release the Contractor from its obligations under the subcontract agreement or this Agreement. Subcontracts between the Contractor and its Subcontractors shall provide for the assignment of those subcontracts from the Contractor to the Owner at election of the Owner upon termination of the Contractor.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be ~~equitably~~ adjusted for increases in direct cost resulting from the suspension beyond the thirty (30) days.

~~§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the~~

~~Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner, at its option, shall either (1) provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them or (2) shall require that the Contractor provide for such coordination, which the Contractor shall perform when directed by Owner to do so. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.2.6 If any Subcontractor initiates legal or any other proceedings against the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at its own expense, and if any settlement, judgment or award against the Owner arises therefrom, the Contractor shall pay or

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satisfy it and shall indemnify and reimburse the Owner for all monies paid or to be paid including attorneys' fees and court or other costs which the Owner has incurred.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, ~~Construction Change Directive~~ or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. Agreement on and execution of any Change Order shall constitute a final settlement and a full accord and satisfaction of all matters relating to the change and to the impact of the change on unchanged Work, including all direct and indirect costs of whatever nature, and all adjustments to the Contract Schedule.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. ~~A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor.~~ An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, ~~Construction Change Directive,~~ or order for a minor change in the Work. A change in Contract Sum or Contract Time shall be accomplished only by Change Order. No course of conduct, verbal discussions or dealings between the parties shall be the basis of claims by the Contractor to any change in the Contract Sum or Contract Time.

§ 7.1.4 If the Architect determines that a change or changes in the Work might be or are necessary or desirable, the Architect shall issue a proposal request to the Contractor in which the Architect describes the proposed change or changes in the Work. The Contractor shall respond to each such proposal request in writing within a reasonable time, but in no event more the fourteen (14) days after receipt, such response to contain (1) the amount of any increase or decrease in the Contract Price or Guaranteed Maximum Price for effecting the proposed change or changes in the Work (2) a written comprehensive and itemized cost breakdown of the estimated reasonable additional or reduced costs to the Contractor of all labor, materials and equipment required by such proposal requests and (3) the length of any extension or reduction of the Contract Time for effecting the proposed change or changes in the Work.

§ 7.1.5 If any Change Order, signed by the Owner and the Contractor, results in or contains an adjustment to the Contract Price, the amount of such adjustment shall be conclusively deemed and held to include the Contractor's applicable profit, Fee and costs of and for all applicable taxes, bond premiums, insurance premiums, supervision, overhead, profit, labor, labor impact and materials related to the Change Order and the additional Work required and/or contemplated thereby, and the Contractor shall be conclusively deemed and held to have waived any claim for any additional sum or time extension for delays, disruption, acceleration, loss of productivity, ripple effect, inefficiency or any other matter arising out of or in any way related to such Change Order and the additional Work contemplated thereby.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work, if any;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 If the Change Order provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.2.3.

§ 7.2.3 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.2.2, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.2.3 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.2.4 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.2.5 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.2.6 In subparagraph 7.2.3 above, the reasonable allowance for overhead and profit, including the Contractor's Fee, if any, included in the total cost to the Owner, shall be based on the following schedule, which shall be full compensation for all overhead and profit of whatever nature associated with the Change:

.1 For the Contractor, for any Work performed by the Contractor's own forces, ten percent (10%) of the cost.
.2 For the Contractor, for Work performed by its Subcontractor, five percent (5%) of the amount due the Subcontractor.
.3 For each Subcontractor or Sub-subcontractor, for any Work performed by that Subcontractor's or Sub-subcontractor's own forces, ten percent (10%) of the cost.
.4 For each Subcontractor, for Work performed by its Sub-subcontractor, five percent (5%) of the amount due the Sub-subcontractor.
.5 Costs to which overhead and profit are to be applied shall be determined in accordance with subparagraphs 7.2.3.1 through 7.2.3.5.
.6 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of all increased and decreased costs to both Contractor and its Subcontractors as follows:
  .1 Material quantities and unit costs.
  .2 Labor costs identified with the specific item of material to be placed or operation to be performed.
  .3 Construction equipment
  .4 Workmen's Compensation and Public Liability Insurance.
  .5 Overhead and Profit.
  .6 Employment taxes under FICA and FUTA.
  .7 In no case will a change over $500.00 be approved without such itemization.

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§ 7.3 ~~Construction Change Directives~~

~~§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.~~

~~§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.~~

~~§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:~~

- ~~.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;~~
- ~~.2 Unit prices stated in the Contract Documents or subsequently agreed upon;~~
- ~~.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or~~
- ~~.4 As provided in Section 7.3.4.~~

~~§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:~~

- ~~.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;~~
- ~~.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;~~
- ~~.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;~~
- ~~.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and~~
- ~~.5 Costs of supervision and field office personnel directly attributable to the change.~~

~~§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.~~

~~§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.~~

~~§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.~~

~~§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.~~

~~§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably~~

~~justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.~~

~~§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.~~

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing and approved by the Owner. ~~If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.~~ The Contractor shall not receive any additional compensation, nor shall there be any adjustment to the Contract Time as a result thereof.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day including weekends and legal holidays unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor ~~and Owner~~.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. To ensure that Substantial Completion of the Work is achieved within the Contract Time, the Contractor will, before commencing the Work, submit to Owner a progress schedule showing milestone dates for completion of major portions of the Work which, if the milestone dates are met, will achieve Substantial Completion of the Work within the Contract Time. In the event any milestone date is missed, the Contractor will immediately accelerate the progress of the Work by taking those steps necessary to ensure that the next milestone date is achieved as originally planned, including without limitation, working seven days a week and overtime and employing additional employees or subcontractors. Unless the failure to meet a milestone date is caused by act of the Owner, the additional cost resulting from such acceleration shall not increase the Contract Sum.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 Except as provided in Subparagraph 8.3.2, no adjustment in Contract Sum shall be made for any delays hereunder and no damages shall be paid by the Owner for such delay. The Contractor shall delay or suspend the progress of the Work, or of any part thereof, whenever he shall be so required by written order of the Owner, and for such periods of time as the Owner may order, providing that in the event of such delay or delays or of such suspension or suspensions of the progress of the Work, or any part thereof, the Contract Time for the Work so suspended or of Work delayed by such suspension shall be extended for a period equivalent to the time lost by reason of the suspension(s), except when the Contractor is notified to suspend Work on account of faulty construction or construction methods that endanger the

Work. Such order of the Owner shall not otherwise modify or invalidate in any way any of the provisions of this Contract, and the Contractor shall not be entitled to any damages or compensation from the Owner on account of such delay or delays, suspension or suspensions, except as provided below. ~~If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.~~

§ 8.3.2 When alterations or additions on the critical path are made to the Work, and such alterations or additions increase the overall completion date, the Contractor shall submit to the Architect in writing any resultant claim for an extension in the Contract Time, and shall deliver such claims to the Architect within ten (10) days after the occurrence of the event giving rise to the claim. The recommendation of the Architect regarding extension of Contract Time shall be submitted to the Owner for approval. ~~Claims relating to time shall be made in accordance with applicable provisions of Article 15.~~

§ 8.3.2.1 Any approved changes in Contract Time shall be incorporated in a Change Order. No changes in Contract Time shall be made for any alterations or additions to the Work which are not demonstrated to affect the overall completion of the job. The provision of this Article 8 shall in no way alter, change or invalidate the provisions of the Contract Documents with respect to liquidated damages. The Contractor shall not be entitled to any delay damages or other compensation solely on account of an increase in Contract Time except in accordance with Section 8.3.4 below.

§ 8.3.3 Notwithstanding Subparagraph 8.3.1, if the Work is delayed due to the fault or neglect of the Owner, and such delays have a cumulative total impact of more than fifteen (15) calendar days to the critical path, the Contractor may make claim pursuant to Article 4 for its actual and direct costs arising out of the delay. The Contract Sum shall be adjusted for such actual and direct costs, but in no event shall indirect, impact, inefficiency, offsite or home office overhead, loss of productivity, consequential damages, legal or consulting costs be paid on account of such delays. The Contractor hereby expressly waives its right to such delay or time-related costs or damages.

§ 8.3.4 In the event the Contractor accelerates its Work, without written authorization of the Owner, the Owner shall pay no overtime inefficiencies to the Contractor for such acceleration and the Contractor hereby expressly waives its right to recover such overtime inefficiencies. ~~This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.~~

§ 8.3.5 The Contractor's written claims for extension of Contract Time shall be accompanied by detailed dates, correspondence, notices and any other data which provides proof of the events which are the basis for the claim, including a network analysis justifying the time extension. Said network analysis shall specifically detail the extension of the critical path of the Project caused by the events, which underlie the time extension request. Any claim not including said data and network analysis shall be deemed waived.

§ 8.3.6 Should the Contractor be obstructed or delayed in the commencement, prosecution or completion of any part of the Work by any act or delay of the Owner; or by any acts or neglect by any separate contractor employed by the Owner; material or appurtenances for the Work; or by riot, insurrection, war (excluding wars involving the United States in the Mid-Eastern portion of the World), pestilence, fire, earthquakes, cyclones, floods, epidemics; or through any act, default or delay of other parties under contract with the Owner; then the Contract Time for the Work so delayed shall be extended for a period equivalent to the time lost. Such allowance shall not be made unless a claim for extension of time is made by the Contractor to the Owner and Architect in writing within ten (10) days from the time when the alleged cause for delay occurs.

§ 8.3.7 It is further expressly agreed that the Contractor shall not be entitled to any damages or compensation from the Owner on account of any delays resulting from any of the causes specified above except those circumstances where delays are caused by the Owner or by parties under contract with the Owner, in which circumstances the Contractor shall be entitled to compensation (1) for Contractor's actual costs of increased direct jobsite wages resulting from the extended completion date caused by Owner; and (2) for extra premiums on bonds actually paid by the Contractor on account of the

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additional time required to complete all Work hereunder. Any change in the Contract Time resulting from any claims for delays shall be incorporated in a signed Change Order upon approval of the change by the Owner.

§ 8.3.8 Except for weather events listed in Section 8.3.6 above, Contractor expressly assumes the risk for all weather delays of every kind and nature.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 ~~If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.~~

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. The schedule of values shall be prepared in such manner that each major item of the Work and each subcontracted item of the Work is shown as a separate line item on AIA Document G703, Application and Certificate for Payment, Continuation Sheet, or other form acceptable to the Owner. This schedule, unless objected to by the Architect or Owner, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment. The Contractor shall not make changes in the Schedule of Values without prior approval of the Architect and Owner. The form for the Application for Payment shall be AIA Document G702, supported by AIA Document G703, or other Owner approved form. The Schedule of Values shall be prepared in such a manner that each major item of Work and each subcontracted item of Work is shown as a single item on AIA Document G703 Application and Certificate for Payment Continuation Sheet, or other Owner approved form.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 ~~As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.~~

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing and bonded or insured as required by the Owner. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. The Contractor shall submit, within 30 days after the date of commencement of the Work and thereafter as the Owner

requires, schedules of materials and equipment for each category or subcontract for which application for payment under this Section 9.3.2 will be made, which schedules shall include items, quantities, value of unit prices with extensions. Schedules shall be updated on a monthly basis and submitted as an attachment to the Contractor's Application for Payment.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment, in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a Separate Contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When ~~either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15~~ the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Contractor disputes any determination by the Architect and/or Owner with respect to any Certificate of Payment, the Contractor nevertheless expeditiously shall continue to complete the Work. ~~If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.~~

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. ~~Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.~~

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

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§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within ~~seven~~ fourteen days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within ~~seven~~ fourteen days after the date established in the Contract Documents, the amount certified by the Architect ~~or awarded by binding dispute resolution~~, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount ~~owing~~ not in dispute has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable direct costs of shutdown, ~~delay~~ and start-up~~, plus interest~~ as provided for in the Contract Documents. Notwithstanding the preceding sentence, the Contractor shall not stop the Work during the pendency of a bona fide dispute between the Owner and the Contractor, provided all sums not in dispute claimed by the Contractor are paid.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. For the Work or any designated portion thereof to be "Substantially Complete", the Work must also satisfy all of the following conditions, except to the extent the same shall be specifically waived or modified in writing by the Owner:

.1 the Work has been completed in accordance with the Contract Documents, except for Punch List Work, to the extent required for the Owner to obtain an occupancy permit and such permit(s) shall have been granted by the appropriate authorities for all of the Work; and

.2 all HVAC, plumbing and electrical systems included in the Work are functioning substantially in accordance with the Contract Documents; and

.3 all life safety systems included in the Work are functioning in accordance with the Contract Documents; and

.4 a Certificate of Substantial Completion has been issued by the Architect as required under Paragraph 9.8; and

.5 all elevators, if any, included in the Work are functioning in accordance with the Contract Documents; and

.6 all offices, rooms and public areas are ready to receive, or have received if required for issuance of a Certificate of Occupancy, furniture, fixtures and equipment supplied by the Owner.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect and Owner a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect and Owner will ~~make~~ perform an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's and or the Owner's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect and Owner to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is determined to be substantially complete, the Architect will prepare a Certificate of Substantial Completion, utilizing the Owner's Procore platform, that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time of thirty (30) days within which the Contractor shall finish all items on the list. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 ~~When the Work or designated portion thereof is substantially complete,~~ The Architect, as the Owner's representative, including all Project Consultants, shall prepare a single list of items (Punch List) to be completed by the Contractor. The Punch List shall include close out requirements, not limited to, Operations and Maintenance Manual, warrantees, and as built drawings, contingent on Project completion, which will be submitted to the Contractor. The

Contractor will assign a cost estimate for each item then submit the Punch List to the Architect and Owner for review and acceptance. Estimated costs to render the Project complete, satisfactory and acceptable are to be agreeable to the Contractor, Owner and Architect. The development and review of the Punch List shall be completed within 30 calendar days, or 45 calendar days by applicable law and mutual agreement of Contractor and Owner, of the substantial completion date and shall be issued by the Architect to the Contractor and Owner within five (5) days of acceptance by all parties. Within twenty (20) business days after the final Punch List is issued, the Owner must pay the Contractor the remaining contract balance that includes all retainage previously withheld less an amount equal to one hundred fifty percent (150%) of the estimated cost to complete the Punch List items. ~~will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.~~

§ 9.8.6 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. ~~Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.~~

§ 9.8.7 The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding that the time for completing the entire Work or such portions of the Work may not yet have expired. However, such action on the part of the Owner shall not be deemed to be an acceptance of any Work not completed in accordance with the Contract Documents. Likewise, absent the issuance of a Certificate of Substantial Completion by the Project Architect, no portion of the Work shall be subject to the running of the Contractor's bonded one (1) year guarantee on workmanship and materials, despite the fact that the building may be partially utilized. Where mechanical equipment is used prior to final inspection, the Owner shall perform routine maintenance and furnish those supplies that normally wear out in use, such as seals, packings, lubricants, etc. However, any major failure or breakdown of equipment not attributable to lack of maintenance or improper use or abuse of the equipment by the Owner shall be made good by the Contractor under terms of its contract warranty, guarantee, bonds, etc.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2, 9.8.3, 9.8.4 and 9.8.5. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract

Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees. As a condition precedent to Final Payment, and as part of the Application for Payment, the Contractor shall deliver to the Owner all warranties, guarantees and other close out documents required under the Contract Documents.

§ 9.10.2.1 Final Payment is also contingent upon Building Official final inspection and Owner acceptance of the Department of Education (DOE) document OEF 209, Certificate of Final Inspection (CFI).

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents;
.3 terms of special warranties required by the Contract Documents; or
.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

§ 9.10.6 After execution of the Certificate of Substantial Completion and the Certificate of Final Inspection (CFI), and prior to the submittal of the Final Certificate and Application for Payment, the Contractor shall submit to the Architect, along with the affidavits and other documents set forth in Section 9.10.2 above:

.1 Validated warranties and notarized copies of all guarantees for equipment and materials as required by the Construction Documents, and, if applicable, as referred to in the Supplementary Conditions;
.2 Copies of all approved Shop Drawings or installation diagrams and three (3) copies of all brochures, manuals, etc. of all equipment as offered by the manufacturers;
.3 List of subcontractors and major material suppliers (shall include address, telephone number and name of individual to contact regarding this Project); and

.4 As built drawings of the completed Project in paper document and combined PDF or other Architect and Owner acceptable digital format, on CD, DVD or other approved file transfer protocol (FTP), transmitted from the Contractor to the Architect for review and acceptance; Architect shall review for inclusion in the record drawings then transmit to the Owner.

§ 9.10.7 Prior to submission of the Final Certificate and Application for Payment, Contractor and manufacturer's representatives shall provide free instruction in the proper use of installed equipment to representatives of the Owner as designated by the Architect. Instruction shall be given in presence of the Architect.

§ 9.10.7.1 Instruction of the Owner's designated Maintenance Supervisor in the proper methods of cleaning and maintaining all of the finished surfaces and the proper methods of replacement of the consumable items such as filters, light bulbs, washers, etc. shall be the responsibility of the Contractor.

§ 9.10.8 Prior to submission of the Final Certificate and Application for Payment, the Contractor shall start up, test, adjust, balance and otherwise place in a satisfactory working condition all items of mechanical and electrical systems and shall fully instruct representatives of the Owner in the care and operation of such systems.

§ 9.10.8.1 Contractor shall submit to the Architect, along with final requisition for payment, two (2) copies of a manual for the Project, assembled and bound, presenting for the Owner's guidance full details for care and maintenance of equipment included in the Contract.

§ 9.10.8.2 Contractor shall, for this manual, obtain from subcontractors literature of manufacturers relating to equipment, including motors; also furnish cuts, wiring diagrams, instruction sheets and other information pertaining to same in overall operation and maintenance.

§ 9.10.9 During a valid warranty period, if the Contractor is unable or unwilling to respond immediately to make emergency repairs under conditions which the Owner may determine to be an emergency situation, the Owner reserves the right to make such emergency repairs and then to bill the Contractor for a fair and reasonable amount in the reimbursement for such repair.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss. Contractor shall comply with all applicable federal, state and county, and city statutes, safety regulations, codes, ordinances and orders, including the Occupational Safety and Health Administration Act of 1970 (OSHA).

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.9 Contractor shall protect adjoining private or municipal property and shall provide barricades, temporary fences, and covered walkways required to protect the safety of passers-by, as required by prudent construction practices, local building codes, ordinances or other laws, or the Contract Documents.

§ 10.2.10 Contractor shall maintain Work, materials and apparatus free from injury or damage from rain, wind, storms, frost or heat. If adverse weather makes it impossible to continue operations safely in spite of weather precautions, the Contractor shall cease Work and notify the Owner and the Architect of such cessation. The Contractor shall not permit open fires on the Project site.

§ 10.2.11 In addition to its other obligations pursuant to this Article 10, the Contractor shall, at its sole cost and expense, promptly repair any damage or disturbance to walls, utilities, sidewalks, curbs and the property of third parties (including municipalities) resulting from the performance of the Work, whether by it or by its Subcontractors at any tier. The Contractor shall maintain streets in good repair and traversable condition.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Owner has on file at each school and the department of Facilities Services, the following information: (1) Asbestos Management Plan, and (2) Asbestos Survey Report. These documents are available for the Contractor's review at the above locations. The Contractor shall determine if the information contained therein is relevant to the Project. The Contractor shall execute the Owner's "Contractor Acknowledgement Form" of these documents. ~~The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.~~

§ 10.3.1.1 If during the construction of the Project any known hazardous material, or friable asbestos is suspected or encountered, Work in that area shall be suspended and the Owner's Representative shall be notified immediately.

§ 10.3.1.2 The Owner shall be responsible for investigation, removal and disposition of any such material in accordance with applicable laws and regulations. The Contractor will be directed by the Owner on further procedures concerning the project as a result of investigation, removal and disposition of such material.

§ 10.3.2 In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect. ~~Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.~~

§ 10.3.3 The Contractor shall not be required, pursuant to Article 13, perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB). ~~To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.~~

§ 10.3.4 To the fullest extent permitted by law, the Owner shall defend, indemnify and hold harmless the Contractor and its agents and employees from and against claims, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work in the affected area if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, other than the Work itself, including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner, or anyone for whose acts the Owner may be liable. ~~The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.~~

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 ~~If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.~~

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance ~~of the types and limits of liability, containing the endorsements, and subject to the terms and conditions,~~ as described in the Agreement or elsewhere in the Contract Documents. ~~The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.~~

§ 11.2.2 ~~Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.~~

§ 11.2.3 ~~Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-~~

~~subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.~~

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this Section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7. ~~If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.~~

§ 11.3.3 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power. If such objection be made, the Owner shall not make any settlement with respect to such loss until a resolution has been reached by agreement between such parties in interest and the insurers or by a court of competent jurisdiction.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may require the Contractor to purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. ~~The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.~~

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the ~~Owner~~ Contractor as fiduciary and made payable to the ~~Owner~~ Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The ~~Owner~~ Contractor shall pay the Architect and ~~Contractor~~ Owner their just shares of insurance proceeds received by the ~~Owner~~ Contractor, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the ~~Owner~~ Contractor shall notify the ~~Contractor~~ Owner of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The ~~Contractor~~ Owner shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the ~~Contractor~~ Owner does not object, the ~~Owner~~ Contractor shall settle the loss and the ~~Contractor~~ Owner shall be bound by the settlement and allocation. Upon receipt, the ~~Owner~~ Contractor shall deposit the insurance proceeds in a separate account and make the

appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. ~~Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.~~

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's or Owner's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect or Owner, be uncovered for the Architect's or Owner's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect ~~or~~ for failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. ~~During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.~~ If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

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§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work nor to Owner's right to make claim with respect to latent defects.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate ~~and equitable~~. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located ~~excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4~~.

§ 13.1.2 Historical lack of enforcement of any local law shall not constitute a waiver of Contractor's responsibility for compliance with such law in a manner consistent with the Contract Documents unless and until the Contractor has received written consent for the waiver of such compliance from the Owner and the agency responsible for the local law enforcement.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. ~~Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party~~ Contractor may not assign its rights or obligation under this Contract. If Contractor attempts to make such an assignment, it shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 ~~The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.~~

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.3.3 The invalidity of any part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability or effect of the remaining parts and provisions of the Contract Documents.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations

concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.1.1 During construction, periodic building code compliance inspections are required and will be performed by the Owner's building department inspectors when requested by the Contractor. It is the responsibility of the Contractor to properly request such code inspections and no Work shall be covered until such Work has been inspected for code compliance.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity assigned by the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense, including the cost of retesting for verification of compliance if necessary, until the Architect certifies that the Work in question does comply with the requirements of the Contract Documents, and all such costs shall not be included in computing the Contract Sum.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.6 Time Limits on Claims

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law.

§ 13.7 Financial Disclosures

§ 13.7.1 During the term of this Contract, Contractor covenants and agrees that it will keep adequate books and records of accounts in accordance with Generally Accepted Accounting Principles (GAAP). Contractor further covenants and agrees that, upon request from Owner, Contractor shall provide to Owner financial statements of Contractor, including current income and expense statements of Contractor, consolidated balance sheets signed by a financial officer of Contractor, and audited reports provided to Contractor's Surety, audited financial statements certified by a Certified Public Accountant concerning the financial affairs of Contractor and all affiliates of Contractor, and such other financial information requested by Owner. All such financial information shall comply with GAAP.

§ 13.7.2 In the event the Contractor becomes insolvent and/or fails to pay its current obligations when they become due, Contractor shall so advise Owner of such situation. Contractor hereby authorizes its sureties, lenders, financial institutions and other third parties to release to Owner financial information requested by Owner, including, but not limited to, the financial information described in the preceding Section 13.7.1.

§ 13.8 Waiver of Jury Trial

All parties hereby waive any and all right to any trial by jury in any action or proceeding arising directly or indirectly hereunder.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents.~~; or~~

~~.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.~~

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, ~~as well as reasonable overhead and profit on Work not executed,~~ and costs incurred by reason of such termination excluding profit on unexecuted Work.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to material matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; ~~or~~

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents; or

.5 is adjudged a bankrupt or insolvent, or if it makes a general assignment for the benefit of its creditors, or if a trustee or receiver is appointed for the Contractor or for any of its property, or if it files a petition to take advantage of any debtor's loss, or to reorganize under the bankruptcy or similar laws.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, ~~and upon certification by the Architect that sufficient cause exists to justify such action,~~ the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the ~~Initial Decision Maker~~ Architect, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the direct cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall not include profit. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; ~~and the termination fee, if any, set forth in the Agreement~~ along with reasonable overhead and profit on the Work performed to date, but in no event shall the Contractor be entitled to anticipated profits on unperformed Work.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

Any statutes of limitations shall commence to run, and all causes of action shall be deemed to have accrued, in accordance with applicable Florida law. ~~The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the~~

~~Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.~~

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either party must be made within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice to the Architect and the other party. Claims must specifically detail all facts and issues substantiating the Claim, including all costs and expenses incurred. Contractor Claims must be made in writing and timely filed in accordance with the specific requirements of the Contract Documents and under no circumstances whatsoever be based upon actual or verbal notice or lack of prejudice to the other party. An additional Contractor Claim after the initial Claim has been implemented by Change Order will not be considered unless submitted in a timely manner. ~~the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.~~

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the other party. In such event, no decision by the ~~Initial Decision Maker~~ Architect is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the ~~Initial Decision Maker's~~ Architect's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment accordingly ~~in accordance with the decision of the Initial Decision Maker~~.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5.1 If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with this Section 15.1.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Decision of the Architect. Claims, including those alleging an error or omission by the Architect but excluding those arising under Section 10.3 shall be referred initially to the Architect for decision. An initial decision by the Architect shall be required as a condition precedent to mediation or litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered by the Architect. The Architect will not decide disputes between the Contractor and persons or entities other than the Owner. ~~Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.~~

§ 15.2.2 The ~~Initial Decision Maker~~ Architect will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the ~~Initial Decision Maker~~ Architect is unable to resolve the Claim if the ~~Initial Decision Maker~~ Architect lacks sufficient information to evaluate the merits of the Claim or if the ~~Initial Decision Maker~~ Architect concludes that, in the Architect's sole discretion, it would be inappropriate for the ~~Initial Decision Maker~~ Architect to resolve the Claim.

§ 15.2.3 In evaluating Claims, the ~~Initial Decision Maker~~ Architect may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the ~~Initial Decision Maker~~ Architect in rendering a decision. The ~~Initial Decision Maker~~ Architect may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the ~~Initial Decision Maker~~ Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the ~~Initial Decision Maker~~ Architect when the response or supporting data will be furnished, or (3) advise the ~~Initial Decision Maker~~ Architect that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the ~~Initial Decision Maker~~ Architect will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Architect will approve or reject Claims by written decision, which shall state the reasons therefore and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be final and binding on the parties but subject to mediation and litigation. ~~The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.~~

§ 15.2.6 ~~Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.~~

§ 15.2.6.1 ~~Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.~~

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract~~, except those waived as provided for in Sections 9.10.4, 9.10.5 and 15.1.7,~~ shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 Claims, disputes or other matters in question between the parties to this Agreement shall be first subject to pre-suit mediation prior to the filing of any legal claims or litigation. Completion of pre-suit mediation is a condition precedent to litigation. The obligation to mediate is a material and essential provision of the Agreement. ~~The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 Unless otherwise agreed in writing, the Contractor shall carry on the Work and maintain its progress during any mediation or litigation, and the Owner shall continue to make payments to the Contractor in accordance with the Contract Documents. ~~The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.~~

§ 15.3.5 Either party may initiate a mediation preceding by a request in writing to the other party within a reasonable time after the claim, dispute or other matter in question has arisen or as provided in subparagraph 15.3.1, but in no event after the expiration of the applicable statute of limitations.

§ 15.3.6 The parties shall endeavor in good faith to mutually agree upon an acceptable mediator. In the event the parties have not agreed upon a mediator within thirty (30) days of the request for mediation, the Orlando office of the American Arbitration Association, upon the written request of either party, shall appoint a mediator from its pool of approved mediators.

§ 15.3.7 Unless otherwise mutually agreed, the mediation shall be held in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect, each party to bear its own fees, costs and expenses.

§ 15.3.8 In the event that pre-suit mediation is unsuccessful, all claims, disputes or other matters in question shall be resolved in the Circuit Courts of Volusia County Florida. The Parties, including the Contractor's Surety, waive Venue and Jurisdiction of any Federal Court and expressly waive Trial by Jury.

§ 15.3.9 All references to Arbitration in the Contract Documents are deleted.

~~§ 15.4 Arbitration~~

~~§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.~~

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.~~

~~§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

~~§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

~~§ 15.4.4 Consolidation or Joinder~~

~~§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~

~~§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.~~

~~§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.~~

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CONTRACTOR E-VERIFY AFFIDAVIT

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 639

PURSUANT TO STATE OF FLORIDA, OFFICE OF THE GOVERNOR, EXECUTIVE ORDER 11-116 (Superseding Executive Order 11-02) AND SECTION 448.095 F.S.

Executive Order 11-116 requires all agencies under the direction of the Governor to verify the employment eligibility of all new employees through the U.S. Department of Homeland Security's E-Verify system. Further, in conjunction with Section 448.095 F.S., the Contractor is directed to include as a condition of all contracts for the provision of goods or services to the School Board of Volusia County in excess of nominal value, an express requirement that the Contractor utilizes the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the Contractor during the contract term, and an express requirement that the Contractor include in such subcontracts the requirement that subcontractors performing work or providing services pursuant to the state contract utilize the E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term.

In accordance with Executive Order 11-116 and Section 448.095 F.S. the School Board of Volusia County Florida requires all contractors who are awarded state funded contracts to verify newly hired employees using the U.S. Department of Homeland Security's E-Verify system. It is the responsibility of the awarded Contractor to insure compliance. To enroll in the E-Verify system employers should visit www.e-verify.gov.

By affixing your signature below you hereby affirm that you will comply with all applicable E-Verify requirements for the following project:

Facility Name: _____ Project No.: _____

Project Name: _____

The undersigned has hereunto set his/her hand this _____ day of _____ , _____

_____ _____
(Print or Type Name, Title) *(Signature of Affiant)*

_____ _____
(Federal Employer ID Number – FEIN) *(E-Verify Number)*

_____
(Firm Name)

_____ _____ _____ _____
(Firm Address) *(City)* *(State)* *(Zip Code)*

NOTARY PUBLIC

STATE OF FLORIDA, COUNTY OF _____

Before me, the undersigned authority, personally appeared _____
known to me to be the person described herein and who executed the foregoing instrument and acknowledged before me executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal this
_____ day of _____ , _____

(Notary Seal)

My commission expires: _____
(Notary Signature)

_____ _____
(Date) *(Print, type or stamp name of notary public)*

☐ Personally known to me ☐ Produced ID _____
(Type of ID, if applicable)

PERFORMANCE AND PAYMENT BOND

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 640

PUBLIC CONSTRUCTION BOND

Bond No. _____

BY THIS BOND, WE *(Contractor Firm)* _____, *(Physical Address)* _____, *(Phone)* _____, a corporation, *(Surety Firm)* _____, *(Physical Address)* _____, *(Phone)* _____, as Surety, are bound to *(Owner)* School Board of Volusia County Florida, *(Address)* 200 North Clara Avenue, DeLand Florida 32720, *(Phone)* (386) 734-7190, herein called Owner, in the sum of _____ ($_____) 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 the contract dated _____, between Principal and Owner for construction of *(Facility Name)* _____, *(Address)* _____, *(Project Name)* _____,*(Contract/Project No.)* _____, the contract being made a part of this bond by reference, at the times and in the manner prescribed in the contract; 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 Owner all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that Owner sustains because of a default by Principal under the contract; and
4. Performs the guarantee of all work and materials furnished under the contract for the time specified in the contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2), 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.

DATED ON _____ day of _____, _____ _____

Signed, sealed and delivered in the presence of:

_____ By: _____

As to President / Principal — President / Principal

_____ _____

(Print/Type Name of Witness to Contractor) — *(Print/Type Name of Contractor)*

By: _____

Attorney-in-Fact

_____ _____

As to Surety — *(Print/Type Name of Attorney-in-Fact)*

_____ _____

(Print/Type Name of Witness to Surety) — Florida Resident Agent

_____

(Print/Type Name of Florida Resident Agent)

NOTE: If both Principal and Surety are corporations, the respective corporate seals should be affixed and attached. Power-of- Attorney to be attached.

APPROVED _____ Approved as to form only and for reliance only by the School Board of Volusia County.

Signature

_____

Printed Name

_____

Florida Bar Number

CONTRACTOR'S DIRECT MATERIAL PURCHASE AFFIDAVIT

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 641

STATE OF FLORIDA
COUNTY OF VOLUSIA

COMES NOW _____, and after being duly sworn, does depose and state as follows:

1. My name is: _____, I am employed in the position of *(title)* _____ for *(Contractor)* _____.

2. I am over the age of eighteen years and I have personal knowledge of the facts stated herein.

3. All of the materials which the School Board of Volusia County Florida has purchased directly for the project known as *(Facility Name)* _____, *(Project Name)* _____, *(VCS Project No.)* _____, and pursuant to AIA Document A201-2017, Article 3.4.5 have been purchased from subcontractors, suppliers or vendors who provided bids to the Contractor for this Project and whose bids were relied upon by the Contractor in submitting its bid to Volusia County Schools.

4. All materials purchased directly by Volusia County Schools from the Contractor's subcontractors, suppliers and vendors were purchased at or below the price originally negotiated by the Contractor.

FURTHER AFFIANT SAYETH NAUGHT _____

Sworn to and subscribed before me this _____ day of _____ _____ .

_____ _____
Signature of Notary Public, State of Florida Print, Type or Stamp Commissioned Name of Notary Public

Personally Known ☐ or Produced Identification ☐

Type of I. D. Produced _____

CONTRACTOR'S ACKNOWLEDGMENT FORM

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 642
(Asbestos Survey)

TO: Volusia County Schools
Facilities Design and Construction
3750 Olson Drive
Daytona Beach, Florida 32124

I acknowledge that I have been given access to and have read the Asbestos Survey, Management Plan, Re-inspection Report (if applicable) and/or Certificate of Final Inspection (if applicable).

Facility Name: _____

Address: _____

☐ Not applicable - Reason: _____

I further acknowledge that I must cease work and notify the project manager and environmental specialist, 3750 Olson Drive, Daytona Beach Florida 32124, telephone number (386) 947-8786, in the event of encountering materials not previously identified by the aforementioned reports. In addition, I understand that any questions regarding the aforementioned reports should be directed to the environmental specialist as stated above.

My reason for being in the school is: _____

My signature is acknowledgement of the above.

_____ Date: _____
(Signature)

Printed Name: _____

Firm's Name: _____

Address: _____

Telephone: _____

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:	**PROJECT:** G Series Form	**APPLICATION NO:** 001	**Distribution to:**
		PERIOD TO:	OWNER: ☐
		CONTRACT FOR: General Construction	ARCHITECT: ☐
FROM CONTRACTOR:	**VIA ARCHITECT:**	**CONTRACT DATE:**	CONTRACTOR: ☐
		PROJECT NOS: / /	FIELD: ☐
			OTHER: ☐

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM		$0.00
2. NET CHANGE BY CHANGE ORDERS		$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$0.00	
b. 0 % of Stored Material (Column F on G703)	$0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$0.00
8. CURRENT PAYMENT DUE		$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$0.00	$0.00
Total approved this Month	$0.00	$0.00
TOTALS	$0.00	$0.00
NET CHANGES by Change Order		$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED $0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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User Notes: (3B9ADA39)

AIA® Document G703™ – 1992

Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:	001
APPLICATION DATE:	
PERIOD TO:	
ARCHITECT'S PROJECT NO:	

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00%	0.00	0.00
	GRAND TOTAL	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**0.00%**	**$0.00**	**$0.00**

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PARTIAL RECEIPT AND RELEASE
PROGRESS PAYMENT
SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 655

The undersigned _____, of _____ was heretofore on _____ day of _____, _____ awarded a contract by the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, to furnish all of the materials and labor in the construction project entitled *(Facility Name)* _____, *(Address)* _____, *(Project Name)* _____, *(VCS Project No.)* _____ , in accordance with the plans and specifications therefore, as prepared by _____, Architect, and the undersigned has completed said work and fully complied with said contract and has heretofore received the sum of _____, ($_____) as progress payment thereon.

That the undersigned has this date received from the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, the sum representing the balance due as of this progress payment, under terms of said contract, and certifies that said work has been performed in accordance with terms thereof and that, as Contractor, has received monies due and to become due to thereunder for work performed and materials furnished in connection with said work, and that, as Contractor, has paid in full all persons furnishing labor and/or materials in connection therewith, including all subcontractors and suppliers, and that there are no unpaid bills for labor performed or materials furnished in connection with said Work or improvements to date.

That the undersigned, for value received, does hereby forever release and discharge the said building and premises as described in said contract, from any and all liens, claims or demands whatsoever that, as Contractor, has or may have for work performed or materials furnished in connection therewith, or for work performed or materials furnished thereon by any subcontractor or supplier, and will hold the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, safe and harmless from any and all loss and liability arising or to arise by reason of any unpaid bills for labor performed or materials furnished on said building or premises in connection with said work or improvements as of this progress payment.

IN WITNESS WHEREOF,
the undersigned has hereunto set hand and seal this _____ day of _____ , _____
Witnessed by:

_____ _____ *(SEAL)*
(Witness Signature) *(Contractor Signature)*

_____ _____
(Print or Type Name, Title) *(Print or Type Name, Title)*

STATE OF FLORIDA, COUNTY OF
Before me, the undersigned authority, personally appeared _____
to me well-known and known to me to be the person described in and who executed the foregoing instrument, and acknowledged before me executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal this
_____ day of _____ , _____

(Notary Seal)

My commission expires: _____
Notary Public, State of Florida

_____ _____
(Date) *(Print, type or stamp name of notary public)*

☐ Personally known to me ☐ Produced ID _____
(Type of ID, if applicable)

AIA® Document G707A™ – 1994

Consent of Surety to Reduction in or Partial Release of Retainage

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
	CONTRACT FOR:	ARCHITECT: ☐
		CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐
		OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves the reduction in or partial release of retainage to the Contractor as follows:

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

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AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)*	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
	CONTRACT FOR:	ARCHITECT: ☐
		CONTRACTOR: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	SURETY: ☐
		OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

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CONTRACTOR AFFIDAVIT

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 661

PURSUANT TO SECTION 713.06(3), FLORIDA STATUTES

TO: SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA

The undersigned, as Contractor, has heretofore, on the _____ day of _____, in the year _____, been awarded a contract by you, as Owner, to furnish all of the materials and labor in the construction project entitled *(Facility Name)* _____, *(Address)* _____, *(Project Name)* _____,*(VCS Project No.)* _____, for the final contract price of _____ ($_____) in accordance with plans and specifications therefore, as prepared by _____, Architect.

The said project has been completed and the contract and plans therefore fully complied with, and all of the contract price has been paid by you, except the final payment thereon, which is now due, but is being withheld until a sworn statement is furnished as required by law, showing whether there are any unpaid and outstanding bills in connection with said building.

That the undersigned hereby certified, under oath, that all lienors contracting directly with or directly employed by the undersigned, on said contract, have been paid in full, and further certified, under oath, that there are no outstanding or unpaid bills for labor performed or materials furnished in connections with said work or improvements.

That this sworn statement is furnished by the Contractor to the Owner pursuant to Section 713.06(3), Florida Statutes.

IN WITNESS WHEREOF,
the undersigned has hereunto set his hand and seal this _____ day of _____ , _____
Witnessed by:

_____ _____ *(SEAL)*
(Witness Signature) *(Contractor Signature)*

_____ _____
(Print or Type Name, Title) *(Print or Type Name, Title)*

STATE OF FLORIDA, COUNTY OF VOLUSIA

Before me, the undersigned authority, personally appeared _____
to me well-known and known to me to be the person described in and who executed the foregoing instrument, and he acknowledged before me that he executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal this
_____ day of _____ , _____

(Notary Seal)

My commission expires: _____
Notary Public, State of Florida

_____ _____
(Date) *(Print, type or stamp name of notary public)*

☐ Personally known to me ☐ Produced ID _____
(Type of ID, if applicable)

RECEIPT AND RELEASE

SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA
FAC DOCUMENT 662

The undersigned _____, of _____ was heretofore on _____ day of _____, _____ awarded a contract by the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, for the final contract price of _____, ($_____) to furnish all of the materials and labor in the construction project entitled *(Facility Name)* _____, *(Address)* _____, *(Project Name)* _____, *(VCS Project No.)* _____, in accordance with the plans and specifications therefore, as prepared by _____, Architect, and the undersigned has completed said work and fully complied with said contract and has heretofore received the sum of _____, ($_____) as payment thereon.

That the undersigned has this date received from the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, the sum of _____, ($_____) representing the full balance due him as Contractor, under terms of said contract, and certifies that said contract has been fully performed in accordance with terms thereof and that, as Contractor, has received all monies due and to become due thereunder for work performed and materials furnished in connection with said work, and that, as Contractor, has paid in full all persons furnishing labor and/or materials in connection therewith, including all subcontractors and suppliers, and that there are no unpaid bills for labor performed or materials furnished in connection with said work or improvements.

That the undersigned, for value received, does hereby forever release and discharge the said building and premises as described in said contract, from any and all liens, claims or demands whatsoever that, as Contractor, has or may have for work performed or materials furnished in connection therewith, or for work performed or materials furnished thereon by any subcontractor or supplier, and will hold the SCHOOL BOARD OF VOLUSIA COUNTY FLORIDA, safe and harmless from any and all loss and liability arising or to arise by reason of any unpaid bills for labor performed or materials furnished on said building or premises in connection with said work or improvements.

IN WITNESS WHEREOF,
the undersigned has hereunto set hand and seal this _____ day of _____ , _____
Witnessed by:

_____ _____ *(SEAL)*
(Witness Signature) *(Contractor Signature)*

_____ _____
(Print or Type Name, Title) *(Print or Type Name, Title)*

STATE OF FLORIDA, COUNTY OF

Before me, the undersigned authority, personally appeared _____
to me well-known and known to me to be the person described in and who executed the foregoing instrument, and acknowledged before me executed the same.
IN WITNESS WHEREOF, I have hereunto set my hand and official seal this
_____ day of _____ , _____

(Notary Seal)

My commission expires: _____
Notary Public, State of Florida

_____ _____
(Date) *(Print, type or stamp name of notary public)*

☐ Personally known to me ☐ Produced ID _____
(Type of ID, if applicable)

SECTION 01 73 03

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 INTENT AND ARRANGEMENT OF DOCUMENTS 1
1.3 DEFINITIONS AND STATUS OF INDIVIDUALS 2
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1.6 SITE USE AND ACCESS 4
1.7 TEMPORARY FACILITIES 4
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1.2 INTENT AND ARRANGEMENT OF DOCUMENTS

A. THESE DRAWINGS AND SPECIFICATIONS are intended to include everything necessary to perform the entire work properly. Every item necessarily required

may not be specifically mentioned or shown. Unless expressly stated, all systems and equipment shall be complete and operable.

B. TITLES AND HEADINGS to Divisions, Sections and paragraphs in these Subcontract documents are introduced for convenience and shall not be taken as a correct or complete segregation of the several units of materials and labor.

C. THE TERMS of the Agreement, General Provision for Fixed Price Construction and General Requirements apply to each Division of these Specifications as fully as if repeated within that Division.

D. ITEMS LISTED under Scope of Work for each Division of the Specifications are not necessarily all inclusive. The Contractor shall be responsible for the complete job.

E. PORTIONS OF THESE Specifications are of the abbreviated, simplified type and may include incomplete sentences.
1. Omissions of words or phrases such as *the Contractor shall, in conformity with, shall be, as noted on the drawings, in accordance with details, a, the* and *all,* are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a *note* occurs on the drawings.
2. Such terms as *approved, reviewed, equal, as directed, as required, as permitted, acceptable, satisfactory* mean by or to the Architect-Engineer or Project Manager.
3. The words “shall be” are included by inference where a colon (:) is used within sentences or phrases.

1.3 DEFINITIONS AND STATUS OF INDIVIDUALS

A. The terms defined in the agreement, general conditions, and general provision for fixed price construction shall apply throughout. Certain additional terms and refinements shall apply as specified below:

B. CONTRACTOR: The term "Contractor" shall mean the person or firm responsible for the execution of this Contract, or any portion thereof. This shall include the General or Prime Contractor, all Contractors and any Sub-Contractors and suppliers. Contractor usually refers to the particular contractor concerned with the Section in which the term is found, but this in no way relieves the Prime Contractor of its sole responsibility for completing the entire work of this Contract.

C. The Contractor shall complete the work in accordance with the Contract Documents, approved submittals that comply with the Contract Documents, and any clarifications or instructions issued by the Architect and/or Engineer. The Contractor shall not be relieved of any responsibility to comply with such requirements by the activities of the Architect-Engineer or the Owner’s Project Manager.

D. ARCHITECT-ENGINEER: The term "Architect-Engineer" is the person or firm designated as the responsible design professional. The Architect-Engineer shall interpret and clarify the intent of the construction Contract Documents, will participate with the Owner in determining the acceptability of workmanship, materials and the progress of the work and entitlement to payment. The Architect-

Engineer will review proposed changes, substitutions, shop drawings and schedules submitted by the Contractor for approval as required by the Contract Documents. The Architect-Engineer shall have access to the work at all times and the authority to recommend that the Owner not accept any work or materials deemed not to conform to the requirements of the Contract. All professional design responsibility matters will be determined by the Architect-Engineer.

E. OWNER PROJECT MANAGER (PROJECT MANAGER): During the Construction Phase, the Owner's Project Manager will be involved in construction observations and verifying the progress of the construction.

1.4 CONTRACTOR QUALIFICATIONS

A. The Prime contractor shall be well qualified to perform the scope of work and shall have the following experience:
   1. Minimum of 5 years in business using the current name.
   2. Minimum of 5 years experience performing projects with similar construction cost, scope and construction schedule. Contractor shall provide a list of projects upon request.

1.5 CODES

A. Applicable provisions of the Constitution and Laws of the State of Florida are hereby referred to and made a part of this Contract and all work performed shall be in accordance with such laws, regulations and the latest edition or supplement or amendment thereto in effect at the time of submittal of bid shall be considered to be the issue in effect (unless shown otherwise) of all applicable codes including, but not limited to:
   1. Florida Building Code (FBC)
   2. Florida Electrical Code, (FEC)
   3. Florida Mechanical Code (FMC)
   4. Florida Plumbing Code (FPC)
   5. Florida Energy Code (FEC)
   6. Florida Fire Code (FFC)
   7. NFPA 70 National Electrical Code
   8. Americans with Disabilities Act (ADA)

B. Where codes or standard specifications other than those listed in this paragraph are referred to in the different Divisions of these specifications, it is understood that they apply as fully as if cited here.

C. Where differences exist between codes affecting this work, the code affording the greatest protection to the Owner shall govern.

D. If the Contractor observes that these drawings and specifications are at variance with the codes, the Contractor shall notify the Project Manager in writing at once for resolution in writing.

E. Pursuant to OSHA Regulations, the Contractor shall include in its base bid all costs incidental to the provision of adequate sheeting, shoring, bracing or equivalent method for the protection of life or limb, which shall conform to applicable Federal and State safety orders.

F. Maintenance clearances shall be maintained around equipment as required by the Codes and Standards, and as recommended by the equipment manufacturers. The maintenance envelope and equipment access shall be kept clear of any obstruction. It is Contractor's responsibility to enforce these requirements with all the Contractors. The Contractor and Contractors shall be responsible for correcting any infringement on this requirement at no cost to the Owner.

1.6 SITE USE AND ACCESS

A. SIMULTANEOUS USE OF SITE: The contractor shall coordinate the work with the owner to allow Owner occupancy, work by other contractors, and use of the facility by the public as required by the Owner. Site utility shutdowns must be closely coordinated with the onsite staff with minimum 48 hours notice for shutdowns that may interfere with the Owner's activities.

B. PARKING: Parking for private vehicles is limited. Parking for Contractors and their workers will be limited to the construction limits and as agreed with the Project Manager.

C. SITE ACCESS: Heavy and slow moving trucking will not be permitted on site during transition periods. Trucks attempting to enter the site during this period shall be denied access.

D. CONSTRUCTION LIMITS: The Contractor shall confine the construction to the immediate area within the construction limits and spaces specifically coordinated for use during construction.

E. WORKING HOURS: Unless otherwise noted, construction operations shall be as follows:
1. Schools – During summer break: The facility is continuously available for work activities. Utility outages must be coordinated with the onsite staff. Summer school activities shall not be interfered with.
2. Schools – During school year: School activities take priority over construction activities. Construction may occur if it does not interfere with school activities. Construction that may disrupt school activities must occur after school hours or on the weekends.

1.7 TEMPORARY FACILITIES

A. GENERAL: Provide construction facilities and temporary controls necessary for the Work.

B. ELECTRICITY: Owner will pay cost of electricity used. Provide temporary electricity and power outlets for construction operations, connections, branch wiring, distribution boxes, and flexible power cords as required. All temporary services shall comply with NEC. Do not disrupt Owner's need for continuous service.

C. LIGHTING FOR CONSTRUCTION PURPOSES: Provide and maintain temporary lighting for construction operations. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required. Permanent building lighting may be utilized during construction. Repair, clean, and replace lamps at end of construction.

D. SANITARY FACILITIES: Provide and maintain required facilities and enclosures. Owner's facilities may not be used. Maintain in clean and sanitary condition.

E. REMOVAL: Remove the construction facilities and temporary controls when they are no longer required. Restore permanent facilities used for or connected to temporary facilities to their original condition or better.

1.8 BARRIERS AND ENCLOSURES

A. BARRIERS AND FENCING: Provide barriers and/or fencing as required to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage. Where fencing is needed, the following requirements apply:
   1. Provide temporary fence not less than 6 feet in height above grade.
   2. Fabric: Provide #9 gage galvanized steel, or equal gage aluminum, woven together into 2 inch diamond mesh, with both top and bottom edges having a twisted and non-barbed finish.
   3. Posts, Rails, and Connections: Standard galvanized steel products of an approved manufacturer, of the size and types as required and approved. Provide top and bottom rails between all posts secured with bolted connections.
   4. Gates: Provide access gates for passage of employees and materials, complete with padlock. Fabricate gates with galvanized steel pipe perimeter covered with same fabric specified for fence.
   5. Erection: Set posts 4 feet into the ground and not more than 10 feet apart. Install bottom rail not more than 2 inches above existing grade. Pull fabric taut and wire tightly to posts and rails at not more than 2 feet on center.

B. DUST BARRIERS: When the potential exists for construction dust or debris to travel into areas outside the limits of construction, provide temporary dust barriers consisting of wood framing sheathed with 6 mil polyethylene film. Secure the dust barriers in place without damaging existing construction.

C. ENCLOSURES: Provide temporary weather tight closures to exterior openings to permit acceptable working conditions and protection of the Work.

D. BARRICADE PLAN: When required by the Owner, provide a site plan indicating locations for barricades.

1.9 SITE REPAIR

A. DEMOLISHED WORK: Where demolition of existing components occurs, repair resulting holes, blemishes, and deficiencies in the finishes and substrate to match surrounding. Repair shall include patching to match surrounding materials, priming surfaces and topcoat painting with two coats to match.
   1. Where painted patches do not closely match existing color, the contractor shall paint to nearest corner or break point.

B. ENTIRE SITE: All construction areas shall be returned to the same or better condition than prior to construction. The contractor may photograph existing conditions to document existing damage.

C. INTERIORS: Patch and paint walls as required. Clean, repair, and/or replace flooring as required. Repair and/or replace furnishings damaged during construction.

D. EXTERIORS: Pressure wash as required. Repair any damage to sidewalks and driveways. Broken concrete must be replaced ‘cut to cut’, patches are not allowed.

E. LANDSCAPING: Replace damaged landscaping. Sod all grassed areas affected by the work, matching the existing grass type.

1.10 PROGRESS CLEANING AND WASTE REMOVAL

A. Clean up and containerize the rubbish (refuse, debris, waste materials, and removed materials and equipment) resulting from the Work at the end of each work day and leave work areas broom clean, except where more stringent cleaning is specified. Locate containerized rubbish where directed.

B. Remove rubbish from site at least once a week and more often if the rubbish presents a hazard. Properly dispose of rubbish.

C. Burning of rubbish will not be permitted.

1.11 SECURITY

A. Facility Key Regulations:
1. Sign Facility keys out and in on a daily basis unless otherwise directed.
2. Keep keys on person at all times while on the premises. Do not loan or give keys to other persons.
3. Do not remove keys from the premises without written permission from the Owner.
4. Report lost, missing, or stolen keys immediately. Assume responsibility for cost of necessary key and lock replacement as a result of lost, missing, or stolen keys.

B. Identification Badge: Provide and require workers to carry and plainly display at all times identification badges indicating their name and employer.

C. Promptly relock doors and security screens located in access routes, storage areas, and work areas after use.

D. Restore, by the end of each work day, existing in place safety/security items such as doors, screens, alarm systems components, that required removal, replacement, or adjustment to perform the Work, unless otherwise authorized in writing by the Owner.

E. Remove all tools and materials from Owner occupied work areas when the work areas are not attended by employees and at the end of each work day. Store tools in a locked tool box, cabinet, or shed. Store materials in a secure location.

F. Provide security and facilities to protect Work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.12 WATER CONTROL

A. Provide and maintain pumping equipment necessary to keep the work areas free from water. Discharge water into existing storm drainage systems or otherwise disperse as directed.

1.13 QUALITY CONTROL

A. The Contractor shall be fully responsible for inspecting the work of its suppliers, and Subcontractors to assure that the work complies with the standards for materials and workmanship required by the Contract Documents. Inspections, periodic observations and testing performed by the Owner or the Architect-Engineer are for the Owner's benefit and information only and shall not be construed as partial or incremental acceptance of the work and shall not be deemed to establish any duty to the Contractor, its Subcontractors or suppliers.

B. The Subcontractor shall
   1. Monitor quality control over Subcontractors, suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of the quality specified in the Subcontract documents.
   2. Comply fully with manufacturer's instructions, including each step in sequence.
   3. Request clarification from Architect-Engineer before proceeding with work when manufacturers' instructions or reference standards conflict with Contract Documents.
   4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or manufactures instructions require more precise workmanship.
   5. Ensure that work is performed by persons specializing in the specific trade and class of work required, and qualified to produce workmanship of specified quality.
   6. Secure products in place with positive anchorage devices designed and sized to withstand static and dynamic loading, vibration, physical distortion or disfigurement.

1.14 TESTING, INSPECTING, AND REPAIR

A. The work will be inspected by Owner’s inspectors and/or independent service personnel under coordination of the Project Manager.

B. All work is subject to inspection and shall remain accessible and exposed until it has been inspected. Any work covered up or made inaccessible before such inspection shall be uncovered and made accessible without additional expense to the Owner.

C. Work performed by the Owner, independent service companies, or the Architect-Engineer or any of their employees or consultants shall not (1) relieve the Contractor from responsibility for performing his own quality control and for complying with the requirements of the Contract Documents and (2) shall not create a duty or responsibility of the Owner or Architect/ Engineer to the Contractor, any tier of Subcontractors, material and equipment suppliers, their agents, employees or other persons performing portions of the work.

D. The Owner or the Architect-Engineer will not be responsible for the Contractor's failure to carry out work in accordance with the Contract Documents.

1.15 COORDINATION WITH EXISTING FACILITIES

A. The Engineer has endeavored to coordinate the work with the existing facilities. However, the exact location of existing items may differ from what is shown on the drawings. The Contractor shall apply the design intent to the facility regardless of differences in actual field conditions.

B. Prior to any shutdowns or disconnecting, the contractor shall field verify the service to be modified (piping, hydronic, electrical, ductwork, etc) is correct based upon the design intent.

1.16 PROTECTION OF EXISTING FACILITIES

A. Protect installed Work and existing construction and finishes during performance of the Work.

B. Maintain the building in a watertight condition during performance of the Work.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at wall projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, and movement of heavy objects. The minimum protection shall be:
1. Cover the entire floor of all spaces affected by the work with Masonite (or similar product) with taped edges.
2. Furnishings remaining in space: Visqueen covering. Tape edges to prevent dust.
3. Bookcases: Cover completely with Visqueen and tape edges.
4. Remaining items shall be protected as determined by the contractor.
5. Any items with construction dirt/dust/debris shall be thoroughly cleaned.

F. All protective systems shall be removed and disposed of at the end of the project.

G. Protect smoke detectors from airborne dust and debris.
1. At the beginning of each work day, provide protective coverings over smoke detectors in areas where airborne dust and debris will be generated by the Work.
2. At the end of the work day, clean the areas in which the smoke detectors are located by whatever means necessary to assure that airborne dust and debris will not contaminate the smoke detectors, then remove protective coverings.
3. Provide signs, instructions and alternate methods for reporting a fire during the periods that the smoke detectors are covered.

H. Prohibit traffic or storage upon waterproofed and roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

I. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants within the grading limit lines. Do not deposit excavated materials or store building materials around trees or plants. Do not attach guy wires to trees.

J. Prohibit traffic from landscaped areas.

1.17 FIRE PREVENTION

A. Take precautions necessary to prevent fires.

B. Fuel for cutting and heating torches shall be gas only, and shall be contained in Underwriters Laboratory approved containers.

C. Furnish and maintain a currently inspected 20 pound capacity multi-class A B C fire extinguisher in the immediate vicinity where welding tools or torches are in use.

D. Furnish and maintain a currently inspected fire extinguisher of the appropriate class and size whenever the temporary storage of materials changes that areas classification of fire load or life safety.

E. Do not use flammable liquids, other than those specified, within a building without written approval from the Owner.

F. Tarpaulins shall be flameproof and shall be securely anchored when attached to scaffolding or when used to enclose any portion of a building.

1.18 COORDINATION OF WORK

A. The Contractor shall coordinate and schedule the work of all its Contractors, and shall furnish all information required by them for proper scheduling and execution of the work.

B. In the same manner, the Contractor shall coordinate the work with that of the Owner, and any other Contractor operating in the area, including reasonable adjustments of schedule in order to allow other Contractors or the Owner to do their work.

C. The Owner shall have the right to make final and binding decisions on disputes between the Contractor and any other Contractor operating in the area regarding: (a) access to the site with work force, equipment, and/or materials to their work area or (b) their adjacent work areas.

D. The Contractor shall immediately inform the Project Manager of the name of the person(s) designated as Superintendent representing the Contractor at the site. Once assigned, the Superintendent cannot be changed without the consent of the Project Manager.

1.19 INITIAL CONTRACTOR INFORMATION SUBMITTAL

A. The Contractor shall submit copies of the following information to the Owner’s Project Manager and the Engineer within ten (10) calendar days following the Date of Notice to Proceed:

1. LIST OF ALL CONTRACTORS: Submit a list of all Contractors shown in the submitted bid documents. This list shall include the name, telephone numbers, addresses, and portion of work to be accomplished.
2. SCHEDULE OF VALUES: Submit a segregation of the Subcontract price on AIA Form G703 itemizing the estimated cost of each class of work. Each item shall include a pro rata allowance for profit and overhead expense. Insurance and bond expense shall not be prorated but should be shown as separate items. The total of the items shall equal the Contract price. This segregation, when accepted by the Architect-Engineer and Owner's Project Manager, shall become the basis for determining progress payments.
3. CONSTRUCTION SCHEDULE: Three (3) copies of the construction schedule indicating completion within the time provided by the Contract. The schedule shall be a bar graph or an arrow diagram showing the times the Contractor intends to commence and complete the various work stages. After the initial submittal, the Contractor shall update the schedule monthly by entering actual progress for the period and submit one copy as part of the monthly progress payment request.

1.20 SUBMITTALS – GENERAL REQUIREMENTS

A. Shop drawings and submittal data consisting of brochures, catalogs, material lists, samples, and letters requesting review of materials or substitutions by the Contractor shall be submitted for review where required by the individual specification sections. Specific submittal requirements for each division are provided in each division's general requirements.

B. When required by the technical specifications, the Contractor shall submit shop drawings, erection drawings, and equipment layouts, and vendor data for review by the Architect-Engineer.

C. The Contractor shall be responsible for and shall check the correctness of all documents including those of Subcontractors prior to submitting them for review.

D. Product Data consisting of brochures, catalogs, material lists, letters, manufacturer's installation instructions, etc. shall be submitted as described in the specific Sections of the technical specifications. Items for use on this project shall be clearly indicated. Information which is not pertinent shall be voided.

E. Each submittal shall be provided together with a transmittal letter or form and shall itemize the enclosures and indicate the distribution of the transmittal and the enclosures.

F. Shop drawings and other required submittals will be reviewed with reasonable promptness. No delay will be allowed in the progress of the job attributable to Contractor's failure to make required submittals within a reasonable length of time.

G. The Architect-Engineer's favorable review of shop drawings and other submittals shall not relieve the Contractor of responsibility for deviations from drawings or specifications, unless the Contractor has in writing called the Architect-Engineer's attention to such deviations at the time of submission, and the Architect-Engineer

has acknowledged in writing such deviations; nor shall it relieve the Contractor from responsibility for errors of any sort in such drawings.

H. If deviations, discrepancies, or conflicts between shop drawing submittals and the drawings and specifications are discovered either prior to or after the shop drawing submittals are reviewed by the Architect-Engineer, the drawings and specifications shall control and shall be followed.

I. The Contractor shall furnish prints of the favorably reviewed final shop drawings, erection drawings, equipment layouts and vendor data to Subcontractors and suppliers for the proper coordination of their work. The Contractor shall keep one (1) complete set of the above documents at the job site for the use of the Owner and the Architect-Engineer.

1.21 REQUESTS FOR INFORMATION

A. When, during the course of construction, the contractor deems the scope of work is unclear, he shall promptly submit a written Request For Information (RFI) to the engineer for clarification. The RFI shall contain the following:
1. A statement clearly outlining the issue or discrepancy.
2. A recommendation from the contractor regarding the course of action to take.
3. A statement as to whether or not the contractor's recommended course of action will result in added construction costs.
4. A statement as to whether or not the contractor's recommended course of action will result in added construction time.

B. The engineer will process and respond to the RFI as quickly as possible.

1.22 APPLICATION FOR PAYMENTS

A. Submit five (5) signed original copies of each application on AIA Form G702 and G703.

B. Include any owner specific documentation required to be provided with the application for payment. Coordinate with the Owner's purchasing department.

C. Include the Owner Project number on the applications.

D. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.23 CHANGE ORDERS

A. In connection with change orders under this Contract, not covered by unit price or alternate bids, the Owner will use the following formula for approval unless it determines that such amounts would not be acceptable.

B. Basis for Change Order Costs: All change order requests shall be provided with complete time and materials breakout pricing. Costs that lack reference numbers will be rejected.
1. Cost Allowances:
Subcontractor costs (attach full labor and materials breakdown of work)
10% for "Overhead and Profit" for self performed work.

5% for “Overhead and Profit” for non-self performed work.
Additional insurance coverage
Added Performance and Payment Bond cost (if applicable to the project)
Cost of hourly supervision of non-self performed work (if required).

C. Change Order Requests will only be considered when a properly submitted RFI has been processed regarding the issue.

D. To be considered, properly formatted Change Order Requests must be submitted to the engineer within one week of the RFI response.

E. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.

F. Change Order Forms: AIA G701.

G. For deletions not covered by unit prices or alternate bids, the Contractor agrees that the Owner shall be credited with the estimated cost of the labor, materials, supplies, transportation, payroll taxes, sales taxes, insurance, bond costs, overhead and profit associated with the deleted work.

1.24 FIELD ENGINEERING

A. Employ experienced instrument technician as required to locate reference datum and protect survey control and reference points.

B. Establish elevations, lines, and levels and certify elevations and locations of the Work conform with Contract Documents.

C. Verify field measurements are as indicated on shop drawings or as instructed by manufacturer.

1.25 PRECONSTRUCTION MEETINGS

A. Owner will schedule preconstruction meeting after Notice to Proceed for affected parties.

B. When required in individual specification section, convene pre-installation meeting at Project site prior to commencing work of section.

1.26 PROJECT MANAGEMENT SOFTWARE DOCUMENTATION

A. The Owner requires the use of Procore Project Management Software for managing the project. The contractor shall provide the following documentation in a timely basis in Procore:
1. Submittal Data (Note that all Submittal Data shall be assigned to SEG ONLY. SEG will forward submittal data to subconsultants as needed.)
2. Construction Schedule and updates
3. Daily logs of onsite manpower
4. Daily photos of construction progress
5. Minutes of project progress meetings (minutes are to be taken by the contractor)

6. Requests for use of GMP allowances including complete labor and material backup.
7. Documentation (written and photographs) of completion of Observation and Punch List items.

1.27 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.

B. Preside at meetings, record minutes, and distribute copies within two days to those affected by decisions made.

1.28 SUBSTANTIAL COMPLETION

A. The contractor shall be granted substantial completion when the following has occurred:
1. The work has been reviewed by the Engineer and all work has been acceptably completed and a minor punch list remains.
2. All required inspections have successfully passed, including the building inspection and health and safety inspection.

1.29 FINAL CLEANING

A. Perform final cleaning prior to joint inspection for physical completion. Leave the premises in a neat, unobstructed condition, the work areas broom clean (except where more thorough cleaning is specified), and everything in perfect repair and adjustment.

B. Clean site; sweep paved areas, rake clean landscaped surfaces.

C. Remove tools, equipment, waste and surplus materials, rubbish, and construction facilities from the premises as soon as possible upon completion of the Work.

1.30 RECORD DRAWINGS

A. Maintain at the site a complete, precise, accurate dimensioned record of actual locations of the work, including concealed and embedded work, size and type of equipment, and every change or deviation from original Subcontract Drawings. Keep this record legible and correct weekly as the job progresses on black or blueline prints. Keep Record Drawings available for inspection at all times. Drawings will be inspected before approval of requests for payment.

1.31 GUARANTEE

A. The date of acceptance for all warranties and guarantees shall be defined as the date of substantial completion. The contractor shall purchase extended manufacturer warranties as required to provide the warranty duration required by individual specification sections.

B. All work shall be guaranteed for one (1) year from the date of acceptance against all defects in material, equipment and workmanship. When required by the specifications, guarantees for specific items shall be for periods longer than one

(1) year. All guarantees shall be in the following form on the Contractor's own letterhead.

C. Guarantee form:

GUARANTEE FOR
__(Owner's Name)_____
We hereby guarantee___(Project Name)_____ which we have constructed at ___(Site)_____. We agree to repair or replace any or all of our work together with any other adjacent work which may be replaced by so doing, that may prove to be defective in its workmanship or materials within a period of one (1) year from date of acceptance (Substantial Completion) without any expense whatsoever to said Owner excluding ordinary wear and tear and unusual abuse or neglect. Further, the following products have been provided with warrantees exceeding one year:

Product	Warrantee Period
_____	_____
_____	_____
_____	_____
_____	_____

In the event of our failure to comply with above-mentioned conditions within thirty (30) days after being notified in writing of a warrantee issue, we, collectively or separately, do hereby authorize the Owner to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand.

Signed_____
(Contractor)

1.32 CLOSEOUT

A. General: The overall process for closeout documentation shall be as follows:
1. Electronic copies of the closeout documents shall be compiled by the Prime contractor for each discipline with project scope. The electronic documents shall be uploaded to the shared SEG Dropbox folder and SEG notified via email that the documents are ready for review.
2. Refer to the Dropbox folders for additional information regarding the file naming conventions and file organization requirements.
3. SEG will review data and identify any modifications needed and notifies the contractor. The contractor makes the necessary revisions and notifies SEG via email of the updates.
4. Once the electronic documents are accepted, the contractor shall deliver the following to SEG for final review:
   a. Contractual documents
      1) Receipt and Release
      2) Contractor Affidavit
      3) Consent of Surety

4) Final Pay application

b. Four (4) USB Thumb drives labeled with the project information and containing all the electronic closeout content from the Dropbox closeout folder.

B. Documents Required:

1. General Project Information:
   a. Contractor contact information
   b. Final, signed permit
   c. Attic stock transmittals
   d. Owner training sign-in sheets
2. As-Builts
   a. Each page shall indicate 'AS-BUILT' in a large font.
   b. Each page shall indicate the contractor's name, address, and phone number.
   c. Incorporate field markups (redlines) and A/E revisions during construction (ASI's and ESI's) into project conformance documents using either AutoCAD or an electronic markup system for PDF documents (Adobe Acrobat). Drawings shall fully illustrate all revisions made by all the crafts in the course of the work. This shall include all field changes, adjustments, variances, substitutions and deletions, whether covered by Change Order or not. Underground utility installations must be located precisely on the marked-up drawings using 3-point dimensions based off permanent structures. Burial depths shall be included.
   d. Provide PDF documents with individual discipline field markups for review. After acceptance, combine the PDF files into a single As-Built PDF document.
3. Warranty Information
4. O&M Data
   a. Product and/or Equipment operation and maintenance information shall be sorted by discipline. Individual folders for each specification section shall be provided and shall contain the O&M data specific to the folder title. Individual files shall be named based on the product information contained.
5. Reports
   a. Provide report results as required by individual specification sections sorted by discipline

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 91 00

COMMISSIONING

PART 1 GENERAL

1.1 SECTION INCLUDES:

A. General requirements that apply to implementation of commissioning building systems, assemblies and components.

PART 1 GENERAL 1
1.1 SECTION INCLUDES: 1
1.2 RELATED DOCUMENTS 1
1.3 RELATED SECTIONS 1
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3.5 STEP ONE - INSTALLATION VERIFICATION 5
3.6 STEP TWO - SYSTEM START-UP 6
3.7 STEP THREE - FUNCTIONAL PERFORMANCE TESTING 6
3.8 REPORTING 7

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Subcontract apply to this Section.

B. Review these documents for coordination with additional requirements and information that apply to work under this Section.

1.3 RELATED SECTIONS

A. 01 73 03 – Execution Requirements.

B. Division 23 Sections.

1.4 REFERENCES

A. General:

1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
4. Refer to Division 23 Sections for Mechanical codes and standards, and other general requirements.
5. Refer to Division 16 Sections for Electrical codes and standards, and other general requirements.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
1. ASHRAE Guideline 0 - The Commissioning Process.
2. ASHRAE Guideline 1.1 - HVAC&R Technical Requirements for the Commissioning Process.

1.5 DESCRIPTION

A. The purpose of commissioning is to ensure the Owner that work has been completed as specified and that systems are functioning in the manner as described in the construction documents and specified system operating criteria. It will serve as a tool to reduce post-occupancy critical systems operational difficulty or failure.

B. Commission will commence after preliminary punch list items are completed by Subcontractors.

C. The steps associated with commissioning are outlined below:
1. Step One - Installation Verification
2. Step Two - System Start-Up.
3. Step Three – Functional Performance Testing.

D. The Commissioning Team will include:
1. Owner’s representatives
2. Design Engineer
3. Contractor and Installing Subcontractors
4. BAS Subcontractor
5. Test and Balance Subcontractor
6. Commissioning Agent.
7. Equipment manufacturer’s representatives will be present for start-up as specified in the equipment specification sections and for equipment training.

1.6 SYSTEMS TO BE COMMISSIONED

A. Commissioning will be performed on the following systems:
1. Building Automation System (BAS)
2. Hydronic Systems:
a. Heating Boilers
b. Variable Frequency Drives
c. Pumps

1.7 SUBMITTALS

A. Commissioning Agent shall provide Functional Performance Test (FPT) procedures and system narrative descriptions for the above listed systems.

B. Commissioning Plan as prepared by the Commissioning Agent.

1.8 QUALIFICATIONS

A. Commissioning Agent: Company specializing in building commissioning with minimum three years experience.

PART 2 PRODUCTS

2.1 PRODUCT

A. COMMISSIONING PLAN
1. The commissioning plan shall outline the organization, scheduling, team members, and documentation pertaining to the overall commissioning process.

B. FUNCTIONAL PERFORMANCE TESTS (FPT) PROCEDURES
1. The FPT procedures at the minimum shall consist of the following sections:
a. Narrative Description:
1) This section provides a narrative description of the design intents of the systems and their intended modes of sequences of operation.
b. Testing Prerequisites:
1) This section contains verification that primary mechanical, electrical, and controls systems that support or interact with the system that the FPT is prepared against are completed, tested and operational.
c. Installation Verification:
1) This section contains verification that the system installation is completed and is ready for commissioning.
d. Commencement of Functional Performance Testing:
1) This section records the date and time of the start of system commissioning.
e. System Condition Prior to Staring Performance Testing:
1) This section records the current set points and parameters of the system at the start of commissioning.
f. Functional Performance Test:
1) This section shall provide the following:
2) Sequential steps required to set parameters and conditions required to test component and functions throughout intended ranges of operation.
3) Full range of checks and tests carried out to determine if electric and pneumatic connections, components, subsystems, systems and interfaces between systems

function in accordance with the contract documents and design intents.

4) All modes and sequences of control operations, interlocks and conditional control responses and specified responses to abnormal emergency conditions.

g. End of Functional Performance Test:
   1) This section records the date and time of the end of system commissioning.

h. Field Notes:
   1) This section records notes or remarks during system commissioning.
   2) List systems modifications, not required by the Contract Documents, but provided by the Subcontractor. List other questions regarding such system modifications.
   3) List problems discovered during Commissioning that were corrected.
   4) List problems discovered during Commissioning that were not corrected.
   5) List recommended party that should take action on these problems.

PART 3 EXECUTION

3.1 GENERAL

A. The Subcontractors shall be responsible for performing procedures presented in specification and contract drawings as detailed in the Functional Performance Tests (FPT). Members of the designated Commissioning Team shall witness various portions of the commissioning process. Responsibilities for these activities are listed in the following paragraphs. Commissioning Team members shall sign-off on appropriate sections after verifying installation, operation, or documentation. Final sign-off shall be by the Owner and Commissioning Agent.

B. Any test ports, gauges, test equipment, etc., needed to accomplish the functional performance tests shall be provided by Subcontractors.

C. Subcontractors shall provide to the Commissioning Team documentation of calibration of controls. Documentation shall include dates, setpoints, calibration coefficients, control loop verification, and other data required to verify system check-out. Documentation shall be dated and initialed by field engineer or technician performing the work.

3.2 OPERATIONAL STAFF TRAINING

A. System narrative descriptions will be prepared by the Commission Agent and supported by flow diagrams, one line diagrams, and appropriate specification sections for major systems to be commissioned. The Commission Agent will coordinate “system description” meetings with members of facility management and maintenance department groups to review system description

documentation. The meetings will provide an overview of major system features, components, and arrangements.

B. The Subcontractor and associated manufacturer's representatives shall provide required training to operational staff after the system description meetings have occurred. The Subcontractor training sessions shall provide a more detailed analogy of systems operation and maintenance.

3.3 INSTRUMENTATION

A. Instrumentation will be provided by the Subcontractor. Instruments used for measurements shall be accurate. Calibration histories for each instrument shall be available for examination. Calibration and maintenance of instruments shall be in accordance with the requirements of NEBB or AABC Standards.

B. Application of instruments and accuracy of measurements shall be in accordance with NEBB or AABC Standards.

3.4 DOCUMENTATION

A. The installing Subcontractor shall be responsible for collection of pertinent data during system start-up and functional performance testing. The Subcontractor shall submit to the Commissioning Agent documentation of tests performed prior to and after system start-up. Documentation shall also include start-up procedures as approved by Commissioning Team.

B. Documentation is to be typewritten on 8-1/2 by 11 inches paper and inserted in a three ring binder. Indicate the project name, number, volume number, and volume title on the end panel of each binder.

3.5 STEP ONE - INSTALLATION VERIFICATION

A. General Commissioning responsibilities:
   1. Before system start-up begins, the Commission Team shall conduct a final installation verification audit. The Subcontractor shall be responsible for completion of work including change orders and punch list items to the Owner's satisfaction. The audit shall include, but not be limited to, checking of:
      a. Piping specialties including balance, control, and isolation valves.
      b. Ductwork specialty items including actuators, balance, fire, smoke, control dampers, and access doors.
      c. Pipe flushing and cleaning
      d. Control sensor types and location.
      e. Identification of piping, valves, equipment, controls, etc.
      f. Major equipment, pumps, valves, starters, gauges, thermometers, etc.
      g. Documentation of prestart-up tests performed, including manufacturer's factory tests.

B. If work is found to be incomplete, incorrect, or non-functional, the Subcontractor shall correct the deficiency before system start-up work proceeds.

3.6 STEP TWO - SYSTEM START-UP

A. General Commissioning Responsibilities:
1. A start-up plan shall be developed and submitted by the installing Subcontractor. Start-up plan to include the following:
a. Flushing and cleaning of pipe.
b. Filters, strainers, and screens.
c. Valve/damper positions.
d. Electrical tests.
e. Pressure tests.
f. Safeties.
g. Chemical treatment.
h. Manufacturer's tests.
2. The start-up plan will be reviewed and a prestart-up inspection performed by designated members of the Commissioning Team. The installing Subcontractor shall commence with system start-up after approval has been given to start-up plan and the prestart-up inspection is completed. Designated members of the Commissioning Team may witness system start-up and document equipment deficiencies observed during start-up. The Subcontractor shall take corrective action on system deficiencies noted and demonstrate to the Commissioning Team members suitable system operation.
3. Designated systems requiring test and balance work shall have this activity commence after systems have successfully completed start-up. System and equipment deficiencies observed during this activity is to be noted and corrected.

B. Control Contractor responsibilities:
1. Provide a point-to-point device and calibration check out with a written certification that the software and hardware check out is completed prior to the start of the functional testing.
2. Calibrate all sensors and devices. Provide documentation of calibration using standard contractor or manufacture's form sensor and devices requiring calibration including:
a. Water Temp Sensors
b. Air Temp Sensors
c. CO2 Sensors, if installed
d. Flow Stations, if installed
e. dP Sensors, if applicable

3.7 STEP THREE - FUNCTIONAL PERFORMANCE TESTING

A. General Commissioning Responsibilities:
1. Functional Performance Testing begins after operational testing, adjusting, and balancing of the systems have been completed by the Subcontractors; and the System Description and Owner Training sessions have been completed.
2. The objective of the Functional Performance Testing is to advance the building systems from a state of substantial completion to full dynamic

operation in accordance with the specified design requirements and design intent.

3. Attaining this object will be accomplished by developing individual systems testing protocols which, when implemented by the Subcontractor, will allow the Commissioning Team to observe, evaluate, identify deficiencies, recommend modifications, tune, and document the systems and systems equipment performance over a range of load and functional levels.
4. Functional Performance tests for the systems to be commissioned are defined in the Commissioning Plan. These tests are intended to be conclusive but may require minor modifications as system operation dictates.

B. Control Contractor responsibilities:
1. Execute functional testing for controls and be available on site for mechanical testing.
2. Execute control system trend logs as required to supplement functional testing.
3. Participate in startup and testing.
4. Assist the mechanical contractor as required during the functional testing.
5. Participate in fine-tuning or troubleshooting of system performance if either measure became necessary.

3.8 REPORTING

A. Commissioning Agent shall assemble all test results and other required documentation into the final commissioning report and deliver to Owner within 90 days after Substantial Completion is awarded.
1. Report shall include:
a. Results of functional performance tests
b. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
c. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

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2.3 PAINT MATERIALS, GENERAL 3
PART 3 EXECUTION 3
3.1 EXAMINATION 3
3.2 PREPARATION 4
3.3 APPLICATION 4
3.4 CLEANING 4

1.2 RELATED SECTIONS

A. Section 02070 – Selective Demolition.

1.3 SYSTEM DESCRIPTION

A. Work Includes:
   1. Surface preparation, painting, and finishing of exposed interior and exterior items and surfaces affected by the work.

B. Paint exposed surfaces, except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent areas.

1.4 STANDARDS

A. The following codes, standards, and specifications are applicable:
   1. OSHA (Occupational Safety and Health Act) 29 CFR 1910
   2. MSDS (Manufacturer’s Safety Data Sheet) & recommendations

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

B. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to those indicated for the Project that have resulted in a construction record of successful in-service performance.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 73 03 – Execution Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.

1.8 JOB CONDITIONS

A. Apply paints only when the temperature and humidity are within the manufacturer’s recommended application conditions.

1.9 FIELD MEASUREMENTS

A. Ensure adequate supplies are provided prior to beginning application.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. VCSD:
1. Coronado
2. Pre-approved alternate manufacturers

B. Subject to compliance with requirements, provide products of one of the following:
1. Devoe and Raynolds Co. (Devoe).

2. Fuller O'Brien (Fuller).
3. Benjamin Moore and Co. (Moore).
4. PPG Industries, Pittsburgh Paints (PPG).
5. Pratt and Lambert (P & L).

2.2 GENERAL REQUIREMENTS

A. Walls and Trim
1. Only water-based products are allowed.
2. Interior wall surfaces:
   a. acrylic semi-gloss
3. Exterior walls, doors, columns and trim surfaces:
   a. 100% acrylic
4. Tinting: each coat of paint shall be tinted slightly different to verify application of subsequent coatings.

B. Mechanical Room Floors
1. Epoxy Systems allowed:
   a. Sherwin Williams - ArmorSeal
   b. Rust-Oleum - Seal Krete Dura-Shell WB
   c. Pre-approved alternates
2. Epoxy Coating System as follows:
   a. Epoxy Primer Sealer – Light Gray
   b. Epoxy (2 coats) - Gray
   c. Clear Coating with broadcast flakes

2.3 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

B. Material Quality: Provide the manufacturer's best-quality trade sale paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

C. Color:
1. Base coat: As recommended by the manufacturer
2. Scratch coat: match surrounding finishes
3. Finish coat: match surrounding finishes

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting will be performed for compliance with paint application requirements. Surfaces receiving paint must be thoroughly dry before paint is applied.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories already installed that are not to be painted, or provide surface-applied protection prior to surface preparation and painting.

B. Repairs: Provide minor repairs to surfaces prior to surface preparation.

C. Cleaning and Surface Preparation: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease prior to cleaning. Clean and prepare surfaces to be painted according to the manufacturer's instructions.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying.

C. Minimum Coating Thickness: Apply materials no thinner than the manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

D. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime-coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

E. Pigmented (Opaque) Finishes: Completely cover to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

F. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with specified requirements.

3.4 CLEANING

A. Cleanup: At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

END OF SECTION

SECTION 23 05 01

MECHANICAL GENERAL REQUIREMENTS

PART 1 GENERAL

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1.2 GENERAL DESCRIPTION

A. This section describes the general project requirements to be included in the Division 23 contractor's scope of work.

1.3 COORDINATION

A. Coordinate scheduling, submittals, and Work of various sections of specifications to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify utility requirement characteristics of operating equipment are compatible with building utilities.

C. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.

D. In finished areas, conceal pipes, ducts, and wiring within construction.

E. Where connecting to or modifying existing services, field verify service is correct prior to any modification work.

1.4 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching new Work; restore Work with new Products.

B. Submit written request in advance of cutting or altering structural or building enclosure elements.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
1. Fit several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.

E. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

F. Where work penetrates interior walls or ceilings, provide a gypsum patch panel around the work to prevent the transmission of sound.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Refinish surfaces to match adjacent finishes.

1.5 PRODUCT DATA SUBMITTALS

A. Submitted to Architect/Engineer for review for limited purpose of checking for general conformance with information given and design concept expressed in Contract Documents. Review of submittal data does not relieve the contractor of his responsibility to fully coordinate the work and to provide a fully operational system.

B. Upload electronic submittal data to the SEG Dropbox Project Submittal folder. Refer to Dropbox folders for additional organizational requirements.
1. Provide individual PDF files that are all inclusive to a submitted item.
2. The submittal file name shall correspond to the specification section and product submitted (i.e.: 23 21 14-Hydronic Specialties.PDF). Resubmittals shall be suffixed with ‘-R1’, ‘-R2’, etc.
3. Submittal data shall be provided as complete submittals (not piecemeal). The contractor shall accumulate data then upload electronically when the complete submittal package can be provided.

4. Each submitted product shall have a contactor cover page indicating the following:
    - Prime contractor name, address, and phone number
    - Sub-contractor name, address, and phone number
    - Identifying Submittal information (i.e.: HVAC Submittal Data)
    - Product representative contact information
    - Clearly mark each submittal to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this project.
    - Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
    - Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of completed Work.
5. Product data must be project specific. Generic information will be rejected.
6. Notify SEG by email that submittal data has been uploaded to the shared site and is ready for review.

C. Long-lead item submittal: When the lead time for a product requires a separate, advanced review by SEG, the following process shall be followed:
1. Only one (1) advanced submittal will be reviewed. Compile all long-lead items into one submittal.
2. Submit two bound copies of the product data clearly marked LONG-LEAD ITEM SUBMITTAL to SEG for review.
3. Include the long-lead item product data in the complete submittal for the project, make copies as needed.

D. For each submittal for review, allow 10 days for review.

E. Submittals not requested will not be recognized or processed.

F. Revise and resubmit submittals as required; identify changes made since previous submittal.

1.6 SHOP DRAWING SUBMITTALS

A. Submitted to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Review of submittal data does not relieve the contractor of his responsibility to fully coordinate the work and to provide a fully operational system.

B. Provide one electronic copy of each submittal for review. Submittal to identify Project name and SEG project number, Contractor name address and phone number, subcontractor name address and phone number; and pertinent Contract Document references.

C. Refer to individual specification sections for shop drawing submittal requirements.

D. Apply Contractor's stamp, signed or initialed, certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.

E. Identify variations from Contract Documents and system limitations which may be detrimental to successful performance of completed Work.

F. For each submittal for review, allow 10 days excluding delivery time to and from Contractor.

G. Submittals not requested will not be recognized or processed.

H. Revise and resubmit submittals as required; identify changes made since previous submittal.

1.7 MANUFACTURER’S INSTRUCTIONS

A. When specified in individual specification sections, submit manufacturer printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

1.8 MANUFACTURER’S CERTIFICATES

A. When specified in individual specification sections, submit certifications by manufacturer to Architect/Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.9 MANUFACTURER’S FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, require material or Product suppliers or manufacturers to furnish qualified staff personnel to observe site conditions and to initiate instructions when necessary.

B. Report observations and site decisions or instructions that are supplemental or contrary to manufacturer’s written instructions.

1.10 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.11 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents.

C. Provide interchangeable components of same manufacture for components being replaced.

1.12 DELIVERY, HANDLING, STORAGE, AND PROTECTION

A. Deliver, handle, store, and protect Products in accordance with manufacturer's instructions.

1.13 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for manufacturers not named.

1.14 SUBSTITUTIONS

A. Architect/Engineer will consider requests for Substitutions up to 10 days prior to bid date.

B. Post-bid substitutions will only be considered when Product becomes unavailable through no fault of Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. Submit two copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

1.15 STARTING OF SYSTEMS

A. Provide three days notification prior to start-up of each item.

B. Ensure each piece of equipment or system is ready for operation.

C. Execute start-up under supervision of responsible persons in accordance with manufacturer’s instructions.

D. Prior to Substantial Completion walkthrough, submit written startup report stating equipment or system has been properly installed and is functioning correctly.

1.16 DEMONSTRATION AND INSTRUCTIONS

A. Refer to individual sections for additional training requirements.

B. Provide a four (4) hour training session onsite to demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of final review.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within nine months of Substantial Completion.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.

1.17 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of Contract Documents to be utilized for record documents.

B. Record actual revisions to the Work. Record information concurrent with construction progress.

C. Specifications: Legibly mark and record at each Product section description of actual Products installed.

D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.

E. Digital Record: Update digital contract drawings to reflect As-Built conditions. Provide compact disk with updated drawings, in AutoCAD format, with closeout documents.

F. Submit documents to Architect/Engineer prior to Substantial Completion review.

1.18 OPERATION AND MAINTENANCE DATA

A. Submit four (4) sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE MANUALS" and title of project.

C. Internally subdivide binder contents with permanent page dividers, logically organized, with tab titles legibly printed under reinforced laminated plastic tabs.

D. Contents:
1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, subcontractors, and major equipment suppliers.
2. Part 2: Summary page of project warrantees (include extended warrantee information where required on individual products) and warrantee documents.
3. Part 3: Operation and maintenance instructions, arranged by system.
4. Part 4: Project documents and certificates.

1.19 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed by Owner; obtain receipt prior to final payment.

1.20 WARRANTIES

A. Provide one year materials and labor warrantee on all work. Provide additional warrantees as required by individual product sections.

B. Provide signed warrantee letters in each O&M Manual.

C. Execute and assemble transferable warranty documents from subcontractors, suppliers, and manufacturers.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

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1.3 RELATED SECTIONS 1
1.4 INCLUDED SCOPE 1
PART 2 PRODUCTS 2
2.1 COMBINATION STARTER/DISCONNECTS: 2
PART 3 EXECUTION 2
3.1 INSTALLATION: 2

1.2 SUBMITTALS

A. Product Data: Mechanical Equipment: Submit for mechanical identification manufacturers literature for each product required.

1.3 RELATED SECTIONS

A. Division 23 Sections.

1.4 INCLUDED SCOPE

A. All 3 phase motors in drawings shall be provided with motor starters unless powered via a VFD.

B. Where a starter is required and the electrical contractor will be providing an enclosed disconnect, the mechanical contractor shall coordinate with the electrical contractor to provide combination starter/disconnects.

C. The electrical provisions of mechanical work includes the following:
   1. Motors.
      a. Motors shall be high efficiency type rated for the intended use and installed environment.
      b. Motors nameplates shall clearly indicate Full Load Amperage.
      c. Motors powered by VFD’s shall be rated for inverter duty.

D. Additional work:
   1. Control interlock wiring of mechanical equipment.
   2. Control switch, pilot lights, interlocks and similar devices.
   3. Electrical heating coils and similar elements in mechanical equipment.
   4. Electrical work specified as mechanical work in the HVAC control system.

PART 2 PRODUCTS

2.1 COMBINATION STARTER/DISCONNECTS:

A. Manufacturers:
1. Schneider Electric (Square D)
2. Eaton
3. Pre-approved alternates

B. Configuration
1. NEMA Combination Starter, Type S, non-fusible lockable disconnect, Size to accommodate load, 24VAC control coil,
2. Enclosure:
a. Interior installations: NEMA 1
b. Exterior installations: NEMA 3R
3. Accessories:
a. Phase Loss/Imbalance/Under-voltage protection
b. Pilot light (Green=Run)
c. Hand-Off-Auto Switch
d. Control Circuit Transformer
e. Two (2) auxiliary contacts for EMS control

PART 3 EXECUTION

3.1 INSTALLATION:

A. Starter heaters shall be replaced and/or adjusted as needed to correspond to the FLA of the powered motor.

B. Verify electrical systems are installed and power is energized.

C. Utilize safety devices while working around energized components.

D. Install wiring and devices in accordance with NEC and Division 26 Specifications.

E. Test and verify operation after installation.

END OF SECTION

SECTION 23 05 14

VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.1 SECTION INCLUDES

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1.1 SECTION INCLUDES 1
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1.3 SUBMITTALS 1
1.4 CLOSEOUT SUBMITTALS 2
1.5 QUALITY ASSURANCE 2
1.6 QUALIFICATIONS 2
1.7 DELIVERY, STORAGE, AND HANDLING 3
1.8 WARRANTY 3
PART 2 PRODUCTS 3
2.1 MANUFACTURERS (VCS): 3
2.2 ADJUSTABLE FREQUENCY DRIVES 3
2.3 BYPASS AND DISCONNECT 7
2.4 INTERLOCK TERMINAL STRIP 7
2.5 ADDITIONAL FEATURES 8
PART 3 EXECUTION 8
3.1 EXAMINATION 8
3.2 INSTALLATION 8
3.3 DRIVE START-UP 9
3.4 PRODUCT SUPPORT 9

1.2 SUMMARY

A. Section Includes:
1. Adjustable Frequency Drives.
2. Bypass and disconnect.

B. General:
1. Provide a complete Adjustable Frequency motor Drive (AFD) consisting of a pulse width modulated (PWM) inverter designed for use on a standard NEMA Design B induction motor, designed specifically for variable torque applications.
2. The drive and all necessary controls as herein specified shall be supplied by the drive manufacturer.

1.3 SUBMITTALS

A. Product Data, Submit the following:

1. Published Literature: Indicate dimensions, capacities, ratings, and electrical characteristics and connection requirements.
2. Electrical Requirements: Power supply wiring including wiring diagrams for control wiring. Indicate factory installed and field installed wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit instructions for maintenance and wiring diagrams.

1.5 QUALITY ASSURANCE

A. Referenced Standards:
1. Institute of Electrical and Electronic Engineers (IEEE)
a. Standard 519-1992, IEEE Guide for Harmonic Content and Control.
2. Underwriters laboratories
a. UL508C
3. National Electrical Manufacturer's Association (NEMA)
a. ICS 7.0, AC Adjustable Speed Drives
4. IEC 16800 Parts 1 and 2

B. Testing:
1. All printed circuit boards shall be completely tested and burned-in before being assembled into the completed AFD. The AFD shall then be subjected to a preliminary functional test, burn-in, and computerized final test. The burn-in shall be at 104 deg F, at full rated load, on a motor. Drive input power shall be continuously cycled for maximum stress and thermal variation.
2. All testing and manufacturing procedures shall be ISO 9001 certified.

C. Manufacturer:
1. The manufacturer shall not have less than five (5) years of experience in the manufacture of drives and shall be ISO 9001 certified.

D. Drives:
1. The drive shall be manufactured in the United States and shall be UL listed as a complete assembly with options and CSA approved (up to 125 hp).

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years experience. The drive manufacturer shall have an existing independent service organization.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Accept units and components on site in factory protective containers, with factory shipping skids. Inspect for damage.

B. Protect units from weather and construction traffic by storing in dry, roofed location.

1.8 WARRANTY

A. Furnish three year manufacturer labor and materials warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS (VCS):

A. ABB

B. Danfoss

C. Pre-approved alternate

2.2 ADJUSTABLE FREQUENCY DRIVES

A. The adjustable frequency drives (AFDs) shall be solid state, with a Pulse Width Modulated (PWM) output. The AFD package as specified herein shall be enclosed in a NEMA 1 enclosure, completely assembled and tested by the manufacturer. The AFD shall employ a full wave rectifier (to prevent input line notching), Integral Line Reactor(s), Capacitors, and Insulated Gate Bipolar Transistors (IGBT's) as the output switching device.

B. The drive efficiency shall be 97% or better at full speed and full load. Fundamental power factor shall be 0.98 at all speeds and loads.

C. Products shall provide:
1. Input 208 or 480 VAC (as indicated in schedule) +/- 10%, 3 phase, 48-63 Hz.
2. The overvoltage trip level shall be 30% over nominal, and the undervoltage trip level shall be 35% over the nominal voltage as a minimum.
3. Output Frequency 0 to 250 Hz.
4. Environmental operating conditions: 0 to 40°C, 0 to 3300 feet above sea level, less than 95% humidity, non-condensing.

D. Enclosure:
1. Provide manufacturer's enclosure to meet the following:
2. Indoor AFD's: NEMA 1
a. Mount on wall or provide unistrut support framing.

3. Indoor AFD's with overhead piping: NEMA 12
   a. Provide mounting legs for all AFD's larger than 10HP
4. Outdoor AFD's: NEMA 3R
   a. Provide mounting legs for all AFD's larger than 10HP

E. Drives shall have the following standard features:
1. All AFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad is to be used for local control, for setting all parameters, and for stepping through the displays and menus. The keypad shall be removable, capable of remote mounting, and shall have it's own non-volatile memory. The keypad shall allow for uploading and downloading of parameter settings as an aid for start-up of multiple AFDs.
2. The keypad shall include Hand-Off-Auto membrane selections. When in "Hand", the AFD will be started and the speed will be controlled from the up/down arrows. When in "Off", the AFD will be stopped. When in "Auto", the AFD will start via an external contact closure and the AFD speed will be controlled via an external speed reference. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Auto" and "Hand" modes and vice-versa.
3. The AFDs shall utilize pre-programmed application macro's specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time.
4. The AFD shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable.
5. The AFD shall be capable of starting into a rotating load (forward or reverse) and accelerate or decelerate to setpoint without safety tripping or component damage (flying start). The AFD shall also be capable of DC injection braking at start to stop a reverse spinning motor prior to ramp.
6. The AFD shall be equipped with an automatic extended control power loss ridethrough circuit, which will utilize the inertia of the load to keep the drive powered. Minimum power loss ride-through shall be one-cycle, based on full load and no inertia. Typical control power loss ride-through for a fan load shall be 2 seconds minimum.
7. If the input reference (4-20mA or 2-10V) is lost, the AFD shall give the user the option of either:
   a. stopping and displaying a fault
   b. running at a programmable preset speed
   c. hold the AFD speed based on the last good reference received
   d. cause a warning to be issued, as selected by the user.
8. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus.
9. The customer terminal strip shall be isolated from the line and ground.
10. The drive shall employ current limit circuits to provide trip free operation:

a. The Slow Current Regulation limit circuit shall be adjustable to 150% (minimum) of the AFD's variable torque current rating. This adjustment shall be made via the keypad, and shall be displayed in actual amps, and not as percent of full load.
b. The Current Switch-off limit shall be fixed at 350% (minimum, instantaneous) of the AFD's variable torque current rating.

11. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430-150 for 4-pole motors.
12. The AFD shall have an integral Line Reactor(s) to reduce the harmonics to the power line and to increase the power factor. The minimum impedance shall be 3%.
13. The VFD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay output shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
14. The AFD shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

F. All AFDs to have the following adjustments:
1. Two (2) programmable critical frequency lockout ranges to prevent the AFD from operating the load continuously at an unstable speed.
2. PID Setpoint controller shall be standard in the drive, allowing a pressure or flow signal to be connected to the AFD, using the microprocessor in the AFD for the closed loop control. The AFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The auxiliary power supply shall have overload and over current protection. The PID setpoint shall be adjustable from the AFD keypad, analog inputs, or over the communications bus.
3. Two (2) programmable analog inputs shall accept a current or voltage signal for speed reference, or for reference and actual (feedback) signals for PID controller. Analog inputs shall include a filter; programmable from 0.01 to 10 seconds to remove any oscillation in the input signal. The minimum and maximum values (gain and offset) shall be adjustable within the range of 0 - 20 ma and 0 - 10 Volts. Additionally, the reference must be able to be scaled so that maximum reference can represent a frequency less than 60 Hz, without lowering the drive maximum frequency below 60 Hz. Process variables shall be modifiable by math functions such as multiplication and division between the two signals (fan tracking), high/low select, as well as inverted follower.
4. Five (5) programmable digital inputs for maximum flexibility in interfacing with external devices. One digital input is to be utilized as a customer safety connection point for fire, freeze, and smoke interlocks (Enable). When normally closed contact(s) opens, the AFD shall coast to stop in any mode of operation.

5. One (1) programmable analog output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, and other data.
6. Two (2) programmable digital relay outputs. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; Continuous current rating 2 amps RMS. Outputs shall be true form C type contacts; open collector outputs are not acceptable. Relays shall be programmable on and off delay times.
7. Seven (7) programmable preset speeds.
8. Two independently adjustable accel and decel ramps. These ramp times shall be adjustable from 1 to 1800 seconds.
9. The AFD shall Ramp or Coast to a stop, as selected by the user.

G. The following operating information displays shall be standard on the AFD digital display. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of two operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
1. Output Frequency
2. Motor Speed (RPM, %, or Engineering units)
3. Motor Current
4. Calculated Motor Torque
5. Calculated Motor Power (kW)
6. DC Bus Voltage
7. Output Voltage
8. Heatsink Temperature (deg C or deg F)
9. Analog Input Values
10. Analog Output Value
11. Keypad Reference Values
12. Elapsed Time Meter (resettable)
13. kWh meter (resettable)
14. mWh meter
15. Digital input status
16. Digital output status
17. Engineering units (CFM, GPM, etc.)

H. The AFD shall have the following protection circuits. In the case of a protective trip, the drive shall stop, and announce the fault condition in complete words (alphanumeric codes are not acceptable).
1. Overcurrent trip 350% instantaneous (170% RMS) of the AFD's variable torque current rating.
2. Overvoltage trip 130% of the AFD's rated voltage
3. Undervoltage trip 65% of the AFD's rated voltage
4. Heatsink overtemperature +90° C
5. Ground Fault either running or at start
6. Adaptable Electronic Motor Overload (I2t). The Electronic Motor Overload protection shall protect the motor based on speed, load curve, and

external fan parameter. Circuits, which are not speed dependant, are unacceptable. The electronic motor overload protection shall be UL Listed for this function.

I. Speed Command Input shall be via:
1. Keypad.
2. Two Analog inputs, each capable of accepting a 0-20mA, 4-20mA, 0-10V, 2-10V signal.
3. Floating point input shall accept a three-wire input from a Dwyer Photohelic (or equivalent type) instrument.

J. Noise
1. Provide a common mode choke on the VFD output for common mode noise abatement.

2.3 BYPASS AND DISCONNECT

A. The bypass and disconnect shall be furnished and mounted by the drive manufacturer. All components shall be UL Listed by the drive manufacturer as a complete assembly.

B. A complete factory wired and tested bypass system consisting of an output contactor and bypass contactor. Overload protection shall be provided in both drive and bypass modes. A three contactor bypass is NOT acceptable.

C. The following operators shall be provided:
1. Bypass Hand-Off-Auto
2. Drive mode selector
3. Bypass mode selector
4. Bypass fault reset

D. The following indicating lights (LED type) shall be provided.
1. Power-on
2. External fault
3. Drive mode selected
4. Bypass mode selected
5. Drive running
6. Bypass running
7. Drive fault
8. Bypass fault
9. Automatic transfer to bypass selected

2.4 INTERLOCK TERMINAL STRIP

A. Provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in Hand, Auto, or Bypass modes.

B. The following relay (form C) outputs from the bypass shall be provided:

1. Drive run
2. Bypass run
3. Drive fault
4. Bypass fault (motor overload or underload (broken belt))

2.5 ADDITIONAL FEATURES

A. Automatic or manual bypass (field selectable)

B. Manual or automatic bypass fault (field selectable)

C. Dedicated digital input that will transfer motor from AFD mode to bypass mode upon dry contact closure.

D. Door interlocked, pad-lockable circuit breaker which will disconnect all input power from the drive and all internally mounted options.

E. Fast acting semi-conductor fuses exclusive to the AFD – fast acting semiconductor fuses allow the AFD to disconnect from the line prior to clearing upstream branch circuit protection, maintaining bypass capability. Bypass designs which have no such fuses, or that incorporate fuses common to both the AFD and the bypass will not be accepted.

F. Class 10 or 20 (selectable) electronic motor overload protection shall be included in the microprocessor bypass to protect the motor in bypass mode.

PART 3 EXECUTION

3.1 EXAMINATION

A. Coordinate drive location in mechanical space. Provide adequate NEC clearances. Do not interfere with maintenance access to other equipment.

B. Locate drives and associated equipment as indicated in the drawings. Position variable frequency drives with sufficient clearance for normal service and maintenance, including clearance for component replacement. If equipment supplied is not in agreement dimensionally with equipment specified and shown on plan notify Engineer in writing.

3.2 INSTALLATION

A. Install components and controls required for operation, in accordance with variable frequency drive, manufacturer's instructions and with recognized industry practices, to ensure that variable frequency drive equipment complies with requirements and serves intended purposes.

B. Power wiring shall be completed by the electrical contractor. The contractor shall complete all wiring in accordance with the recommendations of the AFD manufacturer as outlined in the installation manual.

C. Repair damaged and abraded factory finish with matching touch-up paint.

D. Grounding: Provide positive equipment ground for equipment and components.

E. Affix engraved plastic label to drive near disconnect that states “Disconnect switch does not remove incoming power”. Label to be red with 1/2” high black lettering.

3.3 DRIVE START-UP

A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the engineer.

3.4 PRODUCT SUPPORT

A. Factory trained application engineering and service personnel that are thoroughly familiar with the drive products offered shall be locally available at both the specifying and installation locations.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 RELATED SECTIONS 1
1.3 REFERENCES 1
1.4 SUBMITTALS 2
1.5 QUALITY ASSURANCE 2
1.6 QUALIFICATIONS 2
1.7 DELIVERY, STORAGE, AND HANDLING 2
1.8 FIELD MEASUREMENTS 3
PART 2 PRODUCTS 3
2.1 FINISHES: 3
2.2 PIPE HANGERS AND SUPPORTS 3
2.3 ACCESSORIES 3
2.4 ANCHORS 4
2.5 FORMED STEEL CHANNEL 4
PART 3 EXECUTION 4
3.1 INSTALLATION - PIPE HANGERS AND SUPPORTS 4
3.2 PIPE HANGER SPACING SCHEDULE 4
3.3 PROTECTION OF FINISHED WORK 5

1.2 RELATED SECTIONS

A. Section 23 05 48 - Vibration Controls for HVAC Piping and Equipment: Product and execution requirements for vibration isolators.

B. Section 23 05 01 - Pipework: Execution requirements for placement of hangers and supports specified by this section.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B31.1 - Power Piping.
2. ASME B31.9 - Building Services Piping.

B. ASTM International:
1. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Method for Fire Tests of Building Construction and Materials.
3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

C. American Welding Society:

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

D. FM Global:
1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved By Factory Mutual Research For Property Conservation.

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 69 - Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

F. Intertek Testing Services (Warnock Hersey Listed):
1. WH - Certification Listings.

1.4 SUBMITTALS

A. Section 23 05 00 – Common Work Results – Mechanical: Submittal procedures.

B. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

C. Product Data:
1. Hangers and Supports: Submit manufacturers catalog data including load capacity.
2. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

D. Manufacturer's Installation Instructions:
1. Hangers and Supports: Submit special procedures and assembly of components.
2. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years experience.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 00 – Common Work Results – Mechanical: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 FINISHES:

A. Products and associated hardware finishes shall be as follows:
1. Interior: zinc electroplated or primed
2. Outdoors: Hot Dipped Galvanized
3. Cooling tower yards and projects East of I-95: Stainless Steel

2.2 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Anvil International
2. Piping Technology and Products (PTP)
3. Bergen Patterson
4. Cooper B-Line
5. PHD Manufacturing
6. Hilti

B. Product Required:
1. Conform to MSS SP69.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 inches and Larger: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Vertical Support: Steel riser clamp.
6. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
7. Copper Pipe Support: Copper-plated, carbon steel ring.

2.3 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

2.4 ANCHORS

A. 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.

2.5 FORMED STEEL CHANNEL

A. Manufacturers:

B. Allied Tube & Conduit Corp.

C. B-Line Systems

D. Midland Ross Corporation, Electrical Products Division

E. Unistrut Corp

F. Product Description: Galvanized, 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 EXECUTION

3.1 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with MSS SP 69.

B. Support horizontal piping as scheduled.

C. Install hangers with 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.

F. Support vertical piping at every floor.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Provide copper plated hangers and supports for copper piping.

J. Design hangers for pipe movement without disengagement of supported pipe.

K. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

L. Provide clearance in hangers and from structure and other equipment for installation of insulation.

3.2 PIPE HANGER SPACING SCHEDULE

	Pipe Size	Spacing	Hanger Rod
Steel Pipe	1/2 inch	6 feet, 0 inches	3/8 inch
	3/4 to 1-1/4 inch	8 feet, 0 inches	3/8 inch
	1-1/2, 2 inch	10 feet, 0 inches	3/8 inch
	2-1/2 inch	10 feet, 0 inches	1/2 inch
	3 inch	12 feet, 0 inches	1/2 inch
	4 inch	14 feet, 0 inches	5/8 inch
	5 inch	16 feet, 0 inches	5/8 inch
	6 inch	16 feet, 0 inches	3/4 inch
	8 to12 inch	16 feet, 0 inches	7/8 inch

	Pipe Size	Spacing	Hanger Rod
Copper Pipe	1/2 inch	6 feet, 0 inches	3/8 inch
	3/4 inch, 1 inch	8 feet, 0 inches	3/8 inch
	1-1/4 to 2 inch	10 feet, 0 inches	3/8 inch
	2-1/2 inch to 5 inch	12 feet, 0 inches	1/2 inch
	6 inch and above	14 feet, 0 inches	3/4 inch

3.3 PROTECTION OF FINISHED WORK

A. Protect adjacent surfaces from damage by installation.

END OF SECTION

SECTION 23 05 48

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 RELATED SECTIONS: 1
1.3 REFERENCES 1
1.4 SUBMITTALS 2
1.5 QUALITY ASSURANCE 2
1.6 QUALIFICATIONS 2
1.7 FIELD MEASUREMENTS 2
PART 2 PRODUCTS 2
2.1 INERTIA BASES 2
2.2 SPRING TYPE VIBRATION ISOLATORS 3
PART 3 EXECUTION 3
3.1 EXAMINATION 3
3.2 EXISTING WORK 3
3.3 INSTALLATION 3
3.4 FIELD QUALITY CONTROL 4
3.5 EQUIPMENT ISOLATION SCHEDULE 4

1.2 RELATED SECTIONS:

A. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports.

1.3 REFERENCES

A. American National Standards Institute:
1. ANSI S1.4 - Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.
5. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

B. American Society of Heating, Refrigerating and Air-Conditioning and Refrigeration Institute (ASHRAE):
1. ASHRAE Handbook - HVAC Applications.

C. 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 Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
3. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.

1.4 SUBMITTALS

A. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each. Indicate assembly, materials, thickness, dimensional data, pressure losses, acoustical performance, layout, and connection details for sound attenuation products fabricated for this project.

B. Product Data: Submit schedule of vibration isolator type with location and load on each. Submit catalog information indicating, materials, dimensional data, pressure losses, and acoustical performance for standard sound attenuation products.

C. Manufacturer's Installation Instructions: Submit special procedures and setting dimensions. Indicate installation requirements maintaining integrity of sound isolation.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI S1.13, ANSI S12.36 standards and recommendations of ASHRAE 68.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years experience.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 INERTIA BASES

A. Manufacturers:
1. Mason Industries Model BMK.
2. Kinetics Noise Control, Model CIB-L
3. Equivalent

B. Type “CIB” - Concrete Inertia Bases:
1. Mass: Minimum of 1.5 times weight of isolated equipment.
2. Size: Adequate to properly absorb inertial forces and weight of pump and suction diffuser. Suction diffuser shall be supported by inertia base.
3. Construction:

a. Indoor: Painted structured steel channel perimeter frame, with gusset brackets and anchor bolts, structural reinforcement, concrete filled.

4. Reinforcement: Welded in 0.5 in diameter reinforcing bars a minimum of 8 inches on center running both ways, 1.5 in above bottom.
5. Isolator Brackets: Integral to reduce the mounting height of equipment.
6. Connecting Point: Reinforced to connect isolators to base.
7. Concrete: Reinforced 3,000 psi concrete.
8. Thickness: largest of:
   a. 10 percent of the longest span between isolators
   b. 6 inches
   c. Manufacturer's recommendation.

2.2 SPRING TYPE VIBRATION ISOLATORS

A. Manufacturers:
   1. Mason Industries
   2. Kinetics Noise Control
   3. Unger Technologies
   4. Korfund

B. Construction:
   1. Indoor: painted spring assembly with cadmium plated hardware.

C. Type "OS" - Open Spring Isolators:
   1. Spring Isolators:
      a. Code: Color code springs for load carrying capacity.
   2. Springs: Minimum horizontal stiffness equal to 75 percent vertical stiffness, with working deflection between 0.3 and 0.6 of maximum deflection.
   3. Spring Mounts: Furnish with leveling devices, minimum 0.25 inch thick neoprene sound pads.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify equipment, ductwork and piping is installed before work in this section is started.

3.2 EXISTING WORK

A. Provide access to existing piping and ductwork and other installations remaining active and requiring access.

3.3 INSTALLATION

A. Install isolation for motor driven equipment.

B. Bases:
   1. Set concrete inertia bases for 1 inch clearance between concrete floor and base.

C. Adjust equipment level.

D. Install spring hangers without binding.

E. 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.

F. Support piping connections to isolated equipment resiliently to nearest flexible pipe connector.

3.4 FIELD QUALITY CONTROL

A. Inspect isolated equipment after installation and confirm proper isolation.

3.5 EQUIPMENT ISOLATION SCHEDULE

Equipment Type	Isolator Type
HVAC Pumps	
Over 10 hp	CIB-OS

END OF SECTION

SECTION 23 05 54

MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 SUBMITTALS 1
PART 2 PRODUCTS 1
2.1 MECHANICAL IDENTIFICATION 1
PART 3 EXECUTION 2
3.1 INSTALLATION - MECHANICAL IDENTIFICATION 2
3.2 INSTALLATION – MECHANICAL WARRANTY SUMMARY NAMEPLATES 2

1.2 SUBMITTALS

A. Shop Drawings: Submit for mechanical identification 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.

B. Product Data: Mechanical Identification: Submit for mechanical identification manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.1 MECHANICAL IDENTIFICATION

A. Plastic Identification Nameplates: Laminated three-layer plastic with engraved black letters on light background color. Nameplate height to be 2” for small equipment, 3” for large equipment.

B. Plastic Warranty Nameplates: Laminated three-layer plastic with engraved black letters on light background color. Nameplate height as required to accommodate information.

C. Brass Valve Tags: Stamped 19GA (40 mil) brass with 1/2” high black filled lettering, 1-1/2 inches diameter. Brass beaded chain 4-1/2” long.

D. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener. Color and lettering to conform to ASME A13.1.

E. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Color and Lettering: Conform to ASME A13.1.

PART 3 EXECUTION

3.1 INSTALLATION - MECHANICAL IDENTIFICATION

A. Plastic Nameplates: Install plastic nameplates indicating equipment ID with adhesive suitable for indoor or exterior use on all mechanical equipment.

B. Brass Valve Tags: Install valve tags with valve ID with corrosion resistant metal chain on all valves. Valve Chart: Provide laminated and framed valve schedule in mechanical room. Schedule to indicate Valve ID, purpose, and location if not immediately apparent.

C. Plastic Pipe Markers: Shall be installed to indicate fluid being conveyed and flow direction.
   1. Install markers every 10’ on mains, at all branch take-offs and adjacent to valves and cocks.
   2. Apply to all exposed pipes, pipes behind removable tile ceiling, pipes in concealed but accessible locations, such as behind access panels and at least once in each room.
   3. Install pipe marker using pressure sensitive adhesive in accordance with the manufacturer's directions. The marker shall completely cover the circumference of the pipe and overlap itself minimum 1”.

3.2 INSTALLATION – MECHANICAL WARRANTY SUMMARY NAMEPLATES

A. Plastic Tags: Install plastic tags summarizing the following:
   1. Warranty start date and end date
   2. Extent of warranty (I.E. parts only)
   3. Contractor Name and Phone Number

B. Adhere tag with two-sided tape to all equipment in a visible location.

END OF SECTION

SECTION 23 05 93.1

CONTRACTOR ASSISTED TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 SUMMARY 1
1.3 RELATED DOCUMENTS 1
1.4 DESCRIPTION OF WORK 1
PART 2 PRODUCTS 1
PART 3 EXECUTION 2
3.1 OTHER PROCEDURES 2

1.2 SUMMARY

A. Section Includes:
1. Contractor assisted testing adjusting, and balancing of hydronic systems.

1.3 RELATED DOCUMENTS

A. Section 23 05 93.2 - Owner Furnished Testing, Adjusting, and Balancing for HVAC

1.4 DESCRIPTION OF WORK

A. Provide written notification of the construction progress to the Owner’s TAB agent a minimum of 2 weeks before TAB work is to be performed.

B. Provide all labor and materials to assist the Owner’s test and balance agent to complete the TAB work.

C. Contractor shall deliver one set of approved submittals to Owner test and balance contractor.

D. Any labor and material cost incurred by Owner Test and Balance Contractor due to lack of completed work, lack of cooperation, or inoperable equipment shall be back-charged to the Contractor.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 OTHER PROCEDURES

A. Prior to requesting Owner Test and Balance, the Contractor shall:
1. Inspect installation of all systems and equipment.
2. Confirm proper and safe operation of all equipment.
3. Replace all strainers.

B. Provide labor and materials required by Owner's Test and Balance Contractor as necessary to obtain fully working systems as specified.

C. Should the systems require retesting due to fault of contractor (as deemed by the engineer) then the retest work shall be at the expense of the Contractor.

END OF SECTION

SECTION 23 05 93.2

OWNER FURNISHED TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 SUMMARY 1
1.3 SUBMITTALS 1
1.4 QUALITY ASSURANCE 1
PART 2 PRODUCTS 2
PART 3 EXECUTION 2
3.1 SENSOR CALIBRATION 2
3.2 EXAMINATION 2
3.3 INSTALLATION TOLERANCES 2
3.4 WATER SYSTEM PROCEDURE 2
3.5 FIELD QUALITY CONTROL 2

1.2 SUMMARY

A. Section Includes:
1. Owner furnished testing, adjusting and balancing of hydronic systems.

1.3 SUBMITTALS

A. Deficiencies Reports: Provide periodically as issues are identified. All Deficiencies shall be resolved prior to issuing final report.

B. Draft Reports: Submit for review prior to final acceptance of Project.

C. Test Reports:
1. Deficiencies: Include a list of deficiencies found and how they were resolved. The final report shall NOT contain any unresolved deficiencies.
2. Printed: Submit four (4) copies of bound printed documentation in letter size format, with table of contents page and tabs, and cover identification. Include reduced scale drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
3. Electronic: Submit electronic PDF version to Owner and Engineer.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with AABC standards.

B. Report Forms: AABC MN-1 National Standards for Total System Balance forms, Forms prepared following ASHRAE 111, or NEBB forms.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 SENSOR CALIBRATION

A. Calibrate all sensors to the following tolerances:
   1. Water temperature sensors to within 0.5 deg F of actual.
   2. Pressure sensors to within 5% of actual.

3.2 EXAMINATION

A. Before starting work, verify systems are complete and operable.

B. Report defects, deficiencies, or abnormal conditions in mechanical systems preventing system balance.

C. Beginning of work means acceptance of existing conditions.

3.3 INSTALLATION TOLERANCES

A. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.4 WATER SYSTEM PROCEDURE

A. Adjust water systems after air balancing to deliver design quantities within previously stated tolerances.

B. Use calibrated fittings or equipment and pressure gages to determine flow rates for system balance. Where not installed, base flow balance on temperature difference across heat transfer elements.

C. Change system balance with automatic control valves fully open to heat transfer elements.

D. Change adjustment of water distribution systems by means of balancing cocks, valves, and fittings.

3.5 FIELD QUALITY CONTROL

A. Verify recorded data represents actually measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices. Set and lock memory stops.

C. Provide spot checking in the presence of the engineer. If any test data is found to be more than 5% from published TAB report, the TAB report shall be rejected and the contractor shall revise and reissue the report.

END OF SECTION

SECTION 23 07 13

THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 RELATED SECTIONS: 1
1.3 REFERENCES 1
1.4 SUBMITTALS 2
1.5 QUALITY ASSURANCE 2
1.6 QUALIFICATIONS 2
1.7 DELIVERY, STORAGE, AND HANDLING 2
1.8 ENVIRONMENTAL REQUIREMENTS 2
1.9 FIELD MEASUREMENTS 3
PART 2 PRODUCTS 3
2.1 PIPE INSULATION 3
2.2 EQUIPMENT INSULATION 3
2.3 JACKETING: 3
PART 3 EXECUTION 4
3.1 EXAMINATION 4
3.2 PREPARATION 4
3.3 INSTALLATION – PIPING 4
3.4 INSTALLATION – JACKETING: 4
3.5 INSTALLATION – EQUIPMENT INSULATION 4
3.6 INSTALLATION – PUMP INSULATION 5
3.7 CLEANING 5
3.8 REPAIR 5
3.9 PROTECTION OF FINISHED WORK 5
3.10 INSULATION SCHEDULES 5

1.2 RELATED SECTIONS:

A. Section 23 05 01 – Pipework: Product and execution requirements for heating and cooling piping.

B. Section 23 31 14 - Ducts: Product and execution requirements for ductwork.

1.3 REFERENCES

A. ASTM International:
1. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
2. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
4. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.

5. ASTM E84 - Surface Burning Characteristics of Building Materials.
6. ASTM E96 - Water Vapor Transmission of Materials.

B. National Fire Protection Association:
1. NFPA 255 - Surface Burning Characteristics of Building Materials.

C. Sheet Metal and Air Conditioning Contractors' National Association
1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

D. Underwriters Laboratories
1. UL 723 - Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Section 23 05 01 – General Mechanical Requirements: Submittal procedures.

B. Product Data: Submit product description, list of materials and thickness for each service or equipment scheduled and locations.

C. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions for each product type.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years experience.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 – General Mechanical Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not insulate damp or wet systems.

B. Do not install insulation and related products when ambient temperatures and conditions are not meeting manufacturer’s requirements.

C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 PIPE INSULATION

A. Manufacturers:
1. Childers Products Co.
2. Johns Manville
3. Owens Corning
4. Pittsburgh Corning Corp.
5. Armacell
6. K-Flex USA

B. Cellular Foam (Armaflex): ASTM C534; flexible, cellular elastomeric, molded or sheet.
1. k (ksi) Value: 0.27 at 75 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor retarder adhesive.

C. Cellular Glass (Foamglas): ASTM C552;
1. k (ksi) Value: 0.29 at 75 degrees F.
2. 8.0 lb/cu ft density
3. Vapor Retarder Jacket: ASJ jacket applied by the manufacturer to ASTMC-1136 with integral flap for sealing joint.

2.2 EQUIPMENT INSULATION

A. Manufacturers:
1. Childers Products Co.
2. Johns Manville
3. Owens Corning
4. Pittsburgh Corning Corp.

B. Cellular Foam (Armaflex): ASTM C534; flexible, cellular elastomeric, molded or sheet.
1. k (ksi) Value: 0.27 at 75 degrees F.
2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor retarder adhesive.

C. Cellular Glass (Foamglas): ASTM C552; 'k' factor of 0.29 at 75 degrees F; 8.0 lb/cu ft density. Field applied fiber reinforced mastic vapor barrier.

2.3 JACKETING:

A. PVC Plastic: One piece molded type fitting covers and sheet material.
1. Color as follows:
a. HWR – Red
b. HWS – Dark Red
c. Other Services - White

2. Thickness: 10 mil.
3. Connections: Pressure sensitive color matching vinyl tape.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping and equipment are tested and ready for installation.

3.2 PREPARATION

A. Surfaces to be insulated must be dry and free from surface rust and debris.

B. Use a wire brush to remove any surface rust.

3.3 INSTALLATION – PIPING

A. Continue insulation and vapor barrier through penetrations.

B. Locate insulation and cover seams in least visible locations.

C. Neatly finish insulation at supports, protrusions, and interruptions.

D. Insulate complete system of pipes conveying fluids below ambient temperature.

E. Hot Fluid Piping (Fluid temperature above 100 deg F):
1. Insulate complete system.
2. Install standard jackets.

F. Install insert between support shield and piping on piping 2 inches diameter or larger. Fabricate of high density insulating material suitable for temperature, not less than 6 inches long.

3.4 INSTALLATION – JACKETING:

A. Insulate pipe, fittings, joints, and valves.

B. Finish with glass mesh reinforced vapor barrier cement or integral vapor barrier provided by insulation manufacturer.

C. Cover with specified jacket with seams located on bottom side of horizontal piping.
1. PVC Jacketing: Secure with nylon

3.5 INSTALLATION – EQUIPMENT INSULATION

A. Apply insulation to equipment by grooving, scoring, and beveling insulation. Secure insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

B. Fill joints, cracks, seams, and depressions with bedding compound to form uniform surface. On cold equipment, use vapor barrier cement.

C. Cover cellular foam insulation with glass mesh reinforced vapor barrier cement.

D. Mechanical Room Equipment - For equipment in mechanical equipment rooms or in finished spaces, finish with PVC jacket and fitting covers.

E. When equipment with insulation requires periodic opening for maintenance, repair, or cleaning, install insulation in to allow removal and replacement without damage.

3.6 INSTALLATION – PUMP INSULATION

A. Hot Water Pumps:
1. Insulate piping up to flexible connection or pump connecting flange. Impeller housing is not required to be insulated.

3.7 CLEANING

A. After work is complete, thoroughly clean the area of all insulation debris.

B. Remove mastic from adjacent surfaces.

3.8 REPAIR

A. After the Test and Balance agent completes their work, repair all insulation areas damaged.

3.9 PROTECTION OF FINISHED WORK

A. Insulation work shall be performed without applying undue stress or weight on installed piping and/or ductwork.

B. Contractor shall not allow workers to damage installed products.

3.10 INSULATION SCHEDULES

Pipe Insulation			
Service	*Insulation Type*	*Service Size*	*Thickness*
HWS&R Above Ground – Interior	Cellular Glass with PVC Jacketing	All	2”

END OF SECTION

SECTION 23 08 02

STARTUP OF MECHANICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

PART 1 GENERAL 1
1.1 SECTION INCLUDES 1
1.2 SUMMARY 1
1.3 QUALITY ASSURANCE 1
PART 2 PRODUCTS – Not used 2
PART 3 EXECUTION 2
3.1 EXAMINATION 2
3.2 STARTUP/COMMISSION 2
3.3 REPORTING 2
3.4 FORMS: 3

1.2 SUMMARY

A. Section Includes:
1. Start-up and commissioning of Mechanical equipment including:
a. VFD’s
b. Pumps
c. Boilers.
2. Where the specifications do not require manufacturer startup, the contractor may provide qualified technicians to startup the equipment. If qualified technicians are not available, the contractor shall coordinate with the equipment manufacturer to have a factory technician startup the equipment.
3. Provide all labor, materials, and services necessary to complete the startup, safety verification, and adjustments needed for the equipment to perform in accordance with the construction documents for the mechanical equipment provided and/or modified as part of this contract.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

B. Provide qualified, knowledgeable technicians to perform startup and commission work.

PART 2 PRODUCTS – Not used

PART 3 EXECUTION

3.1 EXAMINATION

A. Review the construction documents and applicable addenda and confirm the installation conforms to the documents. If needed, correct any deficiencies.

B. Review the installation for safety and notify the engineer of any unsafe conditions.

C. Review the accessibility to the equipment for maintenance purposes. Identify in writing, any items that may inhibit proper maintenance of the equipment.

3.2 STARTUP/COMMISSION

A. Perform the tasks contained on the following forms to insure that all work is completed and ready for test and balance. Indicate performance of each task by checking off items as they are completed. Where the forms require test results, provide the required data in a legible format (neatly handwritten is acceptable).

3.3 REPORTING

A. At the onset of construction, the Prime Contractor shall compile a startup/commissioning form notebook for all mechanical equipment requiring startup and commissioning on the project.

B. As equipment is installed and started, the contractor shall complete the appropriate forms and return them to the notebook. The contractor shall also fax a copy of the newly completed startup/commissioning forms to the engineer for review.

C. Prior to the processing of each pay application, the notebook will be reviewed by the engineer, and if necessary, the pay application will be adjusted to reflect the level of completion based upon equipment startup forms.

D. When a Test and Balance agent is designated for the project, the Prime Contractor shall provide an additional startup/commissioning notebook, containing copies of all current forms to the TAB contractor. The TAB agent shall then be copied with all subsequent startup/commissioning forms completed by the mechanical contractor.

E. Submit four copies (4) of the final, completed Startup Notebook with the closeout documentation for filing.

3.4 FORMS:

A. The contractor shall utilize the forms on the following pages for startup and commissioning system components. If equipment specific forms are not provided, the contractor shall provide their standard startup form.

GENERAL PROCEDURES

Pre-Start-Up Inspection:

_____ Verify proper equipment mounting and setting.
_____ Verify that control, interlock and power wiring is complete.
_____ Verify alignment of motors and drives.
_____ Verify proper piping connections and accessories.
_____ Verify that filter installation is completed.
_____ Verify that lubrication of equipment is completed.
_____ Verify that instrumentation installation is completed.
_____ Verify that hydronic systems have been cleaned and filled.
_____ Verify that strainers are clean.
_____ Verify that refrigeration systems have been leak tested, evacuated, and filled with refrigerant and fresh oil.

First Run Observations:

_____ Verify direction of rotation.
_____ Verify setting of safety controls including overload heater sizes.
_____ Verify function of safety and operating controls.
_____ Check motor loads against nameplate.
_____ Purge air from hydronic systems.

Systems Start-up Checklist:

_____ Rotating equipment has been aligned and belt drive tension has been adjusted.
_____ Installation has been cleaned up and temporary coverings, stickers and tags removed.
_____ Painted finishes have been touched up where damaged.
_____ Equipment and piping identification work has been completed with valve tags, schedules, and piping identification system.
_____ Fins on heat transfer coils have been combed out where damaged.
_____ Graphic operational data such as start/stop instructions, valve tag schedules, and piping identification schedules have been provided where needed.
_____ Water treatment program has been implemented, with initial qualitative testing of fluids in systems and domestic water supply, check of chemical feeder equipment, and instructions to chemical supplier as to results desired.

PUMP START-UP DATA SHEET

Equipment Tag: _____

Manufacturer	
Type	
Model No	
Serial No.	
Voltage	

Test Data

Motor Horsepower	
Running Amps	
Inlet Pressure	
Outlet Pressure	

Check List

Pump Rotation	
Inertia Base Springs Adjusted	
Pipe Flex Connections	
Suction Diffuser Strainer Removed	
Line Strainer Accessibility	
Clean Strainer	
Bearings Lubricated	
Bearing Noise	

Technician Name: _____

Company Name: _____

As the designated Equipment Startup Technician, I certify that this equipment is operating safely in accordance with the manufacturer's guidelines.

Technician Signature: _____

Date: _____

END OF SECTION

SECTION 23 09 33

VCSD ELECTRIC AND ELECTRONIC CONTROL SYSTEMS FOR HVAC

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

PART 1 GENERAL 1
1.1 SUMMARY 1
1.2 BID PROCEDURES 2
1.3 SCOPE – GENERAL 2
1.4 SCOPE – EXPAND EXISTING CONTROL SYSTEM 4
1.5 RELATED DOCUMENTS: 4
1.6 ABBREVIATIONS 4
1.7 REFERENCES 5
1.8 QUALITY ASSURANCE 6
1.9 SYSTEM PERFORMANCE 8
1.10 COORDINATION 8
1.11 SUBMITTALS 9
1.12 WARANTEE 11
1.13 BAS ACCEPTANCE PROCEDURE 11
1.14 TRAINING 12
1.15 CLOSEOUT PROCEDURES 12
PART 2 PRODUCTS 13
2.1 ACCEPTABLE MANUFACTURERS/SYSTEM INTEGRATORS: 13
2.2 SYSTEM TYPE: BACnet compatible, web-based product 13
2.3 COMMUNICATIONS 13
2.4 SOFTWARE KEY 14
2.5 SYSTEM APPLICATIONS 14
2.6 GRAPHICAL INTERFACE (LOCAL AND REMOTE) 17
2.7 CONTROL UNITS 17
2.8 POWER SUPPLIES, LINE FILTERING, AND ELECTRICAL ACCESSORIES 19
2.9 INPUT AND OUTPUT INTERFACE 20
2.10 ELECTRONIC SENSORS, INDICATORS, TRANSDUCERS AND COMPONENTS 21
2.11 ELECTRIC COMPONENTS 23
2.12 AUXILIARY CONTROL DEVICES 23
PART 3 EXECUTION 25
3.1 EXAMINATION 25
3.2 INSTALLATION 25
3.3 GRAPHICS 27
3.4 VERIFICATION 28
3.5 DEMONSTRATION 28

B. SUMMARY

1. This section defines the basic materials and methods and minimum equipment and performance requirements for the Building Automation System (BAS) in order to provide the functions necessary for control of the mechanical and other specified systems on this project.
2. The implied and stated intent of the drawings and specifications is to establish minimum acceptable quality standards for device-level integration of material and equipment as well as workmanship and to provide a complete and operable BAS.
3. The drawings are diagrammatic intending to show a workable general arrangement and location of components and are not necessarily complete or rigid in all details.

1.2 BID PROCEDURES

A. The existing site BAS manufacturer is:
   1. **KMC**
B. The work occurs on a site with an existing BAS. Therefore, the manufacturer of the existing system is the only acceptable BAS manufacturer.
C. As a prequalification for inclusion on the District's acceptable System Integrator list, the SI has pre-negotiated labor and material costs with the District.
D. The prime contractor's bid submittal shall include a full breakout of the labor and materials proposed by the SI for use on the project. A summary page shall be included where costs are shown to total the SI contractor's price to the prime contractor. A statement of compliance with the pre-negotiated pricing shall be included and signed by an official of the SI contractor.
E. Failure to submit the required documentation with the bid package may result in bid disqualification.

1.3 SCOPE – GENERAL

A. The Building Automation System (BAS) is to provide a peer-to-peer networked, stand-alone, distributed control system for building mechanical and electrical systems. The BAS shall include an operator workstation also known as Engineering Control Center (ECC), field programmable microprocessor based control units panels, instrumentation end control devices, wiring, piping, and related systems to provide centralized and facility wide control functions.
B. The BAS shall be designed such that each mechanical and electrical system will be able to operate under stand-alone control. As such, in the event of a network communication failure, or the loss of any other controller, the control system shall continue to independently operate under control.
C. The System Integrator (SI) Contractor shall refer to the drawings and equipment specifications for coordination of factory installed control equipment in products furnished by others as they relate to this section.
D. Provide all labor (direct employed or subcontracted), materials, programming and supervision necessary to install a complete Building Automation System (BAS) per the construction documents. Include provisions for the following:
   1. Mounting hardware for all control devices.
   2. Construction supervision.
   3. Startup and verify proper operation of control equipment.
   4. Point verification and testing of hardware and software.

5. Work in conjunction with the TAB agent to calibrate and adjust devices as required.
6. Warrantee.

E. The BAS as specified herein shall be provided in its entirety by the SI Contractor. The SI Contractor shall base their bid on the system as specified, the sequence of operation, the point's list (Input/Output Summary) and contract documents. The documentation pertaining to the BAS is schematic in nature. The SI Contractor shall provide equipment and labor not specifically referred to herein or on the plans, that are required to meet the functional intent, shall be provided without additional cost to the owner.

F. The SI shall provide all electrical control and interlock wiring connected to the controls and instrumentation systems.

G. All 110 VAC or greater voltage power wiring to main control panels shall be provided by Division 16 Contractor (Electrical), and coordinated by this Contractor. Failure of this contractor to coordinate requirements with other divisions shall result in the SI contractor being responsible for any non-coordinated items.

H. All 24 VAC control power to operate equipment shall be the responsibility of this contractor.

I. All conduits in connection with the controls and instrumentation system shall be furnished and installed by this Contractor.

J. The Control Contractor shall install all sensing and control components.

K. Provide a comprehensive operator and technician-training program as described herein.

L. Provide as-built documentation, software, and all DDC control logic and all associated support documentation on approved media, which accurately represents the final installed system.

M. Adjustments of manual balancing devices, as required to obtain design air and/or water flows, shall be by the TAB Contractor. The controls contractor shall provide assistance to the TAB Contractor with control adjustments as required to obtain design flows by:

1. Providing on-site instruction on the proper interfacing and operation of the equipment.
2. Providing the necessary software for use with the balancing contractor's personal computer for interfacing with their control equipment. Where proprietary equipment is required, this equipment shall be provided for the Balancing Contractor's use.
3. Provide 2-hours of onsite for the Balancing Contractor to instruct on proper use of the software and interface with the control system.

N. To ensure compatibility and training standards with the present VCSD Building Automation Systems, the BAS must be fully software certified at the time of installation to provide interoperability and backward compatibility to the BAS systems currently installed by the successful BAS manufacturer. The BAS must use only latest versions of database software and tools for area controllers, configuring the system, and for the present graphical user interface (GUI) which is used by the building operator.

O. Demolition: The controls contractor shall remove all unused controls, including devices, controllers, conduit, control tubing, and wire. VCSD shall have the right

of first refusal for all hardware removed. Demolition shall be complete with exposed surfaces and finishes restored to match the surrounding area. Coordinate work with other trades.

1.4 SCOPE – EXPAND EXISTING CONTROL SYSTEM

1. The System Integrator shall expand the existing campus BAS hardware and software to incorporate equipment indicated in the Drawings and control it in the manner indicated in the Sequence of Operations.
2. The EMS expansion shall include all labor and materials to provide the following:
   a. Upgrade existing site software, if required
   b. Upgrade existing site hardware, if required.
   c. Incorporate new equipment into the existing database.
   d. Incorporate new equipment into the existing graphics hierarchy.
   e. All controls devices shown on the drawings and required to meet the sequence of operations.
   f. Program control sequences.
   g. Interconnection to site control system.
   h. Interconnect all onsite BAS devices with Owner's central Building Automation and Control System via Owner's Ethernet system.
   i. Provide installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

1.5 RELATED DOCUMENTS:

A. Sequence of Operations: Refer to Drawings.
B. Drawings and general provisions of the Contract, including General and Supplementary Conditions.
C. Division-1, General Requirements, of these Specifications.
D. The General Conditions of the Contract, Supplementary Conditions, and General Requirements bound herewith are a part of these Specifications and shall be used in conjunction with this Division as a part of the Contract Documents. Consult them for further instructions pertaining to this work. Contractors shall be responsible for and be governed by all requirements thereunder.

1.6 ABBREVIATIONS

A. The acronym shown below are abbreviations used or referenced throughout this section of the specification.

1.	AGC	Application Generic Controller
2.	AI	Analog Input
3.	AMR	Automated Meter Reading
4.	AO	Analog Output
5.	API	Application Program Interface
6.	ASC	Application Specific Controller
7.	ASP	Application Service Provider
8.	BAS	Building Automation System
9.	CAC	Custom Application Controller
10.	CPU	Central Processing Unit
11.	DDC	Direct Digital Controller

12.	DDE	Dynamic Data Exchange
13.	DI	Digital Input
14.	DO	Digital Output
15.	EP	Electric-pneumatic
16.	FACP	Fire Alarm Control Panel
17.	FCC	Fire Command Center
18.	GC	Global Controller
19.	I/O	Input/Output
20.	IP	Internet Protocol
21.	ISS	Intelligent Space Sensor
22.	KLAN	Local Area Network
23.	LC	Local Controller
24.	ODBC	Open Database Connectivity
25.	PE	Pneumatic-electric
26.	PID	Proportional-Integral-Derivative
27.	PLC	Programmable Logic Controller
28.	PPM	Parts per million
29.	SI	System Integrator
30.	SID	Supervisory Interface Device (Gateways)
31.	SMS	Short Message System
32.	TCP/IP	Transmission-Control Protocol/Internet Protocol
33.	TUC	Terminal Unit Controller
34.	UC	Unitary Controller
35.	WAN	Wide Area Network
36.	WET	Web-Enabled Technology
37.	XIF	External Interface File
38.	XML	Extensible Markup Language

1.7 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. All publications shall be the latest edition that is recognized and accepted by the local governing authorities.

1. Air Movement and Control Association (AMCA)
   a. AMCA 502 – Damper Application Manual
   b. AMCA 610 – Methods of Testing Airflow Measurement Stations for Ratings.
2. American Society of Heating, Refrigeration, & Air Conditioning Engineers, Inc.
   a. ASHRAE 114 – Energy Management Control System Instrumentation
   b. ASHRAE Guideline 4 – Preparation of Operating and Maintenance Documentation for Building Systems.
   c. ASHRAE Guideline 14P – Measurement of Energy and Demand Savings
3. American Society of Mechanical Engineers (ASME)
   a. ASME CSD-1 – Control & Safety Devices for Automatically Fired Boilers

b. ASME PTC-22 – Digital Systems Techniques

4. American Society for Testing and Materials (ASTM)
5. Institute of Electrical and Electronic Engineers (IEEE)
   a. IEEE std 1143 – Guide on shielding Practice for Low-Voltage cable
   b. IEEE STD 37.13 – standard for Low- Voltage AC Power Circuit Breakers Used in Enclosures.
   c. IEEE STD 37.14 – Standard for Low – Voltage DC Power Circuit Breakers used in Enclosure.
   d. IEEE std 62.22 – Guide for the Application of Metal-Oxide surge arresters for Alternating Circuit Systems
   e. IEEE std C62.34 – Standard for Performance of Low-Voltage surge Protective Devices
   f. IEEE std C62.36 – Standard Test Methods for surge-protectors used in Low-Voltage AC Power Circuits
   g. IEEE std C62.41 – Recommended Practice on Surge Voltage in Low Voltage AC Power Circuits
   h. IEEE STD C62.45 – Guide on Surge Testing for Equipment Connected to Low – Voltage AC Power Circuits.
   i. IEEE std C62.62 – Standard Test Specification for Surge – Protective Devices for Low – Voltage AC Power Circuits
6. The Instrumentation Systems and Automation Society
   a. ISA 575.01 Flow Equation for Sizing Control Valves
7. National Electrical Contractors Association
   a. NECA 101 – Standard for Installing Conduit (Rigid, IMC, EMT)
   b. NECA 1 – Standard for Good Workmanship in Electrical Contracting
8. National Electrical Manufacturers Association (NEMA)
   a. NEMA WC57 – Control Cable
   b. NEMA WD6 – Wiring Devices-Dimensional Requirements
9. Nation al Fire Protection Association (NFPA)
   a. NFPA 70 – National Electrical Code
   b. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilation Systems
   c. NFPA 90B – Standard for the Installation for Warm Air Heating and Air Conditioning Systems
   d. NFPA 92A – Recommended Practices for Smoke Control Systems
10. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
   a. SMACNA – Energy Systems Analysis and Management
   b. SMACNA – HVAC Systems – Applications
   c. SMACNA – HVAC Systems – Commissioning Manual
   d. SMACNA – Indoor Air Quality – A Systems Approach
11. Underwriters Laboratories (UL)

1.8 QUALITY ASSURANCE

A. Products:

1. All products of the BAS shall be provided with appropriate agency approvals. With the submittal documents, verification that the approvals exist for all submitted products shall be provided. Systems or products not currently offering one or more of the following approvals are not acceptable:
   a. UL-916; Energy Management Systems
   b. UL-873; Temperature Indication and Regulating Equipment
   c. UL-864, Subcategories UUKL, UOXX, UDTZ; Fire Signaling and Smoke Control Systems
   d. FCC, Part 15, Subpart J, Class A Computing Devices Emissions Requirements
2. Electrical Standards: Provide electrical products that have been tested, listed and labeled by UL and comply with NEMA standards.
3. NEMA Compliance: Comply with NEMA standards pertaining to components and devices for electrical control systems.
4. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning And Ventilating Systems" where applicable to controls and control sequences.
5. National Codes: Perform Work in accordance with the Florida Building Code.

B. Manufacturers:
1. Firms regularly engaged in the manufacture of products specified, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

C. System Integrator:
1. The SI Contractor shall provide Licensed Trade Technicians to furnish, engineer, and install the BAS. They shall be skilled and factory trained, certified, and authorized by the manufacturer for debugging, start-up, diagnostics, training, service and repair of all components to ensure interoperability.
2. The SI Contractor shall be designated by the BAS Equipment Manufacturer as a current Authorized Agent for their products in the territory where the equipment is to be installed.
3. The SI shall be regularly engaged in the service and installation of the BAS proposed for the project, and shall have been so for a minimum of three (3) years in central Florida using the current company name. Experience as a company with a different name shall not be considered.
4. The SI shall have an office within 50 miles of Volusia County that is staffed with BAS designers trained in integrating interoperable systems and technicians fully capable of providing BAS instruction and routine emergency maintenance service on all system components of the system to be installed.

D. Software Programmer
1. The SI Contractor shall provide a software programmer to oversee the project that is highly experienced in projects with similar size and scope. The SI Contractor shall submit along with project submittal data the qualifications and specific project experience of the programmer intended to be used on the project. If, upon review by the engineer, the

programmer is deemed insufficiently experienced, the SI Contractor shall remove the programmer from the project and provide the qualifications and experience of an alternative programmer until an acceptably qualified individual is selected.

1.9 SYSTEM PERFORMANCE

A. Performance Standards. The system shall conform to the following:

1. Graphic Display. The system shall display a quality graphic with the capability for a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the request. The graphic shall be intuitive and shall present data in a graphical, not tabular, format.
2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 10 seconds. Analog objects shall start to adjust within 10 seconds.
4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current, within the prior 60 seconds.
5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
7. Performance. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
8. Multiple Alarm Annunciation. All workstations on the network shall receive alarms within 5 seconds of each other.

1.10 COORDINATION

A. The following products are to be furnished by the controls contractor and installed by others. The controls contractor shall coordinate installation locations.

1. Hydronic Piping Components:
   a. Control valves.
   b. Immersion wells.
   c. Flow switches.
   d. Temperature sensor wells and sockets.
   e. Gage taps.
   f. Flow meters.
   g. Couplings for flow and pressure switches

B. The Mechanical Contractor is responsible for providing and installing blank-off plates if needed when the control application requires dampers smaller than duct size. The controls contractor shall coordinate this requirement.

C. The controls contractor shall be responsible for the following:
   1. Coordination of all controls items with other trades.
   2. Coordination of wall space for panels.
   3. Coordination of all wall-mounted sensor locations with furniture.

1.11 SUBMITTALS

A. General:
   1. Pre-Submittal Conference: After award of the Construction Contract, and prior to delivering submittal data to the Engineer, the BAS Contractor shall schedule a pre-submittal conference with the Engineer. The purpose of the pre-submittal conference is to review the proposed system concept and to discuss the sequence of construction activities.
   2. Refer to the specification Division 1 – General Requirements for submittal format.
   3. Coordinate with the Mechanical contractor to determine the number of submittals required. Provide a minimum of five copies of all submittal data.
   4. Product Requirements: Provide shop drawings and other submittals on hardware, software, and equipment to be installed or furnished. Begin no work until submittals have been approved for conformity with design intent. When manufacturer's cutsheets apply to a product series rather than a specific product, clearly indicate applicable data by highlighting or by other means. Clearly reference covered specification and drawing on each submittal. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show in submittal quantities of products appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work.

B. The following data/information shall be submitted for review (prior to ordering any hardware or software items):
   1. Overall system interconnecting diagrams showing all remote panels (PCs, Field Panels, and LAN devices), and power/surge protection locations and Uninterrupted Power Supply (UPS).
   2. Distributed panel locations (site and/or building plan, as appropriate to identify physical locations).
   3. Valve and damper schedules showing size, configuration, capacity, Manufacturer and location.
   4. Data sheets for all hardware and software control components.
   5. Thermostat/sensor locations.
   6. A brief written description of the methodology used to keep graphics files on various PC terminals updated and consistent with one another. (Remote computer graphics vs. site computer)
   7. A detailed point-to-point diagram of circuitry of all DDC panels. Submit on a per distributed panel basis. Typical are accepted, provided all applicable units are listed and the units are identified.
   8. A list of connected data points, including connected control unit and input or output devices.

9. A detailed Sequence of Operations derived from the design intent shown on the Contract Drawings. Retyping the Sequence of Operations in the Contract Drawings is not acceptable.
10. Detailed documentation on the specific field equipment to be supplied by the Controls Contractor shall be submitted and approved prior to installations; including, but not limited to, actuators, valves, temperature sensors, surge protection, and damper operators.
11. The control valve schedule shall include each valve's unique identifier, size, flow coefficient Cv, pressure drop at specified flow rate, actuator size, close-off pressure data, dimensions, and access and clearance requirements data. Valve schedules may be submitted in advance but shall be included in the complete submittal.
12. The damper schedule shall contain each damper's and each actuator's identifier, nominal and actual sizes, arrangement of sections in multi-section dampers, and methods of connecting dampers, actuators, and linkages. The Damper Schedule shall include the maximum leakage rate at the operating static-pressure differential. The Damper Schedule shall contain actuator selection data supported by calculations of the torque required to move and seal the dampers, access and clearance requirements. Damper schedules may be submitted in advance but shall be included in the complete submittal.
13. All schemes and methods proposed to provide lightning protection for the DDC system, entering and leaving each building shall be submitted for review and approval.
14. Complete bill of materials to identify and quantify all devices.
15. Submit a color printout of each graphic. The graphic shall show temperature, status, position and all data points that will appear on the screen. If acceptable to the engineer, the graphics may be submitted on disk in a standard graphic format.

C. Record Submittals:
1. Within one week after substantial completion, submit final copies of the submittals modified to reflect all changes during construction. Electronic data shall be submitted in AutoCad v2004 format on CD-ROM disks. Provide one original and one duplicate.
2. Submit the same number of record submittals that are required for the pre-construction submittals (minimum of 5 copies).
3. All programs, code, databases, graphic files, CAD drawings, and symbol libraries generated for operation of the system shall be included as part of the system documentation. This information shall be submitted both in hardcopy bound format and machine-readable format (i.e., CD ROM). Two (2) copies of the machine-readable form shall be submitted.
4. Complete original issue documentation, installation, operation manuals, and supporting software for all third-party hardware and software furnished and installed as part of the system or required for the operation of the system, including remote terminals, user's computer work station, monitors, graphics and memory boards, network servers, printers, and modems.

5. All software licenses, warranty certificates and documentation for all hardware and software including third party hardware and software shall be provided.

1.12 WARANTEE

A. The entire BAS provided under this contract, including all control devices provided by this Contractor, shall be warranted to be free of defects in workmanship and material for a period of **TWO** (2) years from the date of Substantial Completion. Any equipment found to be defective during this period shall be repaired and/or replaced without expense to the Owner. The Contractor shall accomplish this work during normal working hours (8 a.m. to 5 p.m., Monday through Friday, excluding holidays).

B. The Contractor shall respond to all warranty items within one working day from when they are reported. Provide a report to the VCSD Maintenance Department identifying the problem, the devices affected and the nature of the repair or replacement.

C. The warranty shall cover all costs for parts, labor, associated travel, any software sequence modifications, and expenses throughout the warranty period.

D. Throughout the duration of the prime contractor's warrantee, all BAS warrantee issues and communications shall be routed through the prime contractor. After the prime contractor's warrantee expires, the SI shall coordinate directly with the VCSD Maintenance department regarding warrantee issues for the duration of the BAS warrantee.

1.13 BAS ACCEPTANCE PROCEDURE

A. The SI shall perform a three-phase commissioning procedure consisting of field I/O calibration and commissioning, system commissioning and integrated system program commissioning. Document all commissioning information on commissioning data sheets, which shall be submitted prior to acceptance testing. Commissioning work, which requires shutdown of system or deviation from normal function, shall be performed when the operation of the system is not required. The commissioning must be coordinated with the owner and prime contractor to ensure systems are available when needed. Notify the operating personal in writing of the testing schedule so that authorized personnel from the owner and prime contractor are present throughout the commissioning procedure.

B. After control devices have been commissioned (i.e. calibrated, tested and signed off), each BAS program shall be put on line and commissioned. The SI Contractor shall, in the presence of the owner's representative and/or engineer, demonstrate each programmed sequence of operation and compare the results in writing. In addition, each control loop shall be tested to verify proper response and stable control, within specified accuracy's. System program test results shall be recorded on commissioning data sheets and submitted for record. Any discrepancies between the specification and the actual performance will be immediately rectified and retested.

C. The SI Contractor shall submit printed graphical trend logs of Building Automation System (BAS) points to demonstrate that the HVAC systems are functioning as designed. Trend intervals shall be typically on an hourly basis,

and trends shall be run for a minimum of 2 weeks, 24 hours a day. Trended points shall include as a minimum:

1. All temperature points (air and hydronic) and active setpoints
2. All relative humidity points
3. Damper and valve position points
4. Selected status points.
5. All ventilation airflow rates and active setpoints

D. A variety of historical data collection utilities shall be provided to manually or automatically sample, store, and display system data for all system points:

1. Digital Controllers (DC's) shall store point history data for selected analog and digital inputs and outputs:
   a. Any point, physical or calculated, may be designated for trending.
   b. Any point, regardless of physical location in the network, may be collected and stored in each Digital Controller's (DC's) point group.
2. Each Digital Controller (DC) shall have a dedicated RAM-based buffer for trend data and shall be capable of storing data samples.
3. The Network shall contain sufficient trend storage capacity, either in memory or on hard drive, to retain the last 72 hourly values for every system point shown on the Input/Output Summary, including software points. Trend data shall be displayed at the printer or at any network terminal.

1.14 TRAINING

A. Training sessions shall be provided for Owner's personnel by the SI Contractor's factory trained control engineers and technicians.

B. The SI Contractor shall conduct an 8-hour on-site training course for designated Owner's personnel in maintenance and operation of control system.

1.15 CLOSEOUT PROCEDURES

A. Provide a duplicate of the final resident software on magnetic media, along with instructions on downloading procedures and long-term storage of the media.

B. Provide pre-programmed access codes to all levels. Subject to Owners approval.

C. Ownership of proprietary material: All project developed hardware and software shall become the property of the Owner. These include but are not limited to:

1. Project graphic images,
2. Record drawings,
3. Project database,
4. Job-specific application programming code,
5. All documentation for project hardware and software.

D. Provide the following closeout information:

1. Operating and maintenance data.
   a. Manufacturer' catalog data and specifications on components used in system.
   b. Detailed instructions for operations of system.
   c. Operator's reference table listing addresses of connected input points and output points. Show settings where applicable.

d. Programmer's manual including information necessary to perform programming functions.
e. Language manual including information necessary to perform programming functions.
f. Flow charts of software programs utilized in DDC system.
g. Complete program listing file and parameter listing file for programs.
h. Copy of warranty.
i. Operating and maintenance cautions and instructions.
j. Recommended spare parts list.

2. Owner instruction report.
3. Performance verification report.
4. Guarantee letter.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/SYSTEM INTEGRATORS:
A. KMC Controls, Inc. / ABC Controls

2.2 SYSTEM TYPE: BACnet compatible, web-based product.

2.3 COMMUNICATIONS
A. On-site communications between BAS components shall be accomplished via a dedicated, hardwired Local Area Network (LAN). Individual BAS components shall pass data to the network by the use of directly connection to the network or by passing data through higher level building control units.
B. The BAS shall connect to the existing district-wide peer-to-peer network for remote communications. Modem dial-up systems are not acceptable.
C. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the LAN. Program and test all cross-controller links required to execute control strategies specified on Drawings. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.
D. LAN capacity shall be not less than 60 stations or nodes.
E. Minimum LAN data speed shall be 38 Kbps.
F. Transmission Medium
1. Inside buildings: Fiber optic or single pair of solid 24 gauge twisted, shielded copper cable.
2. Between buildings: Fiber optic run underground and in conduits. If existing communication medium is available that meets these requirements and the Owner provides written approval, the SI may be utilized it for BAS communications. If existing communication medium is not available or usable, the SI shall provide the medium. The minimum conduit size for underground communication shall be one (1) inch diameter. Install two extra spare pairs in each conduit run.
G. Wireless communications are NOT allowed.
H. System shall automatically synchronize controller time clocks daily from an operator-designated controller via the LAN. If applicable, system shall automatically adjust for daylight saving and standard time.

I. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

J. Provide updated software on the master host PC located at the central facilities maintenance department and any on-site PC's as necessary for site-based FMT's or administration access as required by the location.

2.4 SOFTWARE KEY

A. Where access to the EMS software is limited by security programming, the controls contractor shall provide two (2) EMS software keys (hardware or software keys) for the owner's indefinite use.

2.5 SYSTEM APPLICATIONS

A. Each Workstation shall provide for an operator interface and off-line storage of system information. Provide the following applications at each workstation.

1. Manual Database Save and Restore: A system operator with the proper password clearance shall be able to archive the database from any system panel and store on magnetic media. The operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.
2. System Configuration: The Workstation Software shall provide a graphical method of configuring the system. The user with proper security shall be able to add new devices, assign modems to devices, and obtain a visual riser diagram of the system. This shall allow for future system changes or additions.
3. On-Line Help: Provide a context sensitive, on line help system to assist the operator in operation and editing of the system. On line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
4. Security: Each operator shall be required to log on to the system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system supervisor shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operator's access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto logoff time shall be set per operator password. All system security data shall be stored in an encrypted format.
5. System Diagnostics: The system shall automatically monitor the operation of the Workstation, printer, modem, network connections, and Control Panels. The failure of any device shall be annunciated to the operator workstation.
6. Alarm Processing: Any object in the system shall be configurable to alarm in and out of normal state. The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.

a. Alarm Reactions: The operator shall be able to determine what actions, if any, are to be taken, by object (or point), during an alarm. Actions shall include logging, printing, starting programs, displaying messages, dialing out to remote stations, paging, providing audible annunciation or displaying specific system graphics. Each of these actions shall be configurable by Workstation and time of day. An object in alarm that has not been acknowledged within an operator specified time period shall be re-routed to an alternate operator specified alarm receipt device.
b. Binary Alarms: Each binary object shall be set to alarm based on the operator-specified state. Provide the capability to disable alarming when the associated equipment is turned off or is being serviced.
c. Analog Alarms: Each analog object shall have both high and low alarm limits and warning limits. Alarming must be able to be automatically and manually disabled.

7. Trend Logs: The operator shall be able to define a custom trend log for any data in the system. This definition shall include interval, start-time, and stop-time. Trend intervals of 1, 5, 15, 30, and 60 minutes as well as once a shift (8 hours), once a day, once a week, and once a month shall be selectable. All trends shall start based on the hour. Each trend shall accommodate a minimum of 10 system objects. The system operator with proper password shall be able to determine how many samples are stored in each trend. Trend data shall be sampled and stored on the Building Controller panel and be archived on the hard disk. Trend data shall be able to be viewed and printed from the operator interface software. They shall also be storable in a tab delimited ASCII format for use by other industry standard word processing and spreadsheet packages.
8. Alarm and Event Log: The operator shall be able to view all logged system alarms and events from any location in the system. Events shall be listed chronologically. An operator with the proper security level may acknowledge and clear alarms. All that have not been cleared by the operator shall be archived to the hard disk on the workstation.
9. Object and Property Status and Control: Provide a method for the operator with proper password protection to view, and edit if applicable, the status of any object and property in the system. These statuses shall be available by menu, on graphics, or through custom programs.
10. Clock Synchronization: The real time clocks in all building control panels and workstations shall be synchronized on command of an operator. The system shall also be able to automatically synchronize all system clocks, daily from any operator-designated device in the system. The system shall automatically adjust for daylight savings and standard time if applicable.
11. Reports and Logs: Provide a reporting package that allows the operator to select, modify, or create reports. Each report shall be definable as to data content, format, interval, and date. Report data shall be archived on the hard disk for historical reporting. Provide the ability for the operator to

obtain real time logs of designated lists of objects. Reports and logs shall be stored on the PC hard disk in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Reports and logs shall be readily printed to the system printer. Provide the capability for the operator to easily define any system data into a daily, weekly, monthly, or annual report. These reports shall be time and date stamped and shall contain a report title and the name of the facility.

12. Workstation Editors: Each PC Workstation shall support full screen editing of all system applications. Provide editors for each application at the PC workstation. The applications shall be downloaded and executed at the appropriate controller panels.
13. Controller: Provide a full screen editor for each type controller and application that shall allow the operator with proper password to view and change the configuration, name, control parameters, and system setpoints.
14. Scheduling: An editor for the scheduling application shall be provided at each Workstation. Provide a monthly calendar for each schedule. Exception schedules and holidays shall be shown clearly on the calendar. Provide a method for allowing several related objects to follow a schedule. The advance and delay time for each object shall be adjustable from this master schedule.
    a. An operator with proper password level shall be able to modify the schedule. Schedules shall be able to be easily copied between objects and/or dates.
15. Equipment Coordination: Provide a full screen editor that allows equipment to be grouped for proper operation as specified in the sequence of operations.
16. Custom Application Programming. Provide the tools to create, modify, and debug custom application programming. The operator shall be able to create, edit, and download custom programs at the same time that all other system applications are operating. The system shall be fully operable while custom routines are edited, compiled, and downloaded. The programming language shall have the following features:
    a. The language shall be English language oriented and be based on the syntax of programming languages such as BASIC. It shall allow for free form or fill in the blank programming. Alternatively, the programming language can be graphically-based using function blocks as long as blocks are available that directly provide the functions listed below, and that custom or compound function blocks can be created.
    b. A full screen character editor/programming environment shall be provided. The editor shall be cursor/mouse-driven and allow the user to insert, add, modify, and delete code from the custom programming. It shall also incorporate word processing features such as cut/paste and find/replace.

c. The programming language shall allow independently executing program modules to be developed. Each module shall be able to independently enable and disable other modules.
d. The editor/programming environment shall have a debugging/simulation capability that allows the user to step through the program and to observe any intermediate values and or results. The debugger shall also provide error messages for syntax and execution errors.
e. The programming language shall support conditional statements (IF/THEN/ELSE/ELSE-IF) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
f. The programming language shall support floating point arithmetic using the following operators: +, -, /, x, square root, and xy. The following mathematical functions shall also be provided: natural log, log, absolute value, and minimum/maximum value from a list of values.
g. The programming language shall have pre-defined variables that represent clock time, day of the week, and date. Variables that provide interval timing shall also be available. The language shall allow for computations using these values.
h. The programming language shall have ability to pre-defined variables representing the status and results of the System Software, and shall be able to enable, disable, and change the values of BACnet objects in the system.

2.6 GRAPHICAL INTERFACE (LOCAL AND REMOTE)

A. Both the Local and Remote Graphical Interfaces shall provide the following:
1. Dynamic points shall include analog and binary values, dynamic text, static text, and animation files. Graphics shall have the ability to show animation by shifting image files based on the status of the point.
2. The graphics shall be of good quality and shall be consistent throughout the BAS interface providing the user with visual description of the status of the system.
3. Links shall be provided to easily move between data screens. Cross-links shall also be provided to jump to central equipment screens.
4. Provide “drill-down” ability to allow the user to obtain the desired information easily.

B. Standard Building Display: Each floor of each building shall be provided with an independent BAS screen that displays all sensed space temperatures and relative humidity levels. If any space temperature is more than 2 degrees from setpoint, the space shall be displayed as Yellow in color. If any space is more than 4 degrees from setpoint, it shall be displayed as Red in color. If any space relative humidity is above 65% RH, the sensed space shall be displayed as Red in color.

C. Graphics shall display in Standard Inch Pounds.

2.7 CONTROL UNITS

A. General: Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), and Smart Actuators (SA) that conform to the following:

B. Communication:
   1. Service Port: Each controller shall provide a service communication port for connection to a Portable Operator's Terminal.
   2. Signal Management: BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
   3. Data Sharing: Each BC and AAC shall share data as required with each networked BC and AAC.
   4. Stand-Alone Operation: Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.

C. Environment: Controller hardware shall be suitable for anticipated ambient conditions.
   1. Controllers used outdoors or in wet ambient conditions shall be rated for operation at 20°F to 140°F.
   2. Controllers used in conditioned space shall be rated for operation at 32°F to 120°F.

D. Enclosures: Controller enclosures shall be of adequate size and style to allow all housed components to be easily serviced.
   1. Provide locking type, metal cabinet, with common keying. Panels screwed closed are not acceptable. The enclosures shall have a metal print pocket suitable for storing wiring, service and log information.
   2. Indoor panels shall be NEMA 1 enclosures with gaskets.
   3. Outdoor panels shall be NEMA 3R.
   4. Outdoor panels installed East of US-95 or in cooling tower or chemically treated areas shall be NEMA 4X.
   5. Enclosures shall physically isolate 120v power and 24v power and each shall be clearly labeled.

E. Keypad: Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.

F. Real-Time Clock: Controllers that perform scheduling shall have a real-time clock.

G. Serviceability:
   1. Controllers shall have diagnostic LEDs for power, communication, and processor.
   2. Wires shall be connected to a field-removable modular terminal strip or to a termination card connected by a ribbon cable.

3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.

H. Memory:
1. Controller memory shall support operating system, database, and programming requirements.
2. Each BC and AAC shall permanently retain application programming in nonvolatile memory in the event of power loss.
3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss.

2.8 POWER SUPPLIES, LINE FILTERING, AND ELECTRICAL ACCESSORIES

A. Power Line Filtering: Provide internal or external transient voltage and surge suppression for workstations and controllers.
1. Surge protection shall have:
a. Dielectric strength of 1000 V minimum
b. Response time of 10 nanoseconds or less
c. Transverse mode noise attenuation of 65 dB or greater
d. Common mode noise attenuation of 150 dB or greater at 40-100 Hz
2. Surge suppression shall comply at a minimum with manufacturer's requirements and shall include suppression on all lines entering and leaving each building.
3. All communication channels between PC, Global and Unitary Controllers whether in conduits or overhead runs, shall have transient suppression networks installed. The transient (Surge) protection must meet IEEE standard C37.90a-1974. The suppression network shall be automatic, self-restoring and be on active duty at all times.

B. Power Supplies: Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
a. Unit shall operate between 32°F and 120°F. EM/RF shall meet FCC Class B.
b. Line voltage units shall be UL recognized.
c. Transformers shall be mounted in an auxiliary panel or other suitable accessible location with disconnecting means. Provide a pilot light for each transformer, to indicate the presence of load power.

C. Controller Wiring Requirements:

1. Provide all necessary 24 VAC transformers, 24 VAC power distribution wiring, etc. to controllers for a complete operating system.
2. Terminal fittings or insulating bushings shall be used to protect wiring associated with controllers at enclosures, junction boxes, etc.

D. Wiring and Conduit
1. The contractor shall provide all DDC and related control wiring and conduit. Wire and cable shall be pulled from device or control point to the DDC, Auxiliary, or LPI panels. All wire and cable shall be labeled and tagged 4 inches down from the point at which the wire enters the cabinet with the corresponding point number.
2. All indoor exposed control wiring shall be run in EMT; outdoor exposed control wiring shall be run in PVC conduit.
3. All wiring routed in non-exposed (above ceiling) areas shall utilize plenum-rated cabling and be properly supported using J-hooks or cable rings.
4. All cable runs exposed in return air plenums shall be smoke rated for the application and secured to the building structure.
5. Control wiring for 24-volt circuits shall be rated for 300-volt service.
6. All PVC and EMT conduit and outlet boxes shall conform to the requirements specified under Division 16, Electrical.
7. All conductors shall be of stranded copper wire.
8. Conduits shall be sized on a maximum fill of 40% capacity.
9. Data transmission cabling and equipment grounding procedures shall meet the latest FCC guidelines for electromagnetic field generation.
10. All control wiring sizes and types shall meet the equipment manufacturer's recommendations.
11. DDC Wiring and Cable Requirements for New DDC Panels:
    a. Digital Output *Minimum #14 AWG THHN
    b. Digital Input *Teflon jacketed twisted pair #16 -or- #16 AWG THHN minimum
    c. Analog Output *Twisted pair NEC-rated CMP #20 AWG
    d. Analog Input *Twisted pair NEC-rated CMP #20 AWG
    e. Data Transmission *Teflon jacketed twisted shielded pair #24 AWG 12-1/2 pico-ferrad, 6 twists/foot
    f. *Wire sizes listed for lengths up to 750'.
12. All junction boxes and couplings on conduit containing DDC related wiring shall be painted a sky blue color.

2.9 INPUT AND OUTPUT INTERFACE

A. General: Hard-wire input and output points to BCs, AACs, ASCs, or SAs.

B. Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.

C. Binary Inputs: Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.

D. Pulse Accumulation Inputs: Pulse accumulation inputs shall conform to binary input requirements and shall accumulate up to 10 pulses per second.
E. Analog Inputs: Analog inputs shall monitor low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
F. Binary Outputs: Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation. Separate relays with HOA switches and status lights may be used to meet this requirement.
G. Analog Outputs: Analog outputs shall send a modulating 0-10 Vdc or 4-20 mA signal as required to properly control output devices. Analog outputs shall not drift more than 0.4% of range annually.
H. Tri-State Outputs: Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.
I. Universal Inputs and Outputs: Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

2.10 ELECTRONIC SENSORS, INDICATORS, TRANSDUCERS AND COMPONENTS

A. Temperature and Humidity Sensors:
1. Temperature sensor assemblies shall consist of a Resistive Temperature Device (RTD's) with a 4-20 mA 2-wire transmitter and gasketed utility box enclosure. Sensing element shall be platinum with 10K ohms resistance at 32 deg. F. Accuracy shall be +/- 1/2 deg. F over the entire range.
2. Single point duct temperature sensor shall be rigid bulb type with stainless steel (SS) sheath, aluminum tip, and have a calibrated span of 20-120 deg. F or 30-250 deg. F for heating applications.
3. Averaging element duct mounted temperature sensor shall have a SS minimum 25 ft. long continuous element sensor along the entire length, and have a calibrated span of 20-120 deg. F or 30-250 deg. F for heating applications.
4. Rigid averaging element duct mounted temperature sensor shall have a brass case, bendable sheath, continuous element sensor along the entire length, and have a calibrated span of 20-120 deg.
5. Liquid immersion temperature sensors shall have 5 1/2" long probe with SS well, and weather tight enclosure. Transmitters for chilled water shall have a calibrated span of 20-120 deg. F or 30-250 deg. F for heating applications.
6. Approved Manufacturers:
a. System Integrator’s brand named product.
b. Hy-Cal
c. TCS
d. Siemens
e. Minco

f. ACI

B. Outside Air Master Temperature Sensor
1. Single point outside air temperature RTD shall be 1000-ohm thin film platinum resistor sensor with 4-20 mA 2-wire output transmitter with solar shield.
2. Approved Manufacturers:
a. System Integrator's brand named product.
b. Hy-Cal
c. Viasala
d. ACI

C. Pressure to Electronic Transducers
1. Provide transducers to convert linear proportional pressure signals to interface with the Siemens analog input modules. The transducer shall be a panel-mounted device, with input pressure snubber, as required, and gauge. Supply voltage shall be 19-26 VAC. Control signal shall be 4-20 mA. Accuracy shall be 1 percent full scale. Thermal effect shall be less than 1 percent full scale on zero and less than 1 percent of reading on span. Transducer shall have elastomer seals and SS wetted parts.
2. Approved Manufacturers:
a. Siemens
b. Setra
c. Modus
d. ACI
e. Dwyer
f. Veris

D. Current Sensing Switches
1. Provide a solid state switch which closes when the current level sensed by the internal current transformer exceeds the trip point. Internal circuits are to be totally powered by induction from the line being monitored.
2. All devices that are not "direct drive" (using flex couplings or belts) shall utilize adjustable threshold current switches to enable detection of changes in motor amp draw upon drive failure.
3. The CS shall be a self gripping split-core type with optional mounting feet bracket; shall be isolated to 600 VAC rms; and shall have an adjustable mounting bracket for installation flexibility.
4. Output shall be N.O., Solid State, 1.0 A @ 30 VAC/DC with a minimum aperture of 0.52"X0.68" for motor power feed.
5. Approved Manufacturer:
a. Veris Industries Hawkeye model #H800.

E. Current Transducer
1. Provide a solid state transducer to monitor current level sensed by the internal current transformer. Internal circuits are to be totally powered by induction from the line being monitored.
2. Size transducer based upon equipment monitored to operate within manufacturer's recommended range.
3. Accuracy: within 2% FSO
4. Output:4-20 mA
5. Mounting: Foot style

6. Approved Manufacturer:
   a. Kele CX

2.11 ELECTRIC COMPONENTS

A. Components shall be Honeywell, Johnson, Siemens, or private labeled by manufacturer of the control system.

B. Differential Pressure Switches:
   1. Differential pressure switches shall be furnished as indicated by the sequence for status purposes for either air or water applications.
   2. Provide single pole double throw switch with fully adjustable differential pressure settings. The switch shall have a snap-acting Form C contact rated for the application.
   3. The switch contact shall be rated for 5 amps at 120 volts as a minimum.
   4. Units shall be selected for ranges consistent with the application and shall be submitted for the Engineer's approval.
   5. Pressure rating of switch and connecting tubing:
      a. Pump – Maximum deadhead system pressure.
   6. Switches used for safety shutdown applications shall be of the manual reset type.
   7. Approved Manufacturers:
      a. System Integrator's brand named product.
      b. Honeywell
      c. Siemens
      d. Dwyer
      e. Cleveland Airflow
      f. Mamac

C. Control Relays and Contactors:
   1. Relays shall be a minimum DPDT, of proper coil voltage, with neon indicator light, and of sufficient rating for specified purpose. Relay base shall be of the screwed terminal type.
   2. Contactors shall be definite purpose type, have adequate number of poles, of proper coil voltage, and of sufficient rating for specified purpose. Contactors used for DDC interface control shall contain a Hand-Off-Auto switch.
   3. Approved Manufacturers:
      a. System Integrator's brand named product.
      b. Dayton
      c. Siemens
      d. Allen-Bradley
      e. GE
      f. Square D
      g. Veris

2.12 AUXILIARY CONTROL DEVICES

A. 2-way Control Valves (Pressure Dependent)
   1. Control valves shall be two-way type for two-position or modulating service as scheduled or shown.
      a. Close-off (differential) Pressure Rating: 200 psi.

2. Water Valves:
   a. Body and trim style and materials shall be per manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
   b. Sizing Criteria:
      Two-position service: Line size.
      Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load).
      Valves 1/2" through 2" shall be bronze body or cast brass ANSI Class 250, spring loaded, Teflon packing, quick opening for two-position service. Two-way valves to have replaceable composition disc, or stainless steel ball.
      2-1/2" valves and larger shall be cast iron ANSI Class 125 with guided plug and Teflon packing.
   c. Acceptable Manufacturer:
      Delta.
      Belimo
      KMC
      Product by Specified Control System Manufacturer (with prior approval on each project only)

B. Electronic Valve Operators
   1. Description:
      a. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
      b. Where shown, an internal mechanical, spring return mechanism shall be built into the actuator housing.
      c. All rotary spring return actuators shall be capable of both clockwise and counter clockwise spring return operation. Linear actuators shall spring return to the retracted position.
      d. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.
      e. All 24 VAC/DC actuators shall operate on Class 2 wiring and shall not require more than 10 VA for AC or more than 8 W for DC applications.
      f. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
      g. All modulating actuators shall have an external, built-in switch to allow the reversing of direction of rotation
      h. Actuators shall be provided with a conduit fitting and a minimum 1m electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
      i. Actuators shall be Underwriters Laboratories Standard 873 listed.

j. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque.

2. Special Warrantee: Provide a 5 year materials warrantee.
3. Acceptable Manufacturers:
   a. Belimo
   b. KMC
   c. Product by Specified Control System Manufacturer (with prior approval on each project only)

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify equipment is installed and prepared for controls connections.
B. Verify conditioned power supply is available to control units and to operator workstation.
C. Verify field end devices, and wiring is installed prior to installation proceeding.

3.2 INSTALLATION

A. General:
   1. Install Work in accordance with the Florida Building Code.
   2. Remove any unused items that are part of renovations or demolition, including, but not limited to: conduit, wire, tubing, controllers, controlled devices, relays, enclosures, etc. Do not abandon in place.
   3. Locate all control components and accessories such that they are easily accessible for adjustment, service and replacement.
   4. The control system shall be completely installed and ready for operation.
   5. Dielectric isolation shall be provided where dissimilar metals are used for connection and support.
   6. Penetrations through and mounting holes in the building exterior shall be made watertight. Penetrations through fire and smoke rated assemblies shall maintain fire and/or smoke rating.
   7. Devices mounted in or on piping or ductwork, on building surfaces, in mechanical/electrical spaces, or in occupied space ceilings shall be installed in accordance with manufacturer's recommendations and as shown. Control devices to be installed in piping and ductwork shall be provided with required gaskets, flanges, thermal compounds, insulation, piping, fittings, and manual valves for shutoff, equalization, purging, and calibration.
   8. Where control devices are installed on insulated piping or ductwork provide standoff brackets or thermal wells sized to clear insulation thickness. Provide extended sensing elements actuator or linkages, and other accessories as required.
   9. Install control systems and materials in accordance with manufacturer’s instructions, industry standards, rough-in drawings, and detail drawings. Install electrical components complying with the requirements of Division-16. Mount all control panels at convenient locations and heights.
   10. Identify each item, mounted on the face of a control panel, with an engraved nameplate (1/4” high engraved letters minimum). Identify each

item of control equipment (except room sensors and thermostats), with stamped tape, firmly attached to equipment (1/4” high letters minimum).

11. All thermostat bulbs in water lines shall be installed inseparable wells, packed with heat conductive compound.
12. All controllers, relays, transducers, etc., required for stand-alone control shall be housed in NEMA and UL listed enclosures with a lockable door. The type of NEMA enclosure shall be based upon environmental requirements outlined in the specifications or on the drawings for this project.
13. DDC components that are to be factory mounted shall be provided by the SI Contractor and shipped to the equipment manufacturer for installation. Coordination of the factory installation shall be the responsibility of the SI Contractor. Proper operation of factory installed components shall be the responsibility of the SI Contractor.

B. Communication and signal wire installation requirements:
1. Install all exposed wiring external to control panels, including low-voltage wiring, in EMT. Wiring shall be installed without splices between control devices and DDC panels.
2. Plan and coordinate routing with other disciplines.
3. Do not interfere with equipment access.
4. Provide flexible metallic conduit where equipment mounting is flexible.
5. Seal penetrations into air moving equipment including inside conduit.

C. Enclosures
1. Use panduits in each control panel to organize and conceal all wiring.
2. Fuse all transformers.
3. Control panels shall be clearly identified by labels (2” lettering).
4. Provide and install as-built wiring diagrams to indicate the control points on all equipment.
5. Provide laminated point lists in all control panels.

D. Control Units
1. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
2. Install software in control units and in operator workstation. Implement features of programs to specified requirements and appropriate to sequence of operation. Refer to Sequence of Operations.
3. Provide 120 volts alternating current, 15 amp dedicated power circuit to each programmable control unit.
4. Provide surge suppressor at each programmable control unit.
5. Install electrical material and installation in accordance with appropriate requirements of Division 16.

E. Temperature and Humidity Sensors
1. Install space temperature and humidity sensors where shown on drawings.
2. Strap-on temperature sensing elements shall not be used.

F. Pressure and Flow Sensors
1. Install in locations that ensure accurate sensing.
2. Avoid areas that will interfere with maintenance access.

G. Liquid Flowmeters

1. Flowmeters shall be installed with at least 10 diameter of straight pipe length upstream and five diameter of straight pipe length down stream.

H. Current Switch
1. Motor Status: The contractor shall provide and install a Current Sensing switch on any motor required to have motor status. One phase of the motor power feed shall be routed through the aperture of the current sensing switch.

I. Control Valves and Actuators
1. Install control valve actuator vertically (above the pipe) whenever possible.
2. Valves installed such that the actuator is below a horizontal position will not be accepted.
3. Provide ample maintenance access.
4. Permanently mark shaft as to indicate valve position
5. Install in accordance with manufacturers written instructions, rough-in drawings, and detail drawings.

3.3 GRAPHICS

A. The SI shall create site layout color graphics that form an intuitive dynamic hierarchal graphical interface for displaying data generally configured as follows:

B. First Level – Campus-wide data:
1. Campus site plan with drill-down links to individual buildings.
2. Campus CHWS and CHWR temperatures for campuses with hydronic hot water systems.
3. Campus HWS and HWR temperatures for campuses with hydronic hot water systems.
4. If any space temperature or relative humidity level in a building is in an alarm state, the building graphic shall be displayed in red.

C. Second Level – Building specific data:
1. The second level graphic screen shall provide the building floor plan with the HVAC system ductwork and equipment diagrammatically shown.
2. Individual space temperatures shall be displayed.
3. The follow data shall also be displayed, if available.
a. Relative humidity levels.
b. HVAC Supply air temperatures.
c. Operating mode.
d. For Central Plants, show equipment alarms.

D. Third Level – Equipment specific data:
1. The third level graphic screen shall provide complete data for specific HVAC equipment.
2. For Central Plants, provide complete system diagrammatically represented with all components. (i.e.: for an air-cooled chiller plant, diagram shall indicate all chillers and pumps connected by piping to represent the complete system. Separate major system onto independent graphic screens, such as chilled water and hot water systems.

E. Data shall be displayed on the graphic in the location of actual measurement (i.e.: Chilled water bypass water temperature shall be shown next to a bypass pipe).

F. Refer to the system point I/O summary for data to be displayed. If the I/O summary is not provided, all points required by the sequence of operations shall be displayed to optimize system performance analysis and speed alarm recognition. Provide as a minimum the following graphics.

3.4 VERIFICATION

A. After control components have been installed and connected, test, adjust and re-adjust as required all control components in terms of function, design, systems balance and performance.
B. Control devices, linkages and other control components shall be calibrated and adjusted for stable and accurate operation in accordance with the design intent and to obtain optimum performance from the equipment controlled.
C. All control valves shall be stroked and spring ranges verified and set.
D. All dampers shall be stroked to verify proper and smooth operation.
E. Cause every device to automatically operate as intended to ensure its proper functionality. Make systems ready for acceptance tests.

3.5 DEMONSTRATION

A. Demonstrate complete and operating system to Owner’s representative.

END OF SECTION

SECTION 23 11 23

FACILITY NATURAL GAS PIPING

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1.2 SUMMARY

A. RELATED SECTIONS
1. Section 23 05 01 – Mechanical General Requirements: Submittal procedures.
2. Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment.
3. Section 23 05 54 – Mechanical Identification.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.
3. ASME B31.9 - Building Services Piping.
4. 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 B68 - Standard Specification for Seamless Copper Tube, Bright Annealed.
4. ASTM B75 - Standard Specification for Seamless Copper Tube.
5. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
6. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
7. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

C. American Welding Society:
1. 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.

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 78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
5. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
6. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

F. National Fire Protection Association:
1. NFPA 54 - National Fuel Gas Code.

G. Underwriters Laboratories Inc.:
1. UL 842 - Valves for Flammable Fluids.

1.4 SUBMITTALS

A. Product Data:
1. Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes.
2. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.
3. Hangers and Supports: Submit manufacturers catalog information including load capacity.

B. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

B. Perform natural gas Work in accordance with NFPA 54.

C. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years experience.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 – Mechanical General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

E. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation. Furnish temporary protective coating on cast iron and steel valves.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 NATURAL GAS PIPING, ABOVE GRADE

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.

B. Copper Tubing: ASTM B88, Type L annealed.
   1. Fittings: ASME B16.26 cast bronze, compression type.
   2. Joints: Flared.

2.2 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.
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.

2.3 BALL VALVES

A. Manufacturers:
1. Crane Valve, North America
2. Milwaukee Valve Company
3. NIBCO, Inc.
4. Stockham Valves & Fittings

B. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, full port.

C. 1-1/4 inch to 3 inch : MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquids and LPG, conventional port.

2.4 BUTTERFLY VALVES

A. Manufacturers:
1. Crane Valve, North America
2. Milwaukee Valve Company
3. NIBCO, Inc.
4. Stockham Valves & Fittings

B. 2 inches and Smaller: MSS SP 67, 175 psi, bronze body, Viton seals, stainless steel trim, lever handle UL 842 listed for gas service, threaded or soldered ends, full port.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

3.2 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.

A. Verify connection to existing piping system size, location, and invert are as indicated on Drawings.

3.3 EXAMINATION

A. 23 05 01 – Mechanical General Requirements: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.4 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.

3.5 INSTALLATION - ABOVE GROUND PIPING SYSTEMS

A. Install natural gas piping in accordance with NFPA 54.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient.

D. Install piping to conserve building space and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Sleeve pipe passing through partitions, walls and floors.

H. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

I. Provide clearance for access to valves and fittings.

J. Provide access where valves and fittings are not exposed.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.

L. Install vent piping from gas pressure reducing valves to outdoors and terminate in weatherproof hood.

M. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

N. Paint gas piping safety YELLOW with gloss finish.

O. Install identification on piping systems including underground piping.

P. Install valves with stems upright or horizontal, not inverted.

Q. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

R. Install gas pressure regulator vent full size opening on regulator and terminate outdoors.

3.6 FIELD QUALITY CONTROL

A. Pressure test natural gas piping in accordance with NFPA 54.

END OF SECTION

SECTION 23 21 14

HVAC PIPING

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1.2 RELATED SECTIONS

A. Section 23 05 29 – Hangers and Supports for HVAC Piping and Equipment: Product and execution requirements for hangers and supports.

1.3 SUBMITTALS

A. Section 23 05 01 – Mechanical General Requirements: Submittal procedures.

B. Shop Drawings: Indicate schematic layout of piping system, including equipment, critical dimensions, and sizes. Indicate valve locations.

C. Product Data:
1. Valves: Submit Manufacturers catalog information with valve data and ratings for each service.
2. Piping Specialties: Submit product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Submit schedule indicating manufacturer, model number, size, location, rated capacity, load served, and features for each specialty.

3. Pipe Expansion Products: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

D. Welders Certificate: Include welders' certification of compliance with ASME Section IX.

E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years experience.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 – Mechanical General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 PIPES AND TUBES

A. Hydronic Water Piping:
1. Shall be domestic piping marked 'Made in USA'.
2. 2" and Smaller: ASTM A53, type F, standard weight (schedule 40) black steel pipe with ASTM A126/ANSI B16.4, class 125, standard weight cast iron threaded fittings.
3. 2-1/2" and Larger: ASTM A53, standard weight (schedule 40) black steel pipe with ASTM A234 grade WPB/ANSI B16.9 standard weight, seamless, carbon steel weld fittings.
4. Contractor's Option for 1-1/2" and smaller: Copper Tubing, ASTM B88 seamless, type L, hard temper with ANSI B16.22 wrought copper solder-joint fittings.
   a. Where copper is substituted, the contractor shall coordinate and provide brass specialties or dielectric unions for dissimilar metals.

5. PVC Pipe (allowed only where indicated on drawings): ASTM D1785, Schedule 40 and Schedule 80 for sizes 8 inch and larger, or ASTM D2241, SDR 21 or 26 solvent weld joints.

B. Makeup water piping
1. Copper Pipe: ASTM B88, Type L hard drawn, cast brass, wrought copper, or mechanically extracted fittings, lead free solder joints.

C. Equipment Drains and Overflows:
1. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40 black steel, malleable iron or forged steel fittings, threaded or welded joints.
2. Copper Tubing: ASTM B88, Type L, hard drawn, cast brass, wrought copper fittings, lead free solder joints.
3. PVC Pipe: ASTM D1785, Schedule 40, and Schedule 80 for sizes 8 inch and larger, or ASTM D2241, SDR 21 or 26, PVC fittings, solvent weld joints.

2.2 VALVES

A. Manufacturers:
1. American Wheatley
2. Bray International
3. DeZurik
4. Milwaukee Valve
5. Nibco
6. Stockham
7. Watts

B. Ball Valves:
1. Up to 2 inches: Bronze or stainless steel two piece body, chrome plated brass ball, full port, Teflon seats and stuffing box ring, lever handle, solder or threaded ends. Comply with MSS SP-110.
2. Over 2 inches: Cast steel flanged body, chrome plated steel ball, full port, Teflon seat and stuffing box seals and lever handle.
3. Insulated Piping: Provide 2” handle extension.

C. Butterfly Valves:
1. Up to 2 inches: Bronze body, stainless steel disc, resilient EPDM seat, threaded ends, extended neck.
2. Over 2 inches: Ductile iron body, aluminum bronze disc, replaceable EPDM rubber seat, full lug or wafer ends, stainless steel stem. Comply with MSS SP-67. Rated for 200 psi. Nibco Model LD 2000-3 or equal.
3. Operator:
   a. 6” and smaller: 10-position lever handle
   b. 8” and larger: Worm-driven gearbox with hand wheel
   c. 6” and larger (Above 8’ AFF): Worm-driven gearbox with chain
4. Provide 2” insulation extension where valve is installed in insulated piping.

D. Check Valves:
1. Spring Loaded, Globe Style: Cast iron body, bronze trim with Buna-N seat, threaded or flanged ends, stainless steel spring with renewable composition disc.

E. Water Pressure Reducing Valves (PRV):
1. Bronze body, adjustable spring seated EPDM diaphragm, replaceable stainless steel seat, stainless steel strainer, removable disc holder, with bypass feature. Pressure range 10-35 psi. ASSE 1003 listed. Watts Model U5-Z3 or equal.

F. Pressure Relief Valves:
1. Up to 1 inch: Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.
2. Over 2 inches: Differential Pressure Relief Valve, CLA-VAL 250-01 or equal. Class 150, Globe style, 50-150 psi adjustment range, ductile Iron body and cover, cast iron disc retainer and diaphragm washer, stainless steel trim, Buna-N Rubber disc and diaphragm, stainless steel stem, nut and spring.

2.3 PIPING SPECIALTIES

A. Manufacturers:
1. American Wheatley
2. DeZurik
3. Milwaukee Valve
4. Nibco
5. Stockham
6. Watts

B. General: Valve kits may be utilized ONLY on fan coil units and Terminal Boxes.

C. Flanges, Unions, and Couplings:
1. 2" and Smaller:
a. Steel: ASTM A197/ANSI B16.3 black malleable iron unions with brass seats.
b. Copper: ANSI B16.18 cast copper alloy unions on copper piping.
c. Use unions of a pressure class equal to or higher than that specified for the respective piping.
2. 2-1/2" and Larger:
a. Steel: ASTM A181 grade I or A105, grade III hot forged steel flanges of threaded, welding and of a pressure class compatible with that specified for valves, piping specialties and fittings of the respective piping service.
3. Flanges smaller than 2-1/2" may be used as needed for connecting to equipment and piping specialties. Use raised face flanges ANSI B16.5 for mating with other raised face flanges on equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment.
4. Hardware: Provide ASTM A 193 B7 grade bolts and A 194 2H grade nuts & hardened washers for connections (Star washers for grounding.)
5. Gaskets: Water and Glycol Systems: Branded, compressed, non-asbestos sheet gaskets. Klingersil C4401, Garlock 3000, JM Clipper 978 or approved equal.

6. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

D. Y-Strainers:
1. Size 2 inches and Under: Threaded brass or iron body for 175 psig working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
2. Size 2-1/2 inch to 4 inch: Flanged iron body for 175 psig working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
3. Size 5 inch and Larger: Flanged iron body for 175 psig working pressure, Y pattern with 1/8 inch stainless steel perforated screen.

E. Pump Discharge Flexible Connectors:
1. Corrugated stainless steel hose with single layer of 300 series stainless steel exterior braiding, carbon steel flanges rated for 150 psig, stainless steel flow straightening vanes, minimum 9 inches long; for maximum working pressure 150 psig.
2. Product shall provide flow straightening effect equivalent to 10 pipe diameters without affecting pump performance or increasing pressure drop more than the equivalent of 10 pipe diameters of piping.
3. Integral concentric reducer: flex connection shall include a reducer to adapt from pipe line size to the pump discharge size.
4. Product: Metraflex Vaneflex VF or preapproved equal

F. Flexible Connectors:
1. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure 300 psig.

G. Pressure/Temperature (P/T) Test Ports:
1. 1/4” threaded brass test plug with chain connected cap for secondary seal. Neoprene or Nordel core material designed for 0.156 inch (max) diameter insertion probe. Provide 2” extension for insulated piping. Trerice Model D3764 or equal.

H. Air Vents:
1. 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.
2. Float Type: 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.
3. High Capacity Float Type: Minimum 3/4” inlet size. Cast iron body and cover, stainless steel float and internal components. Suitable for system operating temperature and pressure; with isolating valve.

I. Balancing Valves:
1. Manufacturers:
   a. Taco, Accu-Flo
   b. Approved equal
2. Provide venturi type flow measuring/balancing valve with integral ball valve with memory lock for HVAC hydronic balancing. Each unit shall have differential pressure read out ports across a fixed orifice venturi. Pressure

rating as required for system installed. For sizes 2 inch and smaller, provide brass/bronze body, PTFE seat and seals, and FNTP/Sweat connections. For sizes 2 ½ inch to 10 inch, provide flanged, ductile iron bodies conforming to ASTM A395. Provide poly carbonite nameplate with flow information. Provide extension kit to allow insulation of valve body.

J. Pressure Gauges:
1. Provide gauge cock with each gauge.
2. Gages: ASME B40.1, with bourdon tube, glycerine filled, rotary brass movement, brass socket, black scale on white background.
   a. Case: 304 stainless steel with safety glass window
   b. Mounting: Turret
   c. Bourdon Tube: Beryllium Copper.
   d. Dial Size: 4-1/2 inch diameter.
   e. Full-Scale Accuracy: one percent.
   f. Scale: Psi.
3. Manufacturer: H.O. Trerice Model 700LFB or equal.

K. Thermometers:
1. Stem Type Thermometer: ASTM E1, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.
   a. H.O.Trerice, BX9140 or equal
   b. Size: 9 inch scale.
   c. Range:
      1) CHW: 0 to 100 deg F
      2) CW: 30 to 130 deg F
      3) HW: 30 to 240 deg F
   d. Window: Clear Lexan.
   e. Stem: Brass, 3/4 inch NPT.
   f. Accuracy: 2 percent.
   g. Calibration: Degrees F

L. Double Backflow Preventers:
1. Reduced Pressure Backflow Preventers: ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; pressure relief valve located between check valves; third check valve opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two ball valves, Y strainer, and four test cocks. Zurn/Wilkins Model 975XL or equal.

M. Expansion Tanks:
1. Manufacturers:
   a. American Wheatley
   b. Bell & Gossett
   c. Taco
   d. Armstrong
   e. Wessels

2. Construction: Bladder-type tank of welded steel, constructed, tested and stamped in accordance with ASME Code, Section VIII. 125 PSI working pressure. Precharged, heavy duty butyl rubber replaceable bladder. Ring base, lifiting rings, NPT system connection, and air charging valve. American Wheatley WFA Series or equal.

N. Water Meters:
1. Manufacturers: DLJ
2. Product:
a. Line sized with installation couplings or flanges
b. Multi-jet design, Accuracy within 1 percent
c. Dry Dial hermetically sealed, tempered glass lens
d. Magnetic Drive with large pointer dial with indication by 1/10 of a gallon
e. Low flow indicator for leak detection
f. Odometer type totalizer
g. Epoxy coated bronze body with sealed regulator port factory preset
h. Marked with year of manufacture and serial number
i. Integral Strainer in register chamber
j. Horizontally or vertically installation
3. Where EMC connection is required, provide dry contact (reed) pulse output option.

O. Chemical Bypass Feeder
1. Manufacturers:
a. Griswold, Model FB-5-SB-CS
2. Construction: Carbon steel vessel with external powder coat, pedestal mounted, safety bar closure, 5 gallon, ¾" pipe connections, funnel, stainless steel strainer basket.
3. Sock filters: Provide 10 sock filters rated for 5 microns for initial system cleaning.

2.4 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

C. Sealant: Acrylic.

D. Escutcheons: Provide stainless steel escutcheon plates for exposed exterior penetrations.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavate.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside piping before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - INSERTS

A. Install inserts for placement in concrete forms.

B. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

3.4 INSTALLATION - PIPING SYSTEMS

A. Install dielectric connections wherever jointing dissimilar metals.

B. Install unions downstream of valves and at equipment or apparatus connections.

C. Route piping parallel to building structure and maintain gradient.

D. Install piping to maintain headroom. Group piping to conserve space. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

G. Install piping system allowing clearance for installation of insulation and access to valves and fittings.

H. Install identification on piping systems including underground piping. Refer to Section 23 05 54 – Mechanical Identification.

I. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

J. Steel Piping:
   1. "Weldolets" and "Threadolets" may be used for branch takeoffs up to one-half (1/2) the diameter of the main.

K. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

L. Support tanks inside building from building structure. Provide additional structural support as required.

M. Install relief valves on low-pressure side of reducing valves.

N. Select system relief valve capacity greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment. Install piping from relief valve outlet to nearest floor drain.

O. Provide minimum 36” of fill coverage for piping.

3.5 INSTALLATION - VALVES

A. Install valves with stems upright or horizontal, not inverted.

B. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball or butterfly valves for throttling, bypass, or manual flow control services.

D. Provide lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

E. Install spring loaded check valves on discharge of pumps with 5 pipe diameters of straight pipe before check valve.

F. Install plug valves for throttling service. Install non-lubricated plug valves only when shut-off or isolating valves are also installed.

G. Install 3/4 inch ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest drain.

3.6 INSTALLATION - PIPING SPECIALTIES

A. Install one pressure gage for each pump, locate taps before strainers and at manufacturer boss fittings for suction and discharge of pump; manifold together with a ¼ turn valve cock on each connection and pipe to gage.

B. Install pressure gages with pulsation dampers. Provide ball valve to isolate each gage. Extend nipples to allow clearance from insulation.

C. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inches for installation of thermometer sockets. Allow clearance from insulation. Do not install other components within 12” above thermometer wells.

D. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

E. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

F. Install manual air vents at system high points.

G. For automatic air vents in ceiling spaces or other concealed locations, install vent tubing to nearest drain.

H. Provide drain and hose connection with ball valve on strainer blow down connections.

I. Pipe relief valve outlet to nearest floor drain.

3.7 CLEANING – HYDRONIC PIPING

A. Inspection: Inspect each run of each system for completion of joints, supports and accessory items. Inspect pressure piping in accordance with procedures of ANSI B31.

B. Flushing:
1. Flush interior of piping systems with clean water before proceeding with required chemical cleaning and testing.
2. Do not flush through coils or flow restriction flow devices. Remove or disconnect devices prior to flush.
3. Branch piping shall be flushed at 15 fps. Take precautions to avoid damage due to water hammer. Main piping shall be flushed at 10 fps. This flushing velocity will require use of fire hydrant flows. Disconnect/reconnect piping as required for required flushing. Manipulate outlet valves to achieve required flow rates during flushing. Flushing flowrates shall be maintained for 10 minutes (min) for each piping system.

C. After completion, fill, start, and vent prior to cleaning. Use water meter to record capacity in each system. Place terminal control valves in open position during cleaning.

D. Add cleaner to closed systems at concentration as recommended by manufacturer.

E. Hot Water Heating Systems: Apply heat and circulate for 12 hours minimum. Remove heat and cool; drain systems and refill with clean water. Circulate for 6 hours at design temperatures, then drain. Refill with clean water. Repeat until system cleaner is removed.

F. Chilled Water Systems: Circulate for 48 hours, then drain. Refill with clean water, circulate for 24 hours, then drain. Refill with clean water. Repeat until system cleaner is removed.

G. Flush open systems with clean water for one-hour minimum. Drain completely and refill.

H. Remove, clean, and replace strainer screens. Disassemble system components to inspect and remove sludge. Flush low points with clean water after cleaning process is completed.

3.8 PRESSURE TESTING - HYDRONIC PIPING

A. Provide all labor and materials required to perform the indicated tests. Notify Architect/ Engineer at least 48 hours before any testing is performed. Independent Agent or Owner shall verify pressure test and sign off. Report to be furnished to Architect/Engineer.

B. Steel and Copper Hydrostatic Testing: Before insulation is applied to field connections, hydrostatically pressure test each piping as a complete unit with fresh water to 100 psig or not less than 1.5 times system pressure rating, whichever is greater. Pressure testing with air will not be permitted. Remove air from system before start of tests. Pressure must hold for a minimum of 24 hours with a 4-psi maximum drop. Examine system for leaks and porosity. Replace porous sections

and repair leaks in accordance with pipe manufacturer's instructions, repeat tests until system is proven tight. During a 24-hour pressure holding period, valve off system and completely disconnect method of system pressurization.

END OF SECTION

SECTION 23 21 23

HYDRONIC PUMPS

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1.2 RELATED SECTIONS

A. Section 23 05 48 - Vibration Controls for HVAC Piping and Equipment: Product and execution requirements for vibration isolators.

B. Section 23 05 01 - Pipework: Execution requirements for placement of hangers and supports specified by this section.

1.3 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

B. Underwriters Laboratories Inc.:
   1. UL 778 - Motor Operated Water Pumps.

1.4 PERFORMANCE REQUIREMENTS

A. Provide pumps to operate at system fluid temperatures indicated on Drawings without vapor binding and cavitation.

B. Pumps shall be non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.5 SUBMITTALS

A. Section 23 05 01 – Pipework: 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.

E. Operation and Maintenance Data: Submit installation instructions, servicing requirements, assembly views, lubrication instructions, and replacement parts list.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five (5) years experience and with service facilities within 100 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years experience.

1.8 WARRANTY

A. Furnish one year manufacturer warranty for products provided under this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 – Pipework: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Protect systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 VERTICAL IN-LINE PUMPS

A. Manufacturers:

1. Armstrong
2. Bell and Gossett
3. Taco

B. Type: Vertical, single stage, close coupled, radial or horizontally split casing, for in-line mounting, for 175 psig working pressure.

C. Casing: Cast steel, with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction and discharge.

D. Impeller: Bronze, fully enclosed, keyed directly to motor shaft or extension.

E. Shaft: Carbon steel with stainless steel impeller cap screw or nut and bronze sleeve.

F. Shaft Sleeve: Aluminum bronze.

G. Seal: Packing gland with minimum four rings graphite impregnated packing and lantern ring, 230 degrees F maximum continuous operating temperature.

2.2 BASE MOUNTED PUMPS

A. Manufacturers:
1. Armstrong
2. Bell and Gossett
3. Grundfos
4. Taco

B. Type: Horizontal shaft, end suction, single stage, direct connected, radial split casing, for 175 psig maximum working pressure.

C. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.

D. Impeller: Bronze, fully enclosed, keyed to shaft, secured by hex head impeller nut and washer.

E. Bearings: Heavy duty, regreasable ball bearings.

F. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.

G. Seal: Carbon rotating against stationary ceramic seat, 225 degrees F maximum continuous operating temperature.

H. Baseplate: Cast iron or fabricated steel with integral drain rim.

I. Motor: NEMA compliant, Class F insulation.
1. Pumps required to be “Inverter Duty” by the schedule shall be IEEE MG-1, Part 31 rated.

J. Suction Diffuser: Provide suction diffuser as indicated on the pump schedule on the drawings. Maximum pressure drop of suction diffuser shall be 1.0 PSI. Remove suction diffuser strainer after system startup and flushing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify pump supports are installed and ready to receive pump.

3.2 INSTALLATION

A. Install suction diffuser between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings.

B. Install pumps on vibration isolators per Section 23 05 48.

C. Install flexible connectors at or near pumps. All piping supports on the pump side of the flexible connectors shall be flexible mounting.

D. Provide gauge manifold piping with individual ball or needle shutoff valves to allow measurement of pump suction and discharge pressures at factory boss fittings.

E. Provide air cock and drain connection on horizontal pump casings.

F. Provide drains for bases and seals.

G. Lubricate pumps before start-up.

3.3 CLEANING

A. Touch up all painted surfaces on pump with factory paint color.

END OF SECTION

SECTION 23 25 00

HVAC WATER TREATMENT SYSTEMS

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1.2 RELATED SECTIONS

A. Section 23 21 14 – HVAC Piping: Execution requirements for placement of HVAC piping specified by this section.

1.3 PERFORMANCE REQUIREMENTS

A. The types of water treatment systems specified are as follows:
   1. **Closed Hydronic System**: Provide equipment and chemicals necessary to prevent scale build-up and provide corrosion protection for the closed, recirculating hydronic water system specified.

B. Provide system to treat water available at project site to maintain the following characteristics of water:
   1. Hardness: 100-300.
   2. Total Alkalinity: 100-300.
   3. pH: 6.5-8.0

1.4 SUBMITTALS

A. Section 23 05 01 – Mechanical General Requirements: 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.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.

B. 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.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years experience with water analysis laboratories and full time service personnel.

B. Installer: Company specializing in performing Work of this section with minimum five (5) years documented experience approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 – Mechanical General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

PART 2 PRODUCTS

2.1 SYSTEM CLEANER

A. Product Description: Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodium tri-Poly phosphate and sodium molybdate.

B. Biocide; chlorine release agents including sodium hypochlorite or calcium hypochlorite, or microbiocides including quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.

2.2 CLOSED HYDRONIC SYSTEM

A. Acceptable Manufacturers/Servicing Companies:
1. Kibler Chemical Corp
2. Pre-approved Alternate

B. Sequestering agent to reduce deposits and adjust pH; polyphosphate.

C. Corrosion inhibitors; liquid boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulfites.

D. Conductivity enhancers; phosphates or phosphonates.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install all equipment in accordance with manufacturer's recommendations.

B. Install feeder across pump with isolation valves and drain.

3.2 SERVICE COMPANY TESTING EQUIPMENT:

A. The water treatment chemical and service supplier shall provide all labor and materials required to provide water testing and reporting. Where specialized or supplementary equipment is required, it shall be furnished as part of the offering.

3.3 HYDRONIC SYSTEM CLEANING AND FLUSHING

A. Leak test prior to cleaning and flushing process.

B. PREPARATION: Fill, start, vent, and operate systems for minimum 24 hours prior to cleaning. Use water meter to record capacity in each system.
1. Control Valves: Place two way control valves in open position during cleaning. Three way control valves shall be modulated periodically during process.
2. Flow control valves: temporarily remove or bypass flow limiting and flow control devices. Reinstall after completion.

C. Prior to final addition of treatment chemicals, the piping system shall be cleaned and flushed out as specified herein. Do not proceed with chemical treatment until other work has been completed.

D. CLEANING AND FLUSHING: All chemical, chilled water, and condenser water lines and related equipment shall be thoroughly flushed out.
1. Utilize a water service capable of achieving 10 FPS through all piping. Isolate system zones as necessary to achieve the required velocity.

2. Apply pre-cleaning chemicals designed to remove deposition from construction, such as pipe dope, oils, most loose mill scale and other extraneous materials. The products used shall inhibit corrosion of the various metals in the system and shall be safe to handle and use. Effectiveness of the product shall be such that the water need only be ambient temperature. Add recommended dosages of chemicals and circulate 6 to 8 hours.
3. Drain and flush until the total alkalinity of the rinse water is equal to the make-up water.
4. Clean strainers and re-flush any areas with significant debris accumulation.
5. After final flush, clean strainers.

3.4 CLOSED SYSTEM TREATMENT:

A. Provide one bypass feeder on each closed loop system. Install isolating and drain valves and interconnecting piping. Install as indicated on Drawings.

B. After final fill with clean water, introduce closed system treatment through bypass feeder to prevent scale and corrosion during operation of the water systems.

C. Test chemical composition and retreat as required to achieve acceptable inhibitor concentrations.

D. Provide a chemical test to the owner and engineer.

END OF SECTION

SECTION 23 52 00

HEATING BOILERS AND ACCESSORIES

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1.2 RELATED SECTIONS

A. Section 23 11 23 – Facility Natural Gas Piping: Product and execution requirements for gas piping associated with this section.

B. Section 23 21 14 – HVAC Piping: Product and execution requirements for piping associated with this section.

1.3 REFERENCES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.

C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

D. AHRI Compliance: Boilers shall be AHRI listed and must meet the minimum efficiency specified under AHRI BTS-2000 as defined by Department of Energy in 10 CFR Part 431.

E. ANSI Compliance: Boilers shall be compliant with ANSI Z21.13 test standards for US and Canada.

F. CSA Compliant: Boilers shall be compliant with CSA certification.

1.4 SYSTEM DESCRIPTION

A. Forced draft water boiler with horizontal grid, finned tube heat exchanger, gas burning system, refractory combustion chamber, controls, and boiler trim.

1.5 SUBMITTALS

A. Section 23 05 01 –Mechanical General Requirements: Submittal procedures.

B. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

C. Shop Drawings: For boilers, boiler trim, and accessories.
1. Include plans, elevations, sections, details, and attachments to other work.
2. Wiring Diagrams: Power, signal, and control wiring.

D. Source quality-control test reports: Indicate and interpret test results for compliance with performance requirements before shipping.

E. Field quality-control test reports: Indicate and interpret test results for compliance with performance requirements

F. Warranty: Standard warranty specified in this Section.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with the Florida Building Code.

B. Products shall be ASME stamped

C. Coordinate and provide inspection certification by the Florida State Fire Marshal - Boiler inspection department.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum 3 years experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 23 05 01 –Mechanical General Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.9 FIELD MEASUREMENTS

A. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 FINNED WATER-TUBE BOILERS - CONDENSING

A. Manufacturers:
1. Lochinvar
2. Patterson-Kelley
3. Laars

2.2 WARRANTY

A. Heat Exchanger, Pressure Vessel and Condensation Collection Basin shall carry a 10 year limited warranty against defects in materials or workmanship and failure due to thermal shock.

B. All other components shall carry a one year warranty from date of boiler start up.

2.3 CONSTRUCTION

A. Description: Boiler shall be natural gas or LP fired (according to the equipment schedule) and vertical water tubed design. The boiler shall be factory-fabricated, factory-assembled, and factory-tested, water-tube boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.

B. Heat Exchanger: The heater exchanger shall bear the ASME “H” stamp for 160 psi working pressure and shall be National Board listed. The heat exchanger shall be a “Fin Tube” design. The tubes shall be “rolled” securely into glass-lined, cast iron headers. Removable access plugs shall be provided on the heat exchanger headers for the purposes of inspection, cleaning or repair.

C. Burner: Forced draft single burner premix design. The burner shall be high temperature stainless steel with a ceramic fiber outer covering to provide modulating firing rates. The burner shall have minimum of a 5:1 gas train

turndown without loss of combustion efficiency. The burner shall have an independent laboratory rating for Oxides of Nitrogen (NOx) to meet requirements of South Coast Air Quality Management District (SCAMD) as compliant with Rule 1146.2.

D. Blower: Boiler shall be equipped with a pulse width modulating blower system to provide modulating boiler firing rates. The burner firing sequence of operation shall include pre-purge, firing, modulation, and post-purge operation.
   1. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

E. Gas Train: The boiler shall be supplied with a gas train designed with negative pressure regulation and shall be capable of a minimum 5:1 turndown.

F. Ignition: Hot surface ignition with 100 percent main-valve shutoff with electronic flame supervision.

G. Casing:
   1. Jacket: 18 gauge pre-primed and painted steel jacket
   2. Control Compartment Enclosures: NEMA 250, Type 1A.
   3. Insulation: Minimum ½ inch thick, mineral fiber insulation surrounding the heat exchanger.
   4. Combustion-Air Connections: Inlet and vent duct collars.

H. Characteristics and Capacities:
   1. Heating Medium: Hot water.
   2. Design Water Pressure Rating: 160 psi working pressure.
   3. Safety Relief Valve Setting: 50 psi

2.4 TRIM

A. Safety Relief Valve:
   1. Size and Capacity: 50 psi
   2. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.

B. Pressure Gage: Minimum 3-1/2 inch diameter. Gage shall have normal operating pressure about 50 percent of full range.

C. Drain Valves: (2) 3/4” NPS

2.5 CONTROLS

A. Refer to Division 23 Section "Instrumentation and Control for HVAC."

B. Boiler controls shall feature a standard, factory installed onboard controller interface display with the following standard features:
   1. Pump exercise: Boiler shall energize any pump it controls for an adjustable time if the associated pump has been off for a time period of 24 hours.
   2. Time clock: Boiler shall have an internal time clock with the ability to time and date stamp lock-out codes and maintain records of runtime.
   3. Service reminder: Boiler shall have the ability to display a yellow colored service notification screen based upon months of installation, hours of

operation, and number of boiler cycles. All notifications are adjustable by the installer.

4. Pump control: Boiler shall have the ability to control the boiler pump and HW system pump.
5. Anti-cycling control: Boiler shall have the ability to set a time delay after a heating demand is satisfied allowing the boiler to block a new call for heat. The boiler will display an anti-cycling blocking on the screen until the time has elapsed or the water temperature drops below the anti-cycling differential parameter. The anti-cycling control parameter is adjustable by the installer.
6. Freeze protection: Boiler shall turn on the boiler and system pumps when the boiler water temperature falls below 45 degrees. When the boiler water temperature falls below 37 degrees the boiler will automatically turn on. Boiler and pumps will turn off when the boiler water temperature rises above 43 degrees.
7. Condenser water valve control: Boiler shall have the ability to control a motorized control valve to maintain return water temperatures above 140°F.
8. BMS integration with 0-10V DC input: The Control shall allow an option to Enable and control set point temperature or control firing rate by sending the boiler a 0-10V input signal.
9. Data logging: Boiler shall have non-volatile data logging memory including last 10 lockouts, hours running and ignition attempts and should be able to view on boiler screen.
10. BAS integration via BACnet.

C. The boiler shall have a built-in Cascade controller to sequence and rotate lead boiler to ensure equal runtime while maintaining modulation of up to 8 boilers of different btu inputs without utilization of an external controller. The internal cascade controller shall include:
   1. Lead lag control for boiler staging.
   2. Optimize the capacity modulation and equalize run time.
   3. Cascade redundancy.
   4. Rotation of lead boiler.

D. Boiler operating controls shall include the following devices and features:
   1. Set-Point Adjust: Set points shall be adjustable.
   2. Operating Pressure Control: Factory wired and mounted to cycle burner.
   3. Sequence of Operation: Factory installed controller to modulate burner firing rate to maintain system water temperature in response to call for heat.

E. Burner Operating Safety Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
   1. High Temperature Limit: Automatic and manual reset stops burner if operating conditions rise above maximum boiler design temperature. Limit switch to be manually reset on the control interface.
   2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manually reset on the control interface.

3. High and Low Gas Pressure Switches: Optional pressure switches shall prevent burner operation on low or high gas pressure. Pressure switches to be manually reset on the control interface.
4. Blocked Drain Switch: Blocked drain switch shall prevent burner operation when tripped. Switch to be manually reset on the control interface.
5. Blocked Flue Switch: Pressure switches shall prevent burner operation on a blockage in the flue pipe. Switch to be manually reset on the control interface.
6. Audible Alarm: Optional factory mounted on control panel with silence switch; shall sound alarm for any lockout conditions.

F. Building Automation System Interface: Optional Modbus and BACnet MSTP communication protocols are available as well as gateways for Lon and BACnet IP to communicate with building automation system to monitor, control, and display boiler status and alarms.

2.6 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

2.7 CATEGORY IV VENTING

A. Products
1. Heat-Fab, Inc. Saf-T CI Vent with AL29-4C stainless steel
2. Protech Systems Inc. Fas N Seal Vent with with AL29-4C stainless steel
3. Equivalent Category IV vent system suitable for a condensing, positive pressure gas fired appliance. Products must be listed by a nationally recognized test agency.

B. Seal all joints and seams gas-tight.

C. Install venting and intake piping per manufacturer’s instructions.

D. Intake piping for all models must be of approved material as listed in the Installation and Operations manual.

2.8 SOURCE QUALITY CONTROL

A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

B. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

C. Allow Owner access to source quality-control testing of boilers. Notify Engineer 14 days in advance of testing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
   1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in of piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

A. Install equipment on 4” concrete housekeeping pad.

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

A. Install boilers level on concrete bases. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.

B. Install piping adjacent to boiler to allow service and maintenance.

C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

D. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of equipment connection. Provide a reducer if required.

E. Connect hot-water piping to supply and return boiler tappings with shutoff valve and union or flange at each connection.

F. Install piping from safety relief valves to nearest floor drain.

G. Boiler Venting:
   1. Install flue venting kit and combustion-air intake.
   2. Connect full size to boiler connections. Comply with requirements in Division 23 Section “Breechings, Chimneys, and Stacks.

H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

J. Shutdown safety switch:
1. Provide safety shutdown switches at each boiler room door.
2. Install the shutdown safety switch outside the boiler room door in a readily accessible location. The safety may be located inside the boiler room door if installing it outside could result in tampering of the switch.
3. Provide switch signage indicating ‘Emergency Boiler Shutdown’ in 2” high lettering colored red on a white background.
4. Wire shutdown switch to the boiler per the manufacturer’s recommendations.

3.4 HYDRONIC PIPING

A. Install piping adjacent to boiler to allow service and maintenance.

B. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

C. Connect hot-water piping to supply and return boiler tappings with shutoff valve and union or flange at each connection.

D. Install piping from safety relief valves to nearest floor drain.

3.5 GAS PIPING

A. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of equipment connection. Provide a reducer if required.

B. Gas piping shall be painted yellow prior to labeling.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:
1. Perform installation and startup checks according to manufacturer's written instructions. Complete startup form included with Boiler and return to Manufacturer as described in the instructions.

C. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

D. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
1. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

F. Performance Tests:
1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of boilers.
4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Engineer in advance of test dates.
8. Perform a combustion analysis after installation and adjust gas valve per the Installation and Operations manual and note in startup report.
9. Document test results in a report and submit to Architect.

3.7 DEMONSTRATION

A. Engage a factory representative or a factory-authorized service representative for boiler startup and to train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 26 01 00

OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. O & M Manuals contain copies of all warranties, operation and maintenance instructions, and other pertinent information relative to the project that is used throughout the life of the facility. This section contains additional requirements for the preparation of Electrical (Power and Lighting) and Systems Operation and Maintenance Manuals.

1.3 OPERATION AND MAINTENANCE MANUALS

A. O& M Manuals shall consist of PDF files sized to 8 1/2 inch x 11 inch sheets for Electrical and Systems. Refer to Division 01, General Requirements for additional requirements.

B. Description to include submittal type, i.e. Operation and Maintenance for Electrical (Power and Lighting).

C. O & M Data:

1. Manufacturers' operation and maintenance data is required for all items as called for in the specifications. O & M Manuals shall include manufacturer's name, model number(s), characteristics, manufacturer's agent, service agent, supplier, where and/or what item(s) are used for and description (i.e. surge suppression - switchboard MDPA).

2. Include troubleshooting instructions, list of special tools required, theory of operation, manufacturer's care and cleaning, preventative maintenance instructions, wiring diagrams, and point-to-point schematics.

D. O & M Manuals to include but are not limited to:

1. Completed forms and information per Division 01, General Requirements, and this section of the specifications. Reinforced separation sheets tabbed with the appropriate specification reference number and typed index for each section in the Systems Schedule.
   a) Table of Contents
   b) Check Out Memo
   c) Conductor Insulation Resistance Test
   d) Progress and Record Drawing Certification
   e) Spare Parts Certification Memo

2. Shop Drawings: Shop drawings shall be a copy of the final and accepted shop drawing submitted as required in Section Submittals. These shall be inserted in

binder in proper order.

3. Product Data: Product data and/or Catalog sheets shall be a copy of the final and accepted submittal submitted as required in Section Submittals. These shall be inserted in binder in proper order.
4. Warranties/Guarantees: Provide copy of warranties/guarantees. Original warranties/guaranties are to be incorporated into separate project warranty book with warranties/guarantees provided for other sections and divisions of the specifications and submitted for Architectural/Owner acceptance.
5. Copies of electrical panel schedules and electrical panel directories included with the corresponding specification section.
6. Wiring diagrams, schematic, etc. inserted in proper order, for:
   a) Control devices, motor controls.
   b) Each and every part of Division 28 sections of these Specifications.
7. Division 26
   a) Section 26 05 19 – Building Wire and Cable
      1. Product data and/or catalog sheets on all products applicable to this project.
   b) Section 26 05 26 – Grounding and Bonding
      1. Product data and/or catalog sheets on all products applicable to this project.
   c) Section 26 05 29 – Hangers and Supports
      1. Product data and/or catalog sheets on all products applicable to this project.
   d) Section 26 05 33 - Conduit
      1. Product data and/or catalog sheets on all products applicable to this project.
   e) Section 26 05 34 – Outlet Boxes
      1. Product data and/or catalog sheets on all products applicable to this project.
   f) Section 26 05 35 – Pull and Junction Boxes
      1. Product data and/or catalog sheets on all products applicable to this project.
   g) Section 26 05 37 – Surface Raceways
      1. Product data and/or catalog sheets on all products applicable to this project.
   h) Section 26 05 53 – Identification for Electrical Systems
      1. Product data and/or catalog sheets on all products applicable to this project.
      2. Equipment supplier list for each section's equipment.
   i) Section 26 27 16 – Cabinets and Enclosures
      1. Product data and/or catalog sheets on products applicable to this project.

2. Equipment supplier list for section’s equipment.

j) Section 26 27 26 – Wiring Devices
   1. Product data and/or catalog sheets on all products applicable to this project.
   2. Equipment supplier list for section's equipment.
   3. Ground fault wiring devices; in addition to above provide:
      (a) Wiring diagram.

k) Section 26 28 19 – Enclosed Disconnect Switches
   1. Product data and/or catalog sheets on equipment applicable to this project.

l) Section 26 29 13 – Motor Control
   1. Product data and/or catalog sheets on equipment applicable to this project.
   2. Equipment supplier list for section’s equipment.
   3. Internal wiring diagrams.
   4. Wiring diagrams.
   5. Bus diagrams.
   6. Operation and maintenance requirements, instructions, and recommended testing.
   7. Parts list.
   8. Equipment supplier list for section’s equipment.

m) Section 26 43 00 – Surge Protective Devices
   1. Product data and/or catalog sheets on all equipment applicable to this project.
   2. Equipment supplier list for section’s equipment.
   3. Parts list.
   4. Recommended testing and replacement procedures.

n) Sections 26 51 00 Interior Lighting
   1. Product data and/or catalog sheets on all equipment applicable to this project.
   2. Equipment supplier list for each sections equipment.
   3. Lighting fixtures; in addition to above provide the following:
      (a) Operation and maintenance requirements/instructions for special light fixtures (these fixtures to be determined by A/E) including:
         (1) Installation/removal instructions.
         (2) Special re-lamping instructions.
      (b) Parts list.

o) Sections 26 52 13 Emergency Lighting
   1. Product data and/or catalog sheets on all equipment applicable to this project.
   2. Equipment supplier list for each sections equipment.
   3. Lighting fixtures; in addition to above provide the following:
      (a) Operation and maintenance requirements/instructions for special light fixtures (these fixtures to be determined by A/E) including:
         (1) Installation/removal instructions.
         (2) Special re-lamping instructions.

(b) Parts list.

1.4 SUBMITTALS

A. Initial submittals shall be comprised of electronically created and annotated PDF files. Once the PDFs have been approved by Engineer print hard copies for Owner.

B. The Contractor shall review the manuals before submitting to the A/E. No request for payment will be considered until the brochure has been reviewed and submitted for acceptance.

C. Print a minimum of three (3) sets of O & M Manuals, for Owner.

D. Provide additional copies if additional copies are required in other Divisions and/or sections of these specifications.

1.5 DELAYS

A. Contractor is responsible for delays in job project accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.6 RESUBMITTALS

A. The A/E shall be reimbursed cost to review re-submittals subsequent to the second submittal.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

CHECK OUT MEMO

Check Out Memo shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name_____

Type of Equipment Checked_____

Equipment Number _____

Manufacturer of Equipment_____

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

- The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
- The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.*
- Written operating and maintenance information has been presented and reviewed in detail with the Contractor.
- Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

_____
MANUFACTURER'S REPRESENTATIVE – PRINT NAME

_____
ADDRESS

_____
TELEPHONE, FAX, E-MAIL

_____
MANUFACTURER'S REPRESENTATIVE – SIGNATURE AND TITLE

_____
DATE CHECKED

WITNESSED BY:

_____
CONTRACTOR'S REPRESENTATIVE – SIGNATURE AND TITLE

***EXCEPTIONS NOTED AT TIME OF CHECK-OUT (USE ADDITIONAL PAGE IF NECESSARY)**

CONDUCTOR INSULATION RESISTANCE TEST

PROJECT NAME_____

CONDUCTOR FROM _____ TO

SIZE _____

INSULATION TYPE _____

INSULATION VOLTAGE RATING_____

DATE_____ TIME_____

WEATHER CONDITIONS_____

TEST VOLTAGE (DC)_____

RANGE _____

MEGGER INSTRUMENT/SERIAL NUMBER_____

TESTING METHODOLOGY _____

INSULATION RESISTANCE MEASUREMENT (ACCEPTABLE MEASUREMENT NOT TO BE LESS THAN (500) MEGOHM):

PHASE A TO GROUND _____

PHASE B TO GROUND _____

PHASE C TO GROUND _____

NEUTRAL TO GROUND _____

ISOLATED GROUND TO GROUND _____

CONTRACTOR'S REPRESENTATIVE _____

DATE_____

OWNER'S REPRESENTATIVE _____

DATE:_____

ENGINEER'S REPRESENTATIVE:_____

DATE:_____

PROGRESS AND RECORD DRAWING CERTIFICATION

NAME OF PROJECT: _____

DIVISION NUMBER AND NAME: _____

This is to certify that the attached marked-up design prints were marked as the items were installed at the site during construction, and that these prints represent as accurate "As-Builts" record of the work as actually installed. One copy will be turned over to the Owner at the instruction in Operation Conference. The duplicate copy is for the Engineer's files.

_____
General Contractor

:

_____
By: Authorized Signature And Title

_____
Date

_____
Subcontractor

_____
By: Authorized Signature And Title

_____
Date

SPARE PARTS / MAINTENANCE STOCK CERTIFICATION

This form verifies that the parts/stock listed below has been delivered to and received by Maintenance Department. Original shall be included in the Closeout Documentation Manual. Copies shall also be included in the O & M Manual.

Project Name: _____

Type/Name of Spare Parts/Attic Stock: _____

_____

Specification Reference: _____

Quantity of Spare Parts/Attic Stock: _____

_____

_____

Signature below by the Contractor and Subcontractor signifies that the spare parts/maintenance stock, required by the Contract Documents, have been delivered to the Owner.

_____
Contractor/CM

_____ Date: _____
Authorized Signature, Title

_____
Subcontractor

_____ Date: _____
Authorized Signature, Title

Signature by the Owner acknowledges receipt of the same spare parts/maintenance stock.

_____
Department

_____ Date: _____
Authorized Signature, Title

BINDER EXAMPLES FOR SUBMITTALS

Insert In Vinyl Pockets (Front & Spline) 3-Ring Binder

MANUAL COVER (face)

Timbercrest Elementary Upgrade Boilers
2401 Eustace Ave. Deltona, FL 32725

VCS No. 2648255
MPE No.2026-041

ELECTRICAL
OPERATION AND MAINTENANCE MANUAL

DATE
(substantial completion date)

MANUAL COVER (Spine)

Timbercrest
Elementary
Upgrade Boilers
2401 Eustace Ave.
Deltona, FL 32725

VCS No. 2648255

MPE No. 2026-041

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OPERATION AND
MAINTENANCE
MANUAL

DATE

SECTION 26 01 03

MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide and install all equipment, labor, material, accessories, and mounting hardware for minor electrical demolition for remodeling.

1.3 REFERENCES

A. NFPA 70 National Electrical Code
B. Underwriters Laboratories

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work as specified in individual sections.

B. Provide all materials necessary for work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on field observation and existing record documents. Report discrepancies to Architect/Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner, Architect/Engineer at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner, Architect/Engineer and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. For the full period of time the system is deactivated, a safety fireman's watch is required to be provided to enact a fire watch for areas that experience a loss of fire protection and notification coverage due to the modifications.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction.

B. Remove abandoned wiring to source of supply.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.

D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

E. Disconnect and remove abandoned panelboards and distribution equipment.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

H. Repair adjacent construction and finishes damaged during demolition and extension work.

I. Seal openings in walls, floors, etc. and fire stop in accordance with the accepted UL detail to maintain integrity of assembly.

J. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate and as required to comply with the requirements of the NEC.

K. Extend existing installations using materials and methods compatible with existing electrical installations. Extension must meet or exceed the materials/methods specified in the contract documents.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused, including but not limited to:

1. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Replace any missing cover screws with new cover screws obtained from existing panel manufacturer. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 01 05

INVESTIGATION OF EXISTING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes testing and documentation of existing electrical systems.

B. Test the essential features of the following existing electrical systems:

1. Fire detection devices, smoke detection devices.
2. Intercommunication equipment.
3. Outlets: Convenience.
4. Switches: Regular, time.

C. Each system shall be tested once only, and after completion of testing, results given to the Owner, Engineer and/or Owner's Representative. Point out any non-operational function noticed during testing.

D. Document the existing conditions and operation of the existing electrical systems prior to any work.

E. Contractor is responsible for all non-working systems and their components unless non-working status is verified prior to work on system.

1.3 REFERENCES

A. IEEE Recommended Practices

1.4 DESCRIPTION

1.5 TIME

A. The testing shall be held at a date to be agreed upon in writing by the Owner or his representative.

1.6 ATTENDING PARTIES

A. The testing shall be held in the presence of the Owner, or his Representative and Contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PERFORMANCE VERIFICATION

A. Test the operation of each of the following existing devices and associated systems:

1. Fire Alarm System:

a) Test Fire Alarm System sufficiently to determine existing operating condition of system. Pull the pull stations, check automatic detectors. Test minimum of one manual device per zone, and one automatic device per zone.

b) Upon alarm activation verify that the fire alarm zone lights and audible/visual signals function properly. Verify that the local fire department or responding agency receives an automatic signal.

2. Intercom System:

a) Test intercom system sufficiently to determine existing operating condition of system. Check minimum of one call-in station/handset per switchbank and per building.

b) Check for call-in annunciation and communication.

c) Check all call, emerg. call, etc.

3. Lighting and Exit Lighting Fixtures In Areas of Remodel and/or Renovation:

a) Test all lighting fixtures and exit lights for proper operation, list bad ballasts, lamps or broken lenses. Record location of fixtures tested.

b) Test light switches, relay controls, and photo cell controls for proper operation. Record location of tested device; note operational or non-operational.

4. Wiring Devices (Outlets) In Areas of Remodel and/or Renovation:

a) Test receptacles for continuity, open grounds, open neutrals etc. Use circuit testers and record location and results of tested device.

B. The Electrical Contractor shall investigate all existing systems as called out in this performance verification prior to the beginning of any work which could affect these systems.

C. Each system shall be retested after completion of remodel and/or renovation to ensure proper operation is maintained. Demonstrate operation per Section 26 05 06 Demonstration of Completed Electrical Systems.

3.2 INVESTIGATION/TESTING FORMS

A. Submit Existing Facilities Investigation Form (included at the end of this Section) and advise Owner/Engineer of all deficiencies in system(s) prior to work. All systems will be assumed to be fully operational if Form is not received by Engineer prior to work on system.

B. Submit five copies of Existing Facilities Investigation Form for each device tested, signed by the Contractor, Subcontractor and Owner and submit each test result to the Owner's Authorized Representative.

Attachments:
Existing Facilities Investigation

END OF SECTION

EXISTING FACILITIES INVESTIGATION

PROJECT:_____

The existing systems on the above project have been investigated and checked to determine the existing condition of all existing electrical systems within the area(s) affected by the scope of work of this project. The investigation consisted of testing all electrical systems/devices as required by Section 26 01 05 Investigation of Existing Electrical Systems.

All equipment was found to be operational except as noted herein (list below):

_____
PRIME CONTRACTOR

_____
AUTHORIZED SIGNATURE AND TITLE

DATE_____

_____
OWNER'S AUTHORIZED REPRESENTATIVE

_____
AUTHORIZED SIGNATURE AND TITLE

DATE_____

Note To Contractor: Upon completion of investigation and one week prior to the commencement of work, submit five copies of the completed Existing Facilities Investigation Form to the Owner's Authorized Representative, signed and dated by the Contractor. The Owner’s Authorized Representative’s signature and date is required to verify receipt of Form. Retain copies and submit copy of Form in each Operation and Maintenance Manual. Contractor shall submit quantities of Forms as required to present required information.

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes Basic Electrical Requirements specifically applicable to Divisions 26, 28 Sections.

1.3 DESCRIPTION OF WORK

A. The work required under this Division shall include all materials, labor and auxiliaries required to install a complete and properly operating electrical system.

B. The Contractor shall furnish, perform, or provide all labor including planning, purchasing, transporting, storing, installing, testing, cutting and patching, trenching, excavating, backfilling, coordination, field verification, equipment (installation and safety), supplies, and materials necessary for the correct installation of complete electrical systems (as described or implied by these specifications and the applicable drawings) in strict accordance with applicable codes, which may not be repeated in these specifications, but are expected to be common knowledge of qualified Bidders.

C. The Division 26 Sections refer to work required in addition to (or above) the minimum requirements of the NEC and applicable local codes. All work shall comply with all applicable codes as a minimum and with the additional requirements called for in these Contract Documents.

D. Only trained and qualified personnel shall be used by the Contractor to perform work. The Contractor shall not perform work which violates applicable Codes, even if called for in the Contract Documents. The Contractor's Bid shall include work necessary to completely install the electrical systems indicated by the Contract Documents in accordance with applicable Codes.

E. Refer to other Division 26 Sections for additional work requirements.

F. Connections of all items using electric power shall be included under this division of the specifications, including necessary wire, conduit, circuit protection, disconnects and accessories. Securing of roughing-in drawings and connection information for equipment involved shall also be included under this division. See other divisions for specifications for electrically operated equipment.

1.4 WORK SEQUENCE

A. Install work in stages and/or phases to accommodate Owner's occupancy requirements. Coordinate electrical schedule and operations with Owner and Architect/Engineer.

1.5 CODES, FEES, AND STANDARDS

A. Conform to all applicable requirements of Section 26 05 09 Reference Standards and Regulatory Requirements.

B. Obtain permits and request inspections from authority having jurisdiction and applicable utility companies.

C. Pay for all required licenses, fees, and inspections.

D. Material shall be new and free of defects with UL listing or be listed with an approved, nationally recognized Electrical Testing Agency if and only if UL listing is not available for material.

1.6 PROJECT/SITE CONDITIONS

A. Install Work in locations shown or described in the Contract Documents, unless prevented by Project conditions.

B. The Contractor shall install all equipment so that all Code required, and manufacturer recommended servicing clearances are maintained. Contractor shall be responsible for the proper arrangement and installation of all equipment within any designated space. Should the Contractor determine that a departure from the Contract Documents is necessary, he shall submit to the A/E, for approval, detailed drawings of his proposed changes with his written reasons for the changes. No changes shall be implemented by the Contractor without the issuance of the required drawings, clarifications, and/or change orders.

C. The Contractor shall verify finish dimensions at the project site in preference to using dimensions noted on Contract Documents.

1.7 INVESTIGATION OF SITE

A. Check site and existing conditions thoroughly before bidding. Advise A/E of discrepancies or questions noted.

B. Each Bidder shall visit the site and shall thoroughly familiarize himself with existing field conditions and the proposed work as described or implied by the Contract Documents. During the course of the site visit, the electrical bidder shall verify every aspect of the proposed work and the existing field conditions in the areas of construction and demolition which will affect his work. The Contractor will receive no compensation or reimbursement for additional expenses he incurs due to failure to make a thorough investigation of the existing facilities. This shall include rerouting around existing obstructions.

C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.

D. Existing conditions and utilities indicated are taken from existing construction documents, surveys, and field investigations. Unforeseen conditions probably exist and existing conditions shown on drawings may differ from the actual existing installation with the result being that new work may not be field located exactly as shown on the drawings. Contractor shall field verify dimensions of all site utilities, conduit routing, boxes, etc., prior to bidding and include any deviations in the contract.

Notify A/E if deviations are found.

E. All existing electrical is not shown. The Contractor shall become familiar with all existing conditions prior to bidding and include in his bid the removal of all electrical equipment, wire, conduit, devices, fixtures, etc. that is not being reused, back to its originating point.

F. The Contractor shall locate all existing utilities and protect them from damage. The Contractor shall pay for repair or replacement of utilities or other property damaged by operations in conjunction with the completion of this work.

G. Remove existing power, lighting, systems, material and equipment which are made obsolete or which interfere with the construction of the project. Reinstall power, lighting, systems, materials and equipment which are required to remain active for the facility to be fully functional.

H. All items removed and not re-used shall be immediately turned over to Owner as they are made available by renovation. Remove items from job site and deliver to Owner's storage location(s) as directed by project manager. Discard complete items which Owner elects to refuse.

I. Investigate site thoroughly and reroute all conduit and wiring in area of construction in order to maintain continuity of existing circuitry. Existing conduits indicated in Contract Documents indicate approximate locations only. Contractor shall verify and coordinate existing site conduits and pipes prior to any excavation on site. Bids shall include hand digging and all required rerouting in areas of existing conduits or pipes.

J. Work is in connection with existing buildings which must remain in operation while work is being performed. Work shall be in accord with the schedule required by the Contract. Schedule work for a minimum outage to Owner. Notify Owner 72 hours in advance of any shut-down of existing systems. Perform work during non-school operating hours unless otherwise accepted by Owner. Protect existing buildings and equipment during construction.

K. Bid shall include all removal and relocation of all piping, fixtures or other items required for completion of alterations and new construction.

L. See Section Minor Electrical Demolition for Remodeling for additional requirements due to existing conditions.

1.8 CONTRACT DOCUMENTS

A. These specifications and applicable drawings shall be considered supplementary, one to the other and are considered Contract Documents. All workmanship, methods, and/or material described or implied by one and not described or implied by the other shall be furnished, performed, or otherwise provided just as if it had appeared in both sets of documents.

B. Where a discrepancy or conflict is found between these specifications and any applicable drawing, the Contractor shall notify the A/E in written form. In the event that a discrepancy exists between specifications and any applicable drawing, the most stringent requirement shall govern unless the discrepancy conflicts with applicable codes wherein the code shall govern. The most stringent requirement shall be that work, product, etc which is the most expensive and costly to implement.

C. The drawings are diagrammatic and are not intended to include every detail of construction, materials, methods, and equipment. They indicate the result to be achieved by an assemblage of various systems. Coordinate equipment locations with Architectural and Structural drawings. Layout equipment before installation so that all trades may install equipment in spaces available. Coordinate installation in a neat and workmanlike manner.

D. Wiring arrangements for equipment shown on the drawings are intended to be diagrammatic and do not show all required conductors and functional connections. All wiring and appurtenances required for the proper operation of all equipment to be connected shall be provided.

E. Specifications require the Contractor to provide shop drawings which shall indicate the fabrication, assembly, installation, and erection of a particular system's components. Drawings that are part of the Contract Documents shall not be considered a substitute for required shop drawings, field installation drawings, Code requirements, or applicable standards.

F. Locations indicated for outlets, switches, and equipment are approximate and shall be verified by instructions in specifications and notes on the drawings. Where instructions or notes are insufficient to locate the item, notify the A/E.

G. The Contractor shall take finish dimensions at the project site in preference to scaling dimensions on the drawings.

H. Where the requirements of another division, section, or part of these specifications exceed the requirements of this division those requirements shall govern.

1.9 MATERIALS AND EQUIPMENT

A. Material shall be new (except where specifically noted, shown or specified as "Reused") and/or denoted as existing) and shall be UL listed and bear UL label. Where no UL label listing is available for a particular product, material shall be listed with an approved, nationally recognized Electrical Testing Agency. Where no labeling or listing service is available for certain types of equipment, test data shall be submitted to prove to the Engineer that equipment meets or exceeds available standards.

B. Where Contract Documents list design selection or manufacturer, type, this model shall set the standard of quality and performance required. Where no brand name is specified, the source and quality shall be subject to A/E's review and acceptance. Where Contract Documents list accepted substitutions, these items shall comply with Section Substitutions and requirements.

C. When a product is specified to be in accordance with a trade association or government standard and at the request of A/E the Contractor shall furnish a certificate that the product complies with the referenced standard and supporting test data to substantiate compliance.

D. Where multiple items of the same equipment or materials are required, they shall be the product of a single Manufacturer.

E. Where the Contract Documents require materials and/or equipment installed, pulled, or otherwise worked on, the materials and/or equipment shall be furnished and installed

by the Contractor responsible for Division 26 methods and materials unless specifically noted otherwise.

F. Where the contract documents refer to the terms "furnish," "install," or "provide," or any combination of these terms) the materials and/or equipment shall be supplied and delivered to the project including all labor, unloading, unpacking, assembly, erection, anchoring, protecting supplies and materials necessary for the correct installation of complete system unless specifically noted otherwise.

G. Before the Contractor orders equipment, the physical size of specified equipment shall be checked to fit spaces allotted on the drawings, with NEC working clearances provided. Internal access for proposed equipment substitutions shall be provided.

H. Electrical equipment shall be protected from the weather during shipment, storage, and construction per manufacturer's recommendations for storage and protection. Should any apparatus be subjected to possible damage by water, it shall be thoroughly dried and put through a dielectric test, at the expense of the Contractor, to ascertain the suitability of the apparatus, or it shall be replaced without additional cost to the Owner. No additional time will be allowed and the project completion date shall be maintained.

I. Inspect all electrical equipment and materials prior to installation. Damaged equipment and materials shall not be installed or placed in service. Replace or repair and test damaged equipment in compliance with industry standards at no additional cost to the Owner. Equipment required for the test shall be provided by the Contractor with no additional cost to the Contract.

J. Material and equipment shall be provided complete and shall function up to the specified capacity/function. Should any material and/or equipment as a part or as a whole fail to meet performance requirements, replacements shall be made to bring performance up to specified requirements. Damages to finish by such replacements, alterations, or repairs shall be restored to prior conditions, at no additional cost to the Owner.

K. Where tamperproof screws are specified or required, Phillips head or Allen head devices shall not be accepted. For each type used, provide Owner with three tools. Owner will designate the specific hardware design to correspond with existing devices elsewhere in the building, to limit special tool requirements.

L. Where the Contract Documents denote equipment and/or material to be 'new' and/or 'existing' and also provide no denotation for other equipment as to it being 'new' and/or 'existing,' this is not to infer that the non-denoted equipment is either new or existing, or opposite of the equipment that is denoted. The use of the terms 'new' or 'existing' is meant to clarify denoted equipment/materials for that item only, and the lack of the terms 'new' or 'existing' in relation to identifiers/notes/denotations on the drawings is not to infer that this non-denoted equipment or materials is new or existing.

1.10 MISCELLANEOUS CIRCUITS REQUIRED

A. Provide 120 volt, 20 amp circuit to building control panels for HVAC system (whether shown on drawings or not). Connect to spare 20 amp, 1 pole circuit breaker in nearest 120 volt panel. Re-label circuit breaker accordingly. Provide locking device on breaker. Coordinate location with fire protection engineer (and drawings/specifications) prior to

bid and provide all electrical. Coordinate final location and electrical requirements with damper installer after bid and provide all electrical

1.11 SUPERVISION OF THE WORK

A. Reference the General Conditions for additional requirements.

B. The Contractor shall provide experienced, qualified, and responsible supervision for work. A competent foreman shall be in charge of the work in progress at all times. If, in the judgement of the A/E, the foreman is not performing his duties satisfactorily, the Contractor shall immediately replace him upon receipt of a letter of request from the A/E. Once a satisfactory foreman has been assigned to the work, he shall not be withdrawn by the Contractor without the written consent of the A/E.

C. Provide field superintendent who has had a minimum of four (4) years previous successful experience on projects of comparable size and complexity. Superintendent shall be on the site at all times during construction and must have, as a minimum, an active Journeyman's Electrical License in the State of Florida.

D. Superintendent shall be employed by a currently licensed Florida Certified Electrical Contractor (EC).

1.12 COORDINATION

A. Provide all required coordination and supervision where work connects to or is affected by work of other trades, and comply with all requirements affecting this Division. Work required under other divisions, specifications or drawings to be performed by this Division shall be coordinated with the Contractor and such work performed at no additional cost to Owner.

B. Contractor shall obtain set of Contract Documents from Owner for all areas of work noted above and include all electrical work in bid whether included in Division 26 Sections or not.

C. Installation studies shall be made to coordinate the electrical work with other trades. Work shall be preplanned. Unresolved conflicts shall be referred to the A/E prior to installation of the equipment for final resolution.

D. For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings at 1/4" scale showing the actual physical dimension required for the installation to assure proper integration of equipment with building systems and NEC required clearances. Coordination drawings shall be provided for all areas of conflict as determined by the A/E.

E. Secure accepted shop drawings from all required disciplines and verify final electrical characteristics before roughing power feeds to any equipment. When electrical data on accepted shop drawings differs from that shown or called for in Construction Documents, make adjustments to the wiring, disconnects, and branch circuit protection to match that required for the equipment installed.

F. Damage from interference caused by inadequate coordination shall be corrected at no additional cost to the Owner and the contract time for completion will not be extended.

G. The Contractor shall maintain an up-to-date set of Contract Documents (Drawings and

Specifications) of all trades on the project site, including Mechanical and Electrical.

H. The Contract Documents describe specific sizes of switches, breakers, fuses, conduits, conductors, motor starters and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). The Contractor shall coordinate the requirements of each load with each load's respective circuitry shown and with each load's requirements as noted on its nameplate data and manufacturer's published electrical criteria. The Contractor shall adjust circuit breaker, fuse, conduit, and conductor sizes to meet the actual requirements of the equipment being provided and installed and change from single point to multiple points of connection (or vice versa) to meet equipment requirements. Changes due to these coordination efforts shall be made at no additional cost to the Owner.

1.13 PROVISION FOR OPENINGS

A. Locate openings required for work. Provide sleeves, guards or other accepted methods to allow passage of items installed.

B. Coordinate with roofing Contractor on installation of electrical items which pierce roof. Roof penetrations shall not void roof warranty.

C. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types with Contractor prior to installation.

1.14 CONCRETE PADS

A. Furnish and install reinforced concrete housekeeping pads for transformers, switchgear, motor control centers, and other free-standing equipment. Unless otherwise noted, pads shall be four (4) inches high and shall exceed dimensions of equipment being set on them, including future sections, by six (6) inches each side, except when equipment is flush against a wall where the side against the wall shall be flush with the equipment. Pads shall be reinforced with W1.4 x 1.4 6 x 6 welded wire mesh. Chamfer top edges 1/2". Trowel all surfaces smooth. Provide 3000 psi concrete.

1.15 SURFACE MOUNTED EQUIPMENT

A. Surface mounted fixtures, outlets, cabinets, conduit, panels, etc. shall have factory applied finish and/or shall be painted as directed by Engineer. Paint shall be in accordance with other applicable sections of the specifications for this project.

1.16 CUTTING AND PATCHING

A. New Construction:

1. Reference Division 01 - General Requirements.

2. Cutting of work in place shall be cut, drilled, patched and refinished by trade responsible for initial installation.

3. The Contractor shall be responsible for backfilling and matching new grades with adjacent undisturbed finished surface.

B. Existing Construction:

1. See Section Minor Electrical Demolition for Remodeling for additional requirements.

1.17 TRENCHING

A. Trench excavations in excess of 5 feet deep shall comply with OSHA Standard 29 CFR 1926. 650 Subpart P. Contractor shall complete form as referenced in Section Instructions to Bidders.

1.18 INSTALLATION

A. Erect equipment to minimize interferences and delays in execution of the work.

B. Take care in erection and installation of equipment and materials to avoid marring finishes or surfaces. Any damage shall be repaired or replaced as determined by the A/E at no additional cost to the Owner.

C. Equipment requiring electrical service shall not be energized or placed in service until A/E is notified and is present or have waived their right to be present in writing. Where equipment to be placed in service involves service or connection from another Contractor or the Owner, the Contractor shall notify the Owner in writing when the equipment will be ready. The Owner shall be notified as far in advance as possible of the date the various items of equipment will be complete.

D. Equipment supports shall be secured and supported from structural members except as field accepted by the A/E in writing.

E. Plywood material shall not be used as a backboard for mounting panel boards, disconnects, motor starters, and dry type transformers. Provide "cast in place" type inserts or install expansion type anchor bolts. Electrical equipment shall not be mounted directly to dry wall for support without additional channels as anchors. Channels shall be anchored to the floor and structure above. Panelboards and terminal cabinets shall be provided with structural framing located within drywall partitions.

F. The Contractor shall keep the construction site clean of waste materials and rubbish at all times. Upon completion of the work, the Contractor shall remove from the site all debris, waste, unused materials, equipment, etc.

G. Inserts, pipe sleeves, supports, and anchorage of electrical equipment shall be provided. Where items are to be set or embedded in concrete or masonry, the items shall be furnished and a layout made prior to the setting or embedment thereof, so as to cause no delay to the project schedule.

1.19 PROGRESS AND RECORD DRAWINGS

A. Keep two sets of blueline prints on the job and neatly mark up design drawings each day as components are installed. Different colored pencils shall be used to differentiate each system of electrical work. Cost of prints and this labor task shall be included under this Division. All items on Progress Drawings shall be shown in actual location installed. Change the equipment schedules to agree with items actually furnished.

B. Prior to request for substantial completion observation, furnish a set of neatly marked prints showing "as-installed" (as-built) condition of all electrical installed under this

Division of the specifications. Marked up prints are to reflect all changes in work including change orders, field directives, addenda from bid set of Contract Documents, request for information responses, etc. Marked up set of prints to show:

1. All raceways 1-1/2" and above, exactly as installed.
2. All site raceways exactly as installed.
3. Any combining of circuits (which is only allowed by specific written permission) or change in homerun outlet box shall be made on as-builts.
4. Any circuit number changes on plan shall be indicated on as-builts.
5. Any panelboard schedule changes shall be indicated on as-builts and final panelboard schedules.

C. Marked up prints as noted above are to be submitted to A/E for review. Contractor shall review submitted "as-builts" with Engineer in the field. Contractor shall verify every aspect for accuracy.

D. After acceptance of marked up prints by A/E with all changes, additions, etc. included on accepted marked up prints, submit set prior to request for final payment and/or request for final observation.

E. Where the Contractor has failed to produce representative "as-built" drawings in accordance with requirements specified herein, the Contractor shall reimburse Engineer all costs to produce a set of "as-built" drawings to the Architect/Owner satisfaction.

1.20 "OBSERVATION OF WORK" REPORT

A. Reference the General Conditions.

B. Items noted by A/E or his representative during construction and before final acceptance which do not comply with the Contract Documents will be listed in a "Observation of Work" report which will be sent to the Contractor for immediate action. The Contractor shall correct all deficiencies in a prompt concise manner. After completion of the outstanding items, provide a written confirmation report for each item to the A/E. The report shall indicate each item noted, and method of correction. Enter the date on which the item was corrected and return the signed reports so items can be rechecked. Failure to correct the deficiencies in a prompt concise manner or failure to return the signed reports shall be cause for disallowing request for payments.

C. Items noted after acceptance during one-year guarantee period shall be checked by the Contractor in the same manner as above. The signed reports are to be returned by him when the items have been corrected.

1.21 SYSTEMS WARRANTY

A. Reference the General Conditions.

B. The work shall include a one-year warranty. This warranty shall be by the Contractor to the Owner for any defective workmanship or material which has been furnished at no cost to the Owner for a period of one year from the date of substantial completion of each System. Warranty shall not include lamps in service after one month from date of substantial completion of the System. Explain the provisions of warranty to the

Owner at the "Demonstration of Completed System" meeting to be scheduled with the Owner upon project completion.

C. Where items of equipment or materials carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material.

D. Where extended warranty or guarantee are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.

E. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work which shall not alter the Contractor's warranty.

1.22 WASTE MATERIALS DISPOSAL

A. Contractor shall include in his bid the transport and disposal or recycling of all waste materials generated by this project in accordance with all rules, regulations and guidelines applicable. Contractor shall comply fully with Florida statute 403.7186 regarding mercury containing devices and lamps. Lamps, ballasts and other materials shall be transported and disposed of in accordance with all DEP and EPA guidelines applicable at time of disposal. Contractor shall provide owner with written certification of accepted disposal.

1.23 SUBSTANTIAL COMPLETION

A. The Contractor shall be fully responsible for contacting all applicable parties (Engineer and Owner’s Representative) to schedule required observations of the work by Engineer. A minimum of 120 hours notice shall be given for all required observations of the work by Engineer, and minimum of 7 days for substantial completion observation. Time and date shall be agreed on by all applicable parties in writing.

B. Work shall be complete as required by authorities having jurisdiction and the general conditions of the contract prior to request for substantial completion observation. Work must be deemed substantially complete by A/E to fulfill requirements.

1.24 PROHIBITION OF ASBESTOS AND PCB

A. The use of any process involving asbestos or PCB, and the installation of any product, insulation, compound of material containing or incorporating asbestos or PCB, is prohibited. The requirements of this specification for complete and operating electrical systems shall be met without the use of asbestos or PCB.

B. Prior to the final review field visit, the Contractor shall certify in writing that the equipment and materials installed in this Project under Division 26 contain no asbestos or PCB’s. Additionally, all manufacturers shall provide a statement with their submittal that indicates that their product contains no asbestos or PCB’s. This statement shall be signed and dated by a duly authorized agent of the manufacturer.

PART 2 - PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 26 05 03

EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF SYSTEM

A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

1. Electrical connections to equipment specified under other sections.

1.3 RELATED SECTIONS

A. Summary of Work

B. Conduit

C. Building Wire and Cable

D. Boxes

1.4 REFERENCES

A. NEMA WD 1 - General Requirements for Wiring Devices

B. NEMA WD 6 - Wiring Devices-Dimensional Requirements

C. ANSI/NFPA 70 - National Electrical Code.

1.5 SUBMITTALS

A. Submit under provisions of the General Requirements of the Contract Documents and Section 26 05 07 Submittals.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.7 COORDINATION

A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.

D. Sequence electrical connections to coordinate with start-up schedule for equipment.

PART 2 - PRODUCTS

2.1 CORDS AND CAPS

A. Attachment Plug Construction: Conform to NEMA WD 1.

B. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.

C. Cord Construction: ANSI/NFPA 70, Type SO multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conditions under provisions of Section 26 01 05 Investigation of Existing Electrical Systems.

B. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquid tight flexible conduit with watertight connectors in damp or wet locations (including inside of coolers/freezers).

C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment and in cooler/freezers.

D. Provide receptacle outlet where connection with attachment plug is required. Provide cord and cap where field-supplied attachment plug is required.

E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

F. Install disconnect switches, controllers, control stations, and control devices as required.

G. Modify equipment control wiring with terminal block jumpers as required.

H. Provide interconnecting conduit and wiring between devices and equipment where required.

I. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

3.3 EQUIPMENT CONNECTION SCHEDULE

A. By local authority and as required for a complete and operating service.

END OF SECTION

SECTION 26 05 06

DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes the requirements for demonstration of completed electrical systems:

B. Demonstrate to Owner the essential features of the following electrical systems:

1. Communications Systems
   a) Each system included in Systems sections.
2. Electrical Entrance Equipment
   a) Circuit breakers
   b) Fuses and fuseholders
3. Miscellaneous Electrical Equipment
   a) Electrical systems controls and equipment
   b) Electrical power equipment
4. Distribution Equipment
   a) Lighting and appliance panelboards
   b) Distribution panels
   c) Switchboard
5. Wiring Devices
   a) Low-voltage controls
   b) Switches: regular, time

C. Upon completion of testing, each system is to be demonstrated only once.

1.3 TIME

A. The demonstration shall be held upon completion of testing of all systems at a date to be agreed upon in writing by the Owner or his representative.

1.4 ATTENDING PARTIES

A. The demonstration shall be held by this Contractor in the presence of the Owner and the manufacturer's representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 DEMONSTRATION

A. Demonstrate the function and location (in the structure) of each system and indicate its relationship to the riser diagrams and drawings.

B. Demonstrate by "start-stop operation" how to work the controls, how to reset

protective devices, how to replace fuses, and what to do in case of emergency.

C. Performance Verification and Demonstration to Owner

1. Submit Check Out Memo form for each item, equipment and system. Copy to be included in each Operation and Maintenance Manual.

END OF SECTION

CHECK OUT MEMO

Check Out Memo shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration Meeting. A copy shall also be included in the specification section of each O & M Manual for the equipment checked.

Project Name _____

Type of Equipment Checked _____

Equipment Number _____

Equipment Manufacturer _____

Signature below by the manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test and Data and Performance Verification information was used to evaluate the equipment installation and operation.
2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below.*****
3. Written operating and maintenance information has been presented and reviewed in detail with the Contractor.
4. Sufficient copies of all applicable operating and maintenance information, parts lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

CHECKED BY:

_____
MANUFACTURER'S REPRESENTATIVE (print)

_____
ADDRESS

_____
TELEPHONE, FAX, E-MAIL

_____
MANUFACTURER'S REPRESENTATIVE (signature, title)

_____
DATE CHECKED

WITNESSED BY:

_____
CONTRACTOR'S REPRESENTATIVE (signature, title)

***EXCEPTIONS NOTED AT TIME OF CHECK-OUT (USE ADDITIONAL PAGE IF NECESSARY)**

SECTION 26 05 07

SUBMITTALS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Requirements for submittals specifically applicable to Division 26 Sections.

B. See Section Substitutions for additional requirements when submittal consists of accepted substitution equipment.

1.3 SUBMITTAL OF "ACCEPTED SUBSTITUTE" EQUIPMENT/PRODUCT

A. Representation: In submitting item, equipment, product, etc. that has been listed on contract drawings, in contract documents or in an addenda, Contractor represents that he:

1. Has investigated substituted item and has determined that it is equal or superior to specified product in all aspects and that use of substituted item will not require any additional time to the Contract.

2. Will coordinate installation of accepted substitution into work, making changes as may be required to complete work in all aspects.

3. Waives all claims for additional costs related to substitution which may subsequently become apparent.

4. Will provide the same warranties for the substitution as for the product specified.

5. Will absorb all costs incurred by the substitution when affecting other trades including but not limited to electrical, structural, architectural, etc.

6. Will absorb any cost incurred by the Engineer in review of the substituted product if the acceptance of the substituted item creates the need for system modification and/or redesign, or if the substituting contractor exhibits negligence in his substituting procedure thus submitting inferior, misapplied or miss-sized equipment. In the event of additional engineering costs, the billing structure shall be agreed upon prior to review by all involved parties.

B. Substitutions that cannot meet space requirements or other requirements of these Specifications, whether accepted or not, shall be replaced at the Contractor's expense with no additional time added to the Contract.

1.4 SUBMITTALS

A. Submittals shall be created and submitted in PDF format.

B. Submittals Binders to include:

1. Submittals consisting of marked catalog sheets or shop drawings shall be

inserted in the binder in proper order. Submittal data shall be presented in a clear and thorough manner. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Markings shall be made with arrows or circles (highlighting is not acceptable).

2. Shop Drawings: Drawings to include identification of project and names of Architect, Engineer, General Contractor, subcontractor and supplier, data, number sequentially and indicate the following:

   a) Fabrication and erection dimensions.

   b) Arrangements and sectional views.

   c) Necessary details, including complete information for making connections with other work.

   d) Kinds of materials and finishes.

   e) Descriptive names of equipment.

   f) Modifications and options to standard equipment required by the work.

   g) Leave blank area, size approximately 4 by 2 1/2 inches, near title block (for A/E's stamp imprint).

   h) In order to facilitate review of drawings, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and specification paragraph numbers where items occur in the Contract Documents.

   i) Conduit/raceway rough-in drawings.

   j) Items requiring shop drawings include (but not limited to):

      1. Special built light fixtures

      2. Special and/or modified equipment

      3. U.L. listed fire and smoke stopping assemblies for each applicable penetration

   k) See specific sections of Specifications for further requirements.

3. Product Data: Technical data is required for all items as called for in the Specifications regardless if item furnished is as specified.

   a) Submit technical data verifying that the item submitted complies with the requirements of the Specifications. Technical data shall include manufacturer's name and model number, dimensions, weights, electrical characteristics, and clearances required. Indicate all optional equipment and changes from the standard item as called for in the Specifications. Furnish drawings, or diagrams, dimensioned and in correct scale, covering equipment, showing arrangement of components and overall coordination.

   b) In order to facilitate review of product data, insofar as practicable, they shall be noted, indicating by cross reference the contract drawings, note, and/or specification paragraph numbers where and/or what item(s) are

used for and where item(s) occur in the contract documents.

c) See specific sections of Specifications for further requirements.

1.5 PROCESSING SUBMITTALS

A. Submit under provisions of the General Requirements of the Contract and this section of the Specifications, whichever is the most strict.

B. Submittals with marking on each section shall be submitted under provisions of General Requirements of the Contract, Division 01, and this and other sections of the Specifications. PDF file for each specification section shall have a consistent file naming convention that includes the specification section number and the submittal number for section. Initial set of PDF files shall include submittal for each of the following:

1. Basic Materials
2. Light Fixtures
3. Long Lead Items

C. Remainder of submittals are to be submitted no later then 60 days after award of contract or 60 days prior to Request for Substantial Completion whichever is earlier.

D. The Contractor shall review all submittals before submitting to the A/E. No request for payment will be considered until the submittals have been reviewed and submitted for approval.

E. Product Data: For standard manufactured materials, products and items, submit electronically annotated PDF files of manufacturers product data sheets. If submittal is rejected, resubmittal shall contain a complete set of new data sheets.

F. Shop Drawings: For custom fabricated items and systems installations.

G. Shop Drawing Review Notation.

	Action	Description
1.	No Exception Noted	No exceptions taken. Resubmittal not required.
2.	Rejected Resubmit.	Not in compliance with Contract Documents.
3.	Submit Specific Item	Resubmit item as specified.
4.	Make Corrections Noted	Make corrections noted, resubmittal not required.
5.	Revise and Resubmit	Make corrections noted, resubmittal is required
6.	Review not Required	Not required for review. No action taken. Copy retained for reference.

H. Acceptance: When returned to the Contractor, submittals will be electronically stamped by the A/E. If the stamp indicates “Rejected,” “Revise and Resubmit,” or “Submit Specific Item,” the submittal is not accepted and must be corrected and resubmitted as noted. Otherwise, the submittal is accepted and the Contractor shall comply with the notation and make any required corrections. Review comments typically will not appear on individual submittal sheets; they will be provided on a

separate sheet inserted in the shop drawing transmittal, the submittal package, or the applicable submittal section.

H. Note that the acceptance of shop drawings or other information submitted in accordance with the requirements specified above, does not assure that the Engineer, Architect, or any other Owner's Representative, attests to the dimensional accuracy or dimensional suitability of the material or equipment involved, the ability of the material or equipment involved or the Mechanical/Electrical performance of equipment. Acceptance of shop drawings does not invalidate the plans and Specifications if in conflict, unless a letter requesting such change is submitted and accepted on the Engineer's letterhead.

1.6 DELAYS

A. Contractor is responsible for delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

1.7 RE-SUBMITTALS

A. The A/E shall be reimbursed for all costs to review resubmittals subsequent to the second submission for the same product. Cost will be billed to Contractor at Engineer's standard hourly rate.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION

SECTION 26 05 08

SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies general, administrative and procedural requirements for substitutions for Divisions 26, 28 above and beyond the requirements of Division 01 General Requirements and any Supplemental requirements/conditions.

B. Request for substitutions must be submitted no later than 10 days prior to bid due date.

C. Request for substitution will not be considered after bid due date.

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Products, materials, equipment, finishes, and methods of construction are considered substitutions if they meet any one of the following conditions:

1. Does not meet all the requirements of these specifications under Part 1 - General or Part 2 - Products for any section included in Divisions 26, 28.

2. Is a different design which accomplishes the same result as that design specified in Division 26 Sections.

3. Is of similar or different design that:

a) Requires more space.

b) Requires more power.

c) Requires changes in other elements of the work such as (but not limited to) architectural, mechanical, structural, or other electrical work.

d) Affects the construction schedule.

4. Is listed in these specifications on the Contract Documents or in any addenda as an accepted substitution.

1.4 REQUEST FOR SUBSTITUTION SUBMITTALS (10 Days Prior to Bid Due Date)

A. A separate request for substitutions shall be submitted for each product, material, etc. that is defined as a substitution.

B. Submittal must consist of written request for substitution with data as required below. Request must be very specific as to what specified item, request for substitution is submitted for.

C. Each request for substitution submittal for each product, etc. shall include:

1. Name of material or equipment for which it is to be substituted.

2. Drawings, product data, performance data and/or other information necessary for the engineer to determine that the equipment meets all specifications and requirements.

3. Compliance Statement. Each request shall include the following compliance statement typed on letterhead of submitting company:

a) Submittal complies with all aspects/requirements of Contract Documents. (Yes or No). If no, state deviance.

b) Submittal complies with all applicable codes. (Yes or No). If no, state deviance.

c) Submittal complies with all other elements of the work and does not require any other changes. (Yes or No). If No, state required change.

d) Meets or exceeds the performance of specified product. (Yes or No). If no, state required change.

1.5 REQUEST FOR SUBSTITUTION SUBMITTALS (AFTER BID)

A. Substitution requests submitted after bid will not be reviewed.

B. Submittals for items noted as an Accepted Substitution on Contract Drawings, these specifications, or listed in an addenda, shall be submitted as required in Section 26 05 07 Submittals.

1.6 CONSIDERATION AND ACCEPTANCE

A. Request for substitutions will not be considered if:

1. Submittal does not comply with all requirements as noted above or contain all information required above.

2. If submittal does not contain Compliance Statement, fully filled out.

3. If Compliance Statement contains a 'no' or 'N'.

4. Submittals are submitted beyond time limitations noted above.

B. Samples.

1. Sample may be required to be submitted, if deemed necessary by the A/E to determine if the substitution meets specifications.

2. Where required by A/E on an individual basis, samples may be required after written notice of acceptance and approval has been made of each substitution.

3. The A/E reserves the right to reject sample and consequently the substitution should the sample not meet the requirement of the contract documents.

C. Substitutions will be considered on basis of design, concept of the Work, and overall conformance with information given in Contract Documents, including but not limited to:

1. Design criteria, which shall be equal or superior to the specified item.

2. Finishes, which shall be identical or superior to finishes of specified product.
3. Lenses or louvers, which shall be identical size, thickness and type material specified.
4. Physical size and dimension which are identical or within design criteria limitations as determined by the Engineer.
5. Photometric data, which shall be identical or superior in quantity and quality.
6. Trim detail and mechanical qualities, which shall be identical or within design criteria limitations as determined by the Engineer.

D. The Engineer's decision on acceptance or rejection of substitutions will be final.

E. Substitution requests, if accepted, will be included in an addenda.

F. Approval of a substituted item or listing a substituted item as an accepted substitution does not modify or act as a waiver in any way, the requirements of the contract documents. See Section Submittals for additional requirements on accepted substitution submittals, equipment, etc.

G. The naming of any manufacturer as an accepted substitution does not imply automatic approval as a substitution. It is the sole responsibility of the Contractor to ensure that any price quotations received, and submittals made are for systems that meet or exceed these specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 26 05 09

REFERENCE STANDARDS AND REGULATORY REQUIREMENTS

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Reference Standards and Regulatory Requirements applicable to Divisions 26, 28 sections.

1.3 REFERENCES

A. The following references may be referenced within these specifications:

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
AHERA	Asbestos Hazard Emergency Response Act
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	ASME International American Society of Mechanical Engineers International
ASTM	ASTM International American Society for Testing and Materials International
BICSI	BICSI, Inc.
BOCC	Board of County Commissioners Volusia County
COD	City of Deltona
CRSI	Concrete Reinforcing Steel Institute

DCA-ADAIA	Department of Community Affairs - Florida Americans with Disabilities Accessibility Implementation Act
DCA-ADAAG	Department of Community Affairs - Florida Americans with Disabilities Act Accessibility Guidelines
DCA-ARM Manual	Department of Community Affairs - Accessibility Requirements
DMS/DOC	Department of Management Services Division of Communications
DOCA or DCA	State of Florida Department of Community Affairs
EIA/TIA Association	Electronics Industries Alliance/Telecommunications Industry
EJCDC	Engineers Joint Contract Documents Committee American Consulting Engineers Council
FAC	Florida Administrative Code
FBC	Florida Building Code
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FFPC	Florida Fire Prevention Code
FGC	Florida Building Code (Fuel Gas)
FLA	State of Florida
FMC	Florida Building Code (Mechanical)
FMG	FM Global (formerly Factory Mutual System)
FPC	Florida Building Code (Plumbing)
FS	Florida Statutes
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers, Inc
IES	Illumination Engineering Society of North America

ICPEA	International Power Cable Engineer's Association
LPCR	Local Power Company Requirements
LPI	Lightning Protection Institute
LTCR	Local Telephone Company Requirements
NEC	National Electrical Code
NECPA	National Energy Conservation Policy Act
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OEF	Office of Educational Facilities
OSHA	Occupational Safety and Health Act
SBE	State Board of Education
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UFSRS	Uniform Fire Safety Rules and Standards of Insurance Division of State Fire Marshal
UL	Underwriters Laboratories, Inc.
VCS	Volusia County Schools
VCSB	Volusia County School Board
SREF	Florida Building Code Section 453 State Requirements for Educational Facilities

1.4 REGULATORY REQUIREMENTS

A. Conform to all the applicable requirements of the following codes, standards, guidelines, etc. If there should be conflicting requirements between these codes, standards, guidelines, etc., the more or most stringent requirement shall apply that does not violate any codes or laws.

1. Standards and Miscellaneous Codes/Requirements (Comply with latest edition or notice available unless otherwise adopted by Authority Having Jurisdiction):

a) Americans with Disabilities Act of 1990, as amended
b) ADA Standards for Accessible Design, 2010
c) American National Standards Institute
d) American Society of Heating, Refrigerating and Air Conditioning Engineers
e) American Society of Mechanical Engineers
f) American Society for Testing and Materials
g) Concrete Reinforcing Steel Institute
h) Department of Community Affairs
i) Electronics Industries Association/Telecommunications Industry Association
j) Florida Building Code, 8th edition 2023
k) Florida Fire Prevention Code, 8th edition 2023
l) Institute of Electrical and Electronics Engineers
m) Illumination Engineering Society
n) Local Power Company Requirements
o) Lightning Protection Institute
p) Local Telephone Company Requirements
q) National Electrical Code, 2020 edition
r) National Energy Conservation Policy Act
s) National Electrical Safety Code
t) National Electrical Manufacturers Association
u) NFPA 1 Fire Code, 2021 edition with Florida Amendments
v) NFPA 72 National Fire Alarm and Signaling Code, 2019 edition
w) NFPA 101 Life Safety Code, 2021 edition with Florida Amendments
x) NFPA 13 Standard for the Installation of Sprinkler Systems (2019
y) Occupational Safety and Health Act
z) Safety Code for Elevators and Escalators, A17.1, 2019
aa) Safety Code for Existing Elevators and Escalators, A17.3, 2020
bb) Sheet Metal and Air Conditioning Contractors
cc) Underwriters Laboratories, Inc.
dd) Applicable Federal, State, Local Codes, Laws and Ordinances, Florida Statutes and Referenced Codes/Standards

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 26 05 10

ELECTRICAL SYMBOLS AND ABBREVIATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Symbols and abbreviations specifically applicable to all Division 26, 28 sections in addition to those in Division 01 - General Requirements and any supplemental requirements/conditions.

1.3 SYMBOLS

A. In general, the symbols used on the drawings conform to the Standard Symbols of the Institute of Electrical and Electronic Engineers with the exception of special systems or agencies as hereinafter noted.
Corps of Engineers.
Special Symbols as shown in schedules or legends.

1.4 ABBREVIATIONS

A. The following abbreviations or initials are used.

A/C	Air Conditioning
AFD	Adjustable Frequency Drive
A.C.	Alternating Current
ADD #	Addendum #
A/E	Architect/Engineer (or Engineer when Architect not applicable)
AFF	Above Finished Floor
AFG	Above Finished Grade
AHU	Air Handler Unit
AIC	Amps Interrupting Capacity
AL	Aluminum
ALT	Alternate
AMP	Ampere
ANSI	American National Standards Institute
AWG	American Wire Gauge
@	At
B.C.	Bare Copper
BIDS	Baggage Information Display System
BLDG	Building
BRKR	Breaker
BTU	British Thermal Unit
BTUH	BTU Per Hour

C.	Conduit
C.B.	Circuit Breaker
CBM	Certified Ballast Manufacturers
cd	Candela
CFM	Cubic Feet per Minute
CKT.	Circuit
CKT BRKR	Circuit Breaker
C/L	Center Line
Clg.	Ceiling
Comp.	Compressor
Conn.	Connection
Cond.	Condenser
Cont.	Continuous
C.R.I.	Color Rendering Index
C.T.	Current Transformer
CU.	Copper
C.U.	Compressor Condenser Unit
C.W.	Cold Water
D.B.	Direct Burial
D.C.	Direct Current
Disc.	Disconnect
DN.	Down
DPST	Double Pole Single Throw
DWG	Drawing
E.C.	Electrical Contractor (or General Contractor)
ELEV.	Elevator
EMT	Electrical Metallic Tubing
Equip.	Equipment
EST	Estimate
FAAP	Fire Alarm Annunciator Panel
FACP	Fire Alarm Control Panel
FARP	Fire Alarm Remote Panel
FATC	Fire Alarm Terminal Cabinet
FCCP	Fire Alarm Command Center Panel
FHC	Fire Hose Cabinet
FIDS	Flight Information Display System
FLA	Full Load Amperes
FT.	Feet
FLR	Floor
F.C.	Footcandles
FVNR	Full Voltage Non-Reversing
GAL.	Gallon
Galv.	Galvanized
GPH	Gallons per Hour
GPM	Gallons per Minute
GFI	Ground Fault Interrupting
GRS	Galvanized Rigid Steel Conduit
GND.	Ground

HTG	Heaters
HT	Height
HZ	Hertz (Cycles)
HPF	High Power Factor
HPS	High Pressure Sodium
HP	Horsepower
HR	Hour
H.S.	Heat Strip
IMC	Intermediate Metallic Conduit
Incand	Incandescent
in.	Inches
J.B.	Junction Box
KVA	KiloVolt Ampere
KW	Kilowatts
KWH	Kilowatt Hour
K	Kelvin
L.L.D.	Lamp Lumen Depreciation
LED	Light Emitting Diode
LIU	Light Interface Unit (Fiber Optic Patch Panel)
LT.	Light
LTG.	Lighting
LTS.	Lights
L.P.F.	Low Power Factor
M.C.B.	Main Circuit Breaker
M.L.O.	Main Lugs Only
Maint.	Maintenance
MH.	Manhole; Metal Halide
MFG.	Manufacturer
max.	Maximum
MCM/KCMIL	Thousand Circular Mils
MPH	Miles Per Hour
MM	Millimeter
Min.	Minimum
MCP	Motor Circuit Protector
MTD	Mounted
N.	Neutral
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
N.P.T.	National Pipe Thread
NF	Non Fused
N.C.	Normally Closed
N.O.	Normally Open
NIC.	Not in Contract
No.	Number
OB	Outlet Box
OD	Outside Diameter
O.L.	Overload

OLS	Overloads
OS&Y	Outside Screw and Yoke (Sprinkler)
%	Percent
Ø	Phase
P.	Pole
PL	Compact Fluorescent Lamp
P.T.	Potential Transformer
PSF	Pounds per Square Foot
PSI	Pounds per Square Inch
PB	Pullbox
PNL	Panel
PR	Pair
Pri.	Primary
PTZ	Pan, Tilt, Zoom
PVC	Polyvinyl Chloride
Recept.	Receptacle
RPM	Revolutions per Minute
R.S.	Rapid Start
SCA	Short Circuit Amps
Sec.	Secondary
SHT	Sheet
S/N	Solid Neutral
SPST	Single Pole Single Throw
SF	Square Foot
SW.	Switch
SWBD	Switchboard
Sys.	System
THHN/THWN	Nylon Jacketed Wire
TSP	Twisted Shielded Pair
TTB	Telephone Terminal Board
TTC	Telephone Terminal Cabinet
TV	Television
TVTC	Television Terminal Cabinet
TVEC	Television Equip. Cabinet
TYP	Typical
Temp.	Temperature
U.L.	Underwriters' Laboratories
UTP	Unshielded Twisted Pair
VFD	Variable Frequency Drive
VHF	Very High Frequency
VHO	Very High Output
V	Volt
VA	Volt Amperes
Vol.	Volume
W	Wire
W.P.	Weatherproof
XFMR	Transformer
Y	Wye

Yd.	Yard
Yr.	Year
3R	Rainproof
4X	Stainless Steel Dust-tight, Watertight

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 26 05 19

BUILDING WIRE AND CABLE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for provision and installation of building wire and cable.

B. Provide all equipment, labor, material, accessories, and mounting hardware to properly install all conductors and cables rated 600 volts and less for a complete and operating system for the following:

1. Building wire and cable.

2. Wiring connectors and connections.

C. No aluminum wiring shall be permitted.

D. All sizes shall be given in American Wire Gauge (AWG) or in thousand circular mils (MCM/kcmil).

1.3 REFERENCES:

A. ANSI/NFPA 70 National Electrical Code
B. UL 486A-486B

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Product Data: Submit catalog cut sheet showing, type and UL listing of each type of conductor, connector and termination.

B. Submit catalog cut sheet(s) showing each type of conductor is manufactured in the United States.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years experience.

B. All building wire and cable shall be manufactured in the United States.

1.7 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Conductor sizes are based on copper.

C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.8 COORDINATION

A. Determine required separation between cable and other work.

B. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.1 BUILDING WIRE AND CABLE

A. Description: Single conductor insulated wire.

B. Conductor: Stranded Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation: ANSI/NFPA 70,

1. #10 AWG and smaller: Type THHN/THWN and XHHW.

a) THHN/THWN-2 insulation is acceptable substitute for THHN/THWN insulation.

b) XHHW-2 insulation is acceptable substitute for XHHW insulation.

2. #8 AWG and larger: Type THHN/THWN-2 and XHHW-2.

E. Acceptable Manufacturers:

1. Southwire
2. Encore
3. Cerro

2.2 PULLING LUBRICANTS

A. Pulling lubricants shall be polymer based pulling lubricants suitable for use with conductor insulation. The lubricant shall be UL listed. The lubricant shall contain no waxes, greases, silicones, or polyalkylene glycol oils. Lubricant manufacturer must provide cable manufacturer approvals upon request.

B. Basis of Design:

1. Polywater J

C. Approved Substitutions:

1. Ideal Clear Glide
2. Ideal Velocity
3. Klein Tools Premium Synthetic Clear Lubricant
4. Klein Tools Premium Synthetic Polymer Lubricant

2.3 TAPS/SPLICES/CONNECTORS/TERMINATIONS FOR COPPER CONDUCTORS

A. Interior Locations #8 AWG and Smaller:

1. Helically wound steel spring with corrosion resistant coating with conical plastic cap.

2. Acceptable Manufacturers:

a) Ideal Industries, Inc.

b) 3M

c) Gardener Bender

PART 3 - EXECUTION

3.1 GENERAL

A. Install products in accordance with manufacturer's instructions.

B. Conductors #10 AWG or #12 AWG shall be 600 volt type THWN/THHN unless noted otherwise, rated 90 degrees C. dry, 75 degrees C. wet.

C. Conductors #8 AWG and larger shall be Type THWN-2/THHN unless noted otherwise, rated 90 degrees C, wet or dry.

D. Use stranded conductors for all feeders and branch circuits including 10 AWG and 12 AWG.

E. Use conductor no smaller than 12 AWG for power and lighting circuits.

F. Neatly train and lace wiring inside boxes, equipment, and panelboards.

G. All conductors shall be installed in raceway.

H. Conductor sizes indicated on circuit homeruns or in schedules shall be installed over the entire length of the circuit, unless noted otherwise on the Drawings or in these Specifications.

I. Before installing raceways and pulling wire to any mechanical equipment, verify electrical characteristics with final submittal on equipment to assure proper number and AWG of conductors. (As for multiple speed motors, different motor starter arrangements, etc.).

J. Coordinate all wire sizes with lug sizes on equipment, devices, etc. Provide/install lugs as required to match wire size.

K. Where oversized conductors are called for (due to voltage drop, etc.) provide/install lugs as required to match conductors, or provide/install splice box, and splice to reduce conductor size to match lug size.

3.2 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work likely to damage wire has been completed.

3.3 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.4 WIRING METHODS

A. Use only building wire type (THHN/THWN for #10 and #12 and THHN/THWN-2 for #8 and larger) insulation in raceway, unless noted otherwise.

B. Wiring in vicinity of heat producing equipment: Use only XHHW insulation in raceway.

C. Conductors installed within fluorescent fixture channels shall be Type THHN or XHHW rated 90 degrees C dry. Conductors for all other light fixtures shall have temperature ratings as required to meet the UL listing of the fixture; however, in no case shall the temperature rating be less than 90 degrees Centigrade. Remove incorrect insulation types in new work.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Identify wire and cable under provisions of Section 26 05 53 Identification for Electrical Systems.

B. Identify each conductor with its circuit number or other designation indicated on Drawings.

C. Identify neutrals with its associated circuit number(s).

3.6 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of the General Requirements of the Contract Documents and Section 26 08 13 Tests and Performance Verification.

B. Inspect wire for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

3.7 VERTICAL RISERS

A. Provide vertical cable riser supports per NEC 300.19. Cable supports shall be O-Z/Gedney Type "S" or equal. These shall be located in accessible pullboxes of adequate size. Provide for adequate structural connection of cable supports to pullbox, which will transfer cable weight to building.

3.8 PULLING

A. No wire shall be pulled until the conduit system is complete from pull point to pull point and major equipment terminating conduits have been fixed in position.

B. Mechanical pulling devices shall not be used on conductors sized #8 and smaller. Pulling means which might damage the raceway shall not be used.

C. Use only pulling lubricants acceptable to the Architect/Engineer and cable manufacturer. Lubricant shall not cause the conductor or insulation to deteriorate.

D. All conductors to be installed in a common raceway shall be pulled together. The manufacturer's recommended pulling tensions shall not be exceeded.

E. Bending radius of insulated wire or cable shall not be less than the minimum recommended by the manufacturer.

F. Where communications type conductors are installed, special requirements shall apply as outlined under that specific system detail specifications.

3.9 CONTROL AND SIGNAL CIRCUITS

A. For control and signal circuits above 50 VAC, conductors shall be #14 AWG minimum size, Type XHHW or THWN-THHN as permitted by NFPA 70, within voltage drop limits, increased to #12 AWG as necessary for proper operation.

B. For control and signal circuits 50 VAC and below, conductors, at the Contractor's option, may be #16 AWG, 300 volt rated, PVC insulated, except where specifically noted otherwise in the Contract Documents.

C. Conductor insulation for fire alarm systems shall be as accepted by Code Inspection Authority only. Wire acceptance by the Architect/Engineer shall not supersede this final acceptance for conditions of this specific project.

D. Install circuit conductors in conduit.

E. Circuit conductors to be stranded.

3.10 COLOR CODING

A. All power feeders and branch circuits regardless of size shall be wired with color-coded wire with the same color used for a system throughout the building.

B. Unless otherwise accepted or required by Architect/Engineer to match existing, color-code shall be as follows:
Neutrals: 120/208V system white; 277/480V system natural grey
Ground Wire: green, bare
120/208V: Phase A black, Phase B red, Phase C blue
277/480V: Phase A brown, Phase B orange, Phase C yellow.

C. All switchlegs, other voltage system wiring, control and interlock wiring shall be color-coded other than those above.

3.11 TAPS/SPLICES/CONNECTORS/TERMINATIONS

A. Clean conductor surfaces before installing lugs and connectors.

B. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

C. Power and lighting conductors shall be continuous and unspliced where located within conduit. Splices shall occur within troughs, wireways, outlet boxes, or equipment enclosures where sufficient additional room is provided for all splices. No splices shall be made in in-ground pull boxes (without written acceptance of engineer).

D. Splices in lighting and power outlet boxes, wireway, and troughs shall be kept to a minimum. Pull conductors through to equipment, terminal cabinets, and devices.

E. No splices shall be made in junction box, and outlet boxes (wire No. 8 and larger) without written acceptance of Engineer.

F. No splices shall be made in communications outlet boxes, pull boxes or wireways (i.e., fire alarm, computer, telephone, intercom, sound system, etc.) without written acceptance of Engineer. Pull cables through to equipment cabinets, terminal cabinets

and devices.

G. Allow adequate conductor lengths in all junction boxes, pull boxes and terminal cabinets. All termination of conductors in which conductor is in tension will be rejected and shall be replaced with conductors of adequate length. This requirement shall include the Contractor to provide sleeve type vertical cable supports in vertical raceway installations, provided in pullboxes at proper vertical spacings.

H. A calibrated torque wrench shall be used for all bolt tightening.

I. Interior Locations:

1. All (non-electronic systems) copper taps and splices in No. 8 or smaller shall be fastened together by means of "spring type" connectors. All taps and splices in wire larger than No. 8 shall be made with compression type connectors and taped to provide insulation equal to wire.

J. Exterior Locations:

1. Make splices, taps and terminations above grade in splice or termination cabinets. Do not splice any cable in ground or below finished grade.

2. All taps and splices shall be made with compression type connectors and covered with Raychem heavywall cable sleeves (type CRSM-CT, WCSM or MCK) with type "S" sealant coating with sleeve kits as per manufacturer's installation instructions or be terminated/connected to terminal strips in above grade terminal boxes suitable for use.

3. Provide and install above grade termination cabinets sized to meet applicable codes and standards, where required for splicing.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Equipment grounding conductors.

2. Bonding.

B. Provide all labor, materials, and equipment necessary to properly install a grounding system conductor in all new branch wiring and feeder installations, which shall be in full compliance with all applicable codes as accepted by the Authorities Having Jurisdiction. The secondary distribution system shall include a grounding conductor in all raceways in addition to the return path of the metallic conduit.

C. In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated or bare copper system grounding conductor in accordance with specific rules of NEC 250, and state codes. Bonding conductor through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.

D. All raceways shall have an insulated copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC. Grounding conductor shall be included in total conduit fill determining conduit sizes, even though not included or shown on drawings. Grounding conductors that run with feeders in PVC conduit outside of building(s) shall be bare only.

E. Provide and install all grounding and bonding as required by the National Electrical Code (NEC), including but not limited to NEC 250.

1.3 REFERENCES

A. ANSI/NFPA 70 National Electrical Code
B. NFPA 780 Standard for the Installation of Lightning Protection Systems
C. UL 467 Grounding and Bonding Equipment

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Submit catalog cut sheets/product data on:

1. Mechanical connectors.

B. Product data shall prove compliance with specifications, National Electrical Code, manufacturers' specifications, and written installation data.

1.6 PROJECT RECORD DOCUMENTS

A. Submit record documents to accurately record actual locations of grounding electrodes.

B. Submit test results of each ground rod. See Section Tests and Performance Verification of Electrical System.

PART 2 - PRODUCTS

2.1 MECHANICAL CONNECTORS

A. All grounding connectors shall be in accordance with UL 467 and UL listed for use with rods, conductors, reinforcing bars, etc., as appropriate.

B. Connectors and devices used in the grounding systems shall be fabricated of copper or bronze materials and properly applied for their intended use. Specified items of designated manufacturers indicate required criteria, and equal products may be provided if approved. All connectors and devices shall be compatible with the surfaces being bonded and shall not cause galvanic corrosion by dissimilar metals. Materials in items not listed herein shall be of equal quality to the following specified items:

1. Lugs: Substantial construction, of cast copper or cast bronze, with "ground" (micro-flat) surfaces, twin clamp, two-hole tongue, equal to Burndy QQA Series or T&B equal. Lightweight and "competitive" devices shall be rejected.

2. Grounding and Bonding Bushings: Malleable iron, Thomas and Betts (T&B), or equal.

3. Piping Clamps: Burndy GAR-TC Series with two hole compression terminal or T&B equal.

4. Grounding Screw and Pigtail: Raco No. 983 or equal.

C. Mechanical lugs or wire terminals shall be used to bond ground wires together or to junction boxes and panel cabinets and shall be manufactured by Anderson, Buchanan, Thomas and Betts Co., or Burndy.

2.2 WIRE

A. Material: Stranded copper.

B. Size: Size to meet NFPA 70 requirements as a minimum, increase size if called for on drawings, in these specifications, or as required for voltage drop.

C. Insulated THWN (or bare as noted elsewhere).

PART 3- EXECUTION

3.1 GENERAL

A. Install products in accordance with manufacturer's instructions.

B. Install grounding electrodes conductor, bonding conductors, ground rods, etc. with all required accessories.

C. Grounding shall meet (or exceed as required to meet these specifications) all the requirements of the NEC, the NFPA, and applicable standards of IEEE.

D. Where there is a conflict between these specifications and the above applicable codes/standards, or between this section of these specifications and other sections, then the most stringent or excessive requirement shall govern. Where there is an omission of a code/standard requirement in these specifications, then the code/standard requirements shall be complied with.

E. Requirement in these specifications to comply with a specific code/standard article, etc. is not to be construed as deleting of requirements of other applicable codes/standards and their articles, etc.

3.2 EQUIPMENT GROUNDING CONDUCTOR

A. Grounding conductors shall be provided with every circuit to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250.

B. At every voltage level, new portions of the electrical power distribution system shall be grounded with a dedicated copper conductor, which extends from termination back to power source in supply panelboard.

C. Provide separate, insulated (bare if with feeder in PVC conduit outside of building(s)) conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

D. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a ground conductor sized as indicated and where not shown shall be sized to meet (or exceed as required to meet these specifications and/or drawings) the requirements of NEC 250. Conductor shall be connected to the equipment grounding bus in switchboards and panelboards, to the grounding bus in all motor control centers, and as specified, to lighting fixtures, motors and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and shall be properly connected thereto, using a lug device located within each item enclosure at the point of electric power connections to permit convenient inspection.

E. Provide green insulated ground wire for all grounding type receptacles and for equipment of all voltages. In addition to grounding strap connection to metallic outlet boxes, a supplemental grounding wire and screw equal to Raco No. 983 shall be provided to connect receptacle ground terminal to the box.

F. All plugstrips and metallic surface raceway shall contain a green insulation ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.

G. Where integral grounding conductor is specified elsewhere in bus duct construction, provide equivalent capacity conductor from supply switchboard or panelboard grounding bus to the bus duct grounding conductor. Bond integral conductor to bus duct enclosure at each tap and each termination.

H. All motors, all heating coil assemblies, and all building equipment requiring flexible

connections shall have a green grounding conductor properly connected to the frames and extending continuously inside conduit with circuit conductors to the supply source bus with accepted connectors regardless of conduit size or type. This shall include Food Service equipment, Laundry equipment, and all other "Equipment By Owner" to which an electric conduit is provided under this Division.

3.3 LIGHTING FIXTURES

A. All new and removed/reinstalled fixtures in building interior, and exterior fixtures shall be provided with green grounding conductor, solidly connected to unit. Individual fixture grounds shall be with lug to fixture body, generally located at point of electrical connection to the fixture unit.

B. All suspended fixtures and those supplied through flexible metallic conduit shall have green ground conductor from outlet box to fixture. Cord connected fixtures shall contain a separate green ground conductor.

3.4 MISCELLANEOUS GROUNDING CONNECTIONS

A. Provide bonding to meet regulatory requirements.

B. Grounding conductors shall: be installed to permit the shortest and most direct path from equipment to ground; be installed in conduit; be bonded to conduit at both ends when conduit is metal; have connections accessible for inspection; and made with accepted solderless connectors brazed (or bolted) to the equipment or to be grounded; in NO case be a current carrying conductor; have a green jacket unless it is bare copper; be run in conduit with power and branch circuit conductors. The main grounding electrode conductor shall be exothermically welded to ground rods, water pipe, and building steel.

C. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Metal rustproofing shall be removed at grounding contact surfaces, for 0 ohms by digital Vm. Exposed bare metal at the termination point shall be painted.

D. All ground connections that are buried or in otherwise inaccessible locations, shall be welded exothermically. The weld shall provide a connection which shall not corrode or loosen and which shall be equal or larger in size than the conductors joined together. The connection shall have the same current carrying capacity as the largest conductor.

E. Install ground bushings on all metal conduits entering enclosures where the continuity of grounding is broken between the conduit and enclosure (i.e. metal conduit stub-up into a motor control center enclosure or at ground bus bar). Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.

F. Install ground bushings on all metal conduits where the continuity of grounding is broken between the conduit and the electrical distribution system (i.e. metal conduit stub-up from wall outlet box to ceiling space. Provide an appropriately sized bond jumper from the ground bushing to the respective equipment ground bus or ground bus bar.

G. Each feeder metallic conduit shall be bonded at all discontinuities, including at switchboards and all subdistribution and branch circuit panels with conductors in

accordance with applicable table in NEC 250 for parallel return with respective interior grounding conductor.

H. Grounding provisions shall include double locknuts on all heavywall conduits.

I. Bond all metal parts of pole light fixtures to ground rod at base.

J. Install grounding bus in all existing panelboards of remodeled areas, for connection of new grounding conductors, connected to an accepted ground point.

3.5 TESTING AND REPORTS

A. Raceway Continuity: Metallic raceway system as a component of the facilities ground system shall be tested for electrical continuity. Resistance to ground throughout the system shall not exceed specified limits.

3.6 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Conduit and equipment supports.

2. Anchors and fasteners.

B. Furnish and install all supports, hangers and inserts required to mount fixtures, conduit, cables, pullboxes and other equipment furnished under this Division.

1.3 REFERENCES

A. NECA National Electrical Contractors Association

B. ANSI/NFPA 70 National Electrical Code

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

PART 2- PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Materials and Finishes: Provide corrosion resistance.

B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide anchors, fasteners, and supports in accordance with NECA National Electrical Installation Standards.

C. Do not fasten supports to pipes, ducts, mechanical equipment or conduit.

D. Do not use spring steel clips and clamps.

E. Do not use gas or powder-actuated anchors.

F. Obtain permission from A/E before drilling or cutting structural members.

G. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

H. Install surface-mounted cabinets and panelboards with minimum of four anchors.

I. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1” off wall.

J. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

K. All items shall be supported from the structural portion of the building, except standard ceiling-mounted lighting fixtures, and small devices may be supported from ceiling system where permitted by Ceiling Contractor, however, no sagging of the ceiling will be permitted. Wire shall not be used as a support. Boxes and conduit shall not be supported or fastened to ceiling suspension wires or to ceiling channels.

L. This Contractor shall lay out and install his work in advance of the laying of floors or walls, and shall furnish and install all sleeves that may be required for openings through floors, wall, etc. Where plans call for conduit to be run exposed, this Contractor shall furnish and install all inserts and clamps for the supporting of conduit. If this Contractor does not properly install all sleeves and inserts required, he will be required to do the necessary cutting and patching later at his own expense to the satisfaction of the Architect.

M. All conduits shall be securely fastened in place per NEC. Hangers, supports or fastenings shall be provided at each elbow and at the end of each straight run terminating at a box or cabinet. The use of perforated iron for supporting conduits will not be permitted. The required strength of the supporting equipment and size and type of anchors shall be based on the combined weight of conduit, hanger and cables. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp-backs, or other accepted devices with suitable bolts, expansion shields (where needed) or beam-clamps for mounting to building structure or special brackets.

N. Where two or more conduits are run parallel or in a similar direction, they shall be grouped together and supported by means of Kindorf type trapeze hanger system (racking) consisting of concrete inserts, threaded solid rods, washers, nuts and galvanized "L" angle iron, or Unistrut cross members. These conduits shall be individually fastened to the cross member of every other trapeze hanger with galvanized cast one hole straps, clamp backs, bolted with proper size cadmium machine bolts, washers and nuts. If adjustable trapeze hangers are used to support groups of parallel conduits, U-bolt type clamps shall be used at the end of a conduit run and at each elbow. J-bolts, or accepted clamps, shall be installed on each third intermediate trapeze hanger to fasten each conduit.

O. Hanger assemblies shall be protected after fabrication by galvanizing. Hangers for PVC coated conduit shall be stainless steel. All hangers exterior to the building shall be stainless steel.

P. On concrete or brick construction, insert anchors shall be installed with round head

machine screws. In wood construction, round head screws shall be used. An electric or hand drill shall be used for drilling holes for all inserts in brick, concrete or similar construction. In brick, inserts shall be near center of brick, not near edge or in joint. Where steel members occur, same shall be drilled and tapped, and round head machine screws shall be used. All screws, bolts, washers, etc., used for supporting conduit or outlets shall be fabricated from rust-resisting metal, or accepted substitution. No tapcons permitted whatsoever. Fasteners similar to tapcon self tapping power driven type are not acceptable. Plastic and metal anchors are acceptable. All hardware exterior to the building shall be stainless steel.

Q. Anchors that do not readily permit removal/replacement of the attached item are not acceptable. Unacceptable anchors include: pin grips, drive pin anchors, split drive anchors, spike anchors, and similar.

R. Conduit supporting devices such as spring type conduit clips manufactured by Caddy Corporation may not be used.

S. Threaded rod hangers shall be galvanized continuous thread type, minimum 3/8" diameter.

T. Concrete/insert anchors, threaded rods, or similar fasteners installed on side or bottom of prestressed beams are not acceptable.

U. Treat cut ends of support struts, support rods, conduit threads, etc. zinc rich coating or as required to prevent corrosion.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for electrical conduit.

B. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

1. Rigid Metal Conduit (RMC) NEC 344
2. Aluminum Rigid Metal Conduit (RMC) NEC 344
3. Rigid Metal Conduit PVC Coated (RMC-PVC Coated) NEC 344
4. Flexible Metal Conduit (FMC) NEC 348
5. Liquidtight Flexible Metal Conduit (LFMC) NEC 350
6. Electrical Metallic Tubing (EMT) NEC 358
7. Rigid Polyvinyl Chloride Conduit (Type PVC) NEC 352
8. Fittings and Conduit Bodies

1.3 REFERENCES

A. ANSI C80.1 Electrical Rigid Steel Conduit, Zinc Coated
B. ANSI C80.3 Electrical Metallic Tubing, Zinc Coated
C. ANSI C80.5 Electrical Rigid Aluminum Conduit
D. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
E. ANSI/NFPA 70 National Electrical Code
F. NECA Standard Practice of Good Workmanship in Electrical Contracting
G. NEMA RN 1 Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
H. NEMA TC 2 Electrical Polyvinyl Chloride (PVC) Conduit (EPC 40, EPC 80)
I. NEMA TC 3 Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 DESIGN REQUIREMENTS

A. Conduit Size: ANSI/NFPA 70. (See Drawings and this and other sections of these Specifications for additional requirements).

B. Raceways and conduits shall begin at an acceptable enclosure and terminate only in

another such enclosure except conduit/raceway stub-outs.

C. A raceway shall be provided for all electrical power and lighting, and electrical systems unless specifically specified otherwise.

1.6 SUBMITTALS

A. Submit catalog cut sheet showing brand of conduit to be used and showing that conduit is UL listed and labeled and manufactured in the United States.

B. Submit catalog cut sheet on all types of conduit bodies and fittings.

C. Product data shall be submitted for acceptance on:

1. Conduits.
2. Conduit straps, hangers and fittings.
3. PVC solvent(s) and bending box.
4. Fitting entering and leaving the ground or pavement
5. Coatings.
6. Strap wrenches that will be utilized to minimize damage to conduit finishes.

D. Submit UL listed fire and smoke stopping assemblies for each applicable application.

E. Product data shall prove compliance with Specifications, National Electrical Code, National Board of Fire Underwriters, manufacturers' specifications and written installation data.

1.7 PROJECT RECORD DOCUMENTS

A. Submit record documents to accurately record actual routing of conduits larger than 1.25".

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, properly store and protect products at the site.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from sun, rain, corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

1.9 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 GENERAL

A. All conduits shall bear UL label or seal and shall be manufactured in the United States.

B. Conduit systems and all related fittings, boxes, supports, and hangers must meet all the requirements of national, state, and other federal codes where applicable.

2.2 MINIMUM TRADE SIZE

A. Homeruns and Branches Underground: 3/4” C.
B. Branches Aboveground: 1/2” C.

2.3 RIGID METAL CONDUIT

A. Comply with:
   1. ANSI C80.1.
   2. UL 6.
   3. NEC 344.

B. Conduit material:
   1. Zinc coated or hot dipped galvanized steel.

C. Fittings:
   1. Threaded.
   2. Insulated bushings shall be used on all rigid steel conduits terminating in panels, boxes, wire gutters, or cabinets, and shall be impact resistant plastic molded in an irregular shape at the top to provide smooth insulating surface at top and inner edge. Material in these bushings must not melt or support flame.
   3. Zinc plated or hot dipped galvanized malleable iron or steel.

D. Conduit Bodies:
   1. Comply with ANSI/NEMA FB 1.
   2. Threaded hubs.
   3. Zinc plated or hot-dipped galvanized malleable iron.

2.4 ALUMINUM RIGID METALLIC CONDUIT

A. Comply With:
   1. ANSI C80.5.
   2. UL 6.
   3. NEC 344.

B. Conduit Material:
   1. Aluminum.

C. Fittings:
   1. Threaded.
   2. Aluminum.
   3. Insulated bushings on terminations.

D. Conduit Bodies:
   1. Comply with ANSI/NEMA FB 1.
   2. Threaded hubs.
   3. Aluminum.

2.5 RIGID METAL CONDUIT PVC COATED

A. Comply with:
   1. UL 6.
   2. ANSI C80.1.

3. NEC 344.
4. NEMA RN1.

B. Conduit material: Hot-dipped galvanized rigid steel with external PVC coating, 40 mil thick.

C. Fittings:
1. Threaded.
2. Insulated bushings on terminations.
3. Zinc plated or hot-dipped galvanized malleable iron or steel with external PVC coating, 40 mil thick.

D. Conduit Bodies:

1. Comply With:
a) ANSI/NEMA FB 1.
b) Threaded hubs.
2. Zinc plated or hot-dipped galvanized malleable iron with external PVC coating 40 mil thick.

2.6 FLEXIBLE METAL CONDUIT

A. Comply With:
1. NEC 348.
2. ANSI/UL 1.

B. Conduit Material:
1. Steel, interlocked.

C. Fittings:
1. ANSI/NEMA FB 1.
2. ANSI/UL 514B.
3. Malleable iron, zinc plated.
4. Threaded rigid and IMC conduit to flexible conduit coupling.
5. Direct flexible conduit bearing set screw type not acceptable.

2.7 LIQUID-TIGHT FLEXIBLE METAL CONDUIT

A. Comply with:
1. NEC 350.
2. ANSI/UL 360.

B. Conduit material:
1. Flexible hot-dipped galvanized steel core, interlocked.
2. Continuous copper ground built into core up to 1-1/4” size.
3. Extruded polyvinyl gray jacket.

C. Fittings:
1. Threaded for IMC/rigid conduit connections.
2. Accepted for hazardous locations where so installed.
3. Provide sealing washer in wet/damp locations.
4. Compression type.
5. ANSI/NEMA FB 1.
6. ANSI/UL 514B.

7. Zinc plated malleable iron or steel.

2.8 ELECTRICAL METALLIC TUBING

A. Comply with:
1. UL 797.
2. ANSI C80.3.
3. NEC 358.
4. ANSI/UL 797.

B. Conduit material: Galvanized steel tubing.

C. Fittings:
1. ANSI/NEMA FB 1.
2. Set screw.
3. Zinc plated malleable iron or steel.
4. Concrete tight.

2.9 RIGID POLYVINYL CHLORIDE CONDUIT

A. Comply with:
1. NEMA TC 2.
2. UL 651.
3. NEC 352.

B. Conduit material:
1. Shall be high impact PVC, tensile strength 55 PSI, flexural strength 11000 PSI.

C. Fittings:
1. Comply with:
a) NEMA TC 3.
b) UL 514.

D. General:
1. UL listed and identified.
2. Conform to all national, state and local codes.
3. Manufacturer shall have 5 years experience in manufacturing PVC conduits.

2.10 EXPANSION FITTINGS

A. Expansion fittings shall be:
1. UL Listed, hot dipped galvanized inside and outside providing a 4” expansion chamber when used with rigid conduit, intermediate metal conduit and electrical metallic conduit, or:
2. Be polyvinyl chloride and shall meet the requirements of and as specified elsewhere for non-metallic conduit and shall provide a 6”expansion chamber.
3. Hot dipped galvanized expansion fitting shall be provided with an external braided grounding and bonding jumper with accepted clamps, UL listed for the application.
4. Expansion fitting, UL listed for the application and in compliance with the NEC without the necessity of an external bonding jumper may be considered. Submit fitting with manufacturer's data and UL listing for acceptance prior to installation.

2.11 CONDUIT COATINGS FOR METAL CONDUITS BELOW GRADE

A. Coating shall be an ultra-high build, single-component coal tar mastic for protecting

steel subject to aggressive conditions.

B. Coating shall be applied in two coats achieving a minimum dry thickness of 25 mils.

C. Basis of Design:

1. Carboline: Bitumastic 50

2.12 COLD GALVANIZING COMPOUND

A. Coating shall be a coating that provides a dry film with a 93% pure zinc content.

B. Coating shall be applied in two in two light coats a few minutes apart and an additional two light coats after the initial coat has dried.

C. Basis of Design:

1. Rust-Oleum® Stops Rust® Cold Galvanizing Spray

PART 3 - EXECUTION

3.1 LOCATION REQUIREMENTS

A. Underground Installations:

1. Use rigid non-metallic conduit (PVC) only unless local Authority Having Jurisdiction or applicable codes/utility requirements, etc. require rigid steel conduit.
2. All conduits or elbows entering or leaving the ground shall be rigid steel conduit coated with asphaltic coating.
3. All underground raceways (with exception of raceways installed under floor slab) shall be installed in accordance with NEC 300.5 except the minimum cover for any conduit shall be 2'. Included under this Section shall be the responsibility for verifying finished lines in areas where raceways will be installed underground before the grading is complete.
4. Where rigid metallic conduit is installed underground as noted above it shall be coated with waterproofing black coal tar mastic before installation, and all joints shall be re-coated after installation.
5. PVC runs over 150' in length shall utilize rigid steel 90-degree elbows at each riser and at each change in direction. Elbows shall be coated with black mastic or PVC coating. Bond all metal elbows per NEC 250.80 and NEC 300.5.
6. All underground service lateral raceways shall be protected as required by NEC 300.5, including requirements for installation of warning tape.

B. In Slab Above or on Grade:

1. Use coated rigid steel conduit, coated intermediate metal conduit (if accepted) or rigid non-metallic conduit.
2. Coating of metallic conduit to be black asphaltic or PVC.

C. Penetration of Slab:

1. Exposed Location:
   a) Where penetrating a floor in an exposed location from underground or in slab, a black mastic coated or PVC coated galvanized rigid steel conduit shall be used.
2. Concealed Location:

a) Where penetrating a floor in a location concealed in block wall and acceptable by applicable codes, rigid non-metallic conduit may be used up to first outlet box, provided outlet box is at a maximum height of 48" above finished floor.
b) Where penetrating a floor in location other than that above use a black mastic coated or PVC coated galvanized rigid steel conduit.

D. Outdoor Location:
1. Above Grade:
a) Where penetrating the finished grade, black mastic coated or PVC coated galvanized rigid steel conduit shall be used.
b) In general all exterior conduit runs shall be rigid conduit with PVC coating and threaded connectors as specified elsewhere.
c) Electrical metallic tubing (thin wall) is permitted under roof, overhangs, etc. provided it is not subjected to physical damage and is not in direct contact or directly subject to exterior elements including sunlight.
2. Metal Canopies:
a) Conduit runs except for canopy lighting raceways are not to be run on (top or bottom) of metal canopies roof systems. All new conduit shown on or at these areas shall be run underground.
3. Roofs:
a) Conduit is not to be installed on roofs, without written authorization by A/E for specific conditions.
b) When accepted by written authorization conduit shall comply with the following:
1. Be PVC coated rigid galvanized metal conduit.
2. All fittings, etc. are to be PVC coated.
3. Conduit shall be supported above roof at least 6" using accepted conduit supporting devices. Refer to applicable sections of specifications on roofing, etc.
4. Supports to be fastened to roof using roofing adhesive or means as accepted by roofing contractor.

E. Interior Dry Locations:
1. Concealed: Use rigid metal conduit or electrical metallic tubing. Rigid non-metallic conduit may be used inside block walls up to first outlet to a maximum of 40" AFF except where prohibited by the NEC (Places of Assembly, etc.).
2. Exposed: Use rigid metal conduit or electrical metallic tubing. EMT may only be used where not subject to damage, which is interpreted by this specification to be above 90" AFF.
3. Concealed or Exposed Flexible Conduit:
a) Concealed flexible steel conduit or seal tight flexible steel conduit in lengths not longer than 6' in length with a ground conductor installed in the conduit or an equipment ground conductor firmly attached to the terminating fitting at the extreme end of the flex. Exposed flexible steel conduit or seal tight flexible steel conduit shall not exceed 2' in length, unless written authorization by A/E for specific conditions is granted.

F. Interior Wet and Damp Locations:

1. Use rigid galvanized steel or intermediate metal conduit.

G. Concrete Columns or Poured in-place Concrete Wall Locations:

1. Use rigid non-metallic conduit. Penetration shall be by accepted metal raceway (i.e. metal conduit as required elsewhere in these specifications).

3.2 ADDITIONAL REQUIREMENTS FOR RIGID STEEL CONDUIT

A. Rigid steel conduit shall be cut and threaded with tools accepted for the purpose and by qualified personnel.

1. Accepted pipe vise.

2. Roller/bade type cutter or band saw.

3. Reamer capable of completely removing all ridges or burrs left by the cutter. Reaming with pliers is not acceptable.

B. Hangers shall be installed 8’ apart.

C. Conduits stubbed through floor slabs, above grade and not contained inside walls, shall be rigid galvanized metallic conduit.

D. Conduit threads and scratches in galvanizing shall be treated with not less than two coats of zinc rich coating.

3.3 ADDITIONAL REQUIREMENTS FOR EMT

A. Electrical metallic tubing (thin wall) may be installed inside buildings above ground floor where not subject to mechanical injury.

B. All cuts shall be reamed smooth and free of sharp and abrasive areas by use of an accepted reamer.

3.4 ADDITIONAL REQUIREMENTS FOR ALUMINUM CONDUIT

A. May be used only for aluminum canopies.

3.5 ADDITIONAL REQUIREMENTS FOR FLEXIBLE STEEL CONDUIT AND SEAL-TITE FLEXIBLE STEEL CONDUIT

A. Shall be properly grounded.

B. Shall be installed with accepted fittings.

3.6 ADDITIONAL REQUIREMENTS FOR RIGID NON-METALLIC CONDUIT (PVC CONDUIT)

A. Rigid non-metallic PVC conduit is not allowed anywhere inside building(s) except underground, in slab, in poured in place concrete, and in block wall up to first outlet box (if not over 40” AFF) if allowed by codes. Rigid non-metallic PVC conduit may be used exterior to building as stated elsewhere in these specifications.

B. Join rigid non-metallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

C. Threads will not be permitted on rigid non-metallic PVC conduit and fittings, except for

rigid steel to rigid non-metallic PVC couplings.

D. Installation of rigid non-metallic PVC conduit shall be in accordance with manufacturer's recommendations.

E. Rigid non-metallic PVC conduit shall not be used to support fixture or equipment.

F. Field bends shall be made with accepted hotbox. Heating with flame and hand held dryers are prohibited.

3.7 SUPPORTS

A. Arrange supports to prevent misalignment during wiring installation.

B. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

C. Group related conduits; support using conduit rack. Construct rack using steel channel; (minimum 24", increase distance as required) provide space on each for 25 percent additional conduits.

D. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29 Hangers and Supports.

E. Do not support conduit with wire, metal banding material, or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach conduit to ceiling support wires.

G. Conduits shall not be supported from ceiling grid supports, plumbing pipes, duct systems, heating or air conditioning pipes, or other building systems.

H. Non-bolted conduit clamps, as manufactured Caddy Corp. are not accepted. Supporting conduit and boxes with wire is not accepted. All raceways except those from surface-mounted switches, outlet boxes or panels shall be supported with clamp fasteners with toggle bolt on hollow walls, and with lead expansion shields on masonry.

3.8 EXPANSION FITTINGS

A. Provide expansion fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.

B. Expansion fittings shall be installed in the following cases: In each conduit run wherever it crosses an expansion joint in the concrete structure; on one side of joint with its sliding sleeve end flush with joint, and with a length of bonding jumper in expansion equal to at least three times the normal width of joints; in each conduit run which mechanically attached to separate structures to relieve strain caused by shift on one structure in relation to the other; in straight conduit run above ground which is more than 100’ long and interval between expansion fittings in such runs shall not be greater than 100’.

3.9 GROUNDING

A. All raceways shall have a copper system ground conductor throughout the entire length of circuit installed within conduit in strict accordance with NEC codes.

B. Grounding conductor shall be included in total conduit fill determining conduit sizes,

even though not included or shown on drawings.

C. Grounding conductors run with exterior/ underground feeders shall be bare only.

D. Grounding conductors run with feeders shall be bonded to portions of conduit that are metal by accepted ground bushings.

E. See other sections of these specifications for additional requirements.

F. Grounding conductors (including lightning protection down conductors) run in metal conduit shall be bonded to metal conduit at both ends.

3.10 FIRE AND SMOKE STOPPING

A. Contractor is to provide fire stopping and/or smoke stopping for all penetrations of existing (or new if applicable) fire or smoke barrier walls, chases, floors, etc. as required to maintain existing rating of floor, wall, chase, etc.

B. Install conduit to preserve fire resistance rating of partitions and other elements.

C. Install fireproofing material to maintain existing rating of floor, beams, etc. damaged or removed by renovation.

D. Fire and smoke stopping material: A two-part silicone foam or a one-part putty, UL classified and FM accepted with flame spread of 0 and smoke development not to exceed 50 in compliance with ASTM E84. Material shall be suitable for penetration seals through fire-rated floors and walls when tested in compliance with ASTM E119. Material shall not melt or soften at high temperatures, shall be suitable for direct outdoor and ultraviolet exposures, shall cure to give a tight compression fit, and shall not produce toxic fumes. Material, when heated, shall expand to fill and hold penetration closed where burn out of cable insulation or ATC tubing occurs.

3.11 VERTICAL RACEWAYS

A. Cables in vertical raceways shall be supported per NEC 300.19. Provide and install supporting devices for cables, including any necessary accessible pullbox as required regardless if shown on drawings or not. Provide and install access panels as required. Coordinate location of pull box and access panel with architect prior to installation. This includes empty raceways for future use.

3.12 GENERAL

A. Install conduit in accordance with NECA Standard Practice of Good Workmanship in Electrical Contracting. Contractor shall layout all work prior to rough-in.

B. Utilize strap wrenches to tighten conduits and fittings so as to prevent damage to galvanized finishes.

C. Install nonmetallic conduit in accordance with manufacturer's instructions.

D. Arrange conduit to maintain headroom and present neat appearance.

E. Route conduit installed above accessible ceilings or exposed to view parallel or perpendicular to walls. Do not run from point to point.

F. Route conduit in and under slab from point-to-point.

G. Do not cross conduits in slab.

H. Maintain adequate clearance between conduit and piping.

I. Maintain 12” clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).

J. Cut conduit square using saw or pipe cutter; de-burr cut ends.

K. Bring conduit to shoulder of fittings; fasten securely.

L. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

M. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2” size.

N. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

O. Provide and install pullboxes, junction boxes, fire barrier at fire rated walls etc., as required by NEC 300, whether shown on Drawings or not.

P. Provide continuous fiber polyline 1000 lb. minimum tensile strength pull string in each empty conduit except sleeves and nipples. This includes all raceways which do not have conductors furnished under this Division of the Specifications. Pullcord must be fastened to prevent accidental removal. A phenolic or brass nameplate shall be attached to each end indicating the location of both ends of conduit as follows: THIS END = "LOCATION," OTHER END = "LOCATION."

Q. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

R. Ground and bond conduit under provisions of Section 26 05 26 Grounding and Bonding.

S. Identify conduit under provisions of Section 26 05 53 Identification for Electrical Systems.

T. Install all conduits concealed from view unless specifically shown otherwise on drawings

U. Rigid steel box connections shall be made with double locknuts and bushings.

V. All raceways shall be kept clear of plumbing fixtures to facilitate future repair or replacement of said fixtures without disturbing wiring. Except where it is necessary for control purposes, all raceways shall be kept away from items producing heat.

W. All raceway runs in masonry shall be installed at the same time as the masonry so that no face cutting is required, except to accommodate boxes.

X. All raceways shall be run from outlet to outlet as shown on the drawings, unless permission is granted to alter arrangement shown. If permission is granted arrangement shall be marked on field set of drawings as previously specified.

Y. Spare conduit stubs shall be capped and location and use marked with concrete marker set flush with finish grade. Marker shall be 6” round x 6” deep with appropriate symbol embedded into top to indicate use. Also, tag conduits in panels where originating.

Z. All conduit stubbed above floor shall be strapped to Kindorf channel supported by conduit driven into ground or tied to steel. Spare conduit stubs shall be capped with a UL listed and accepted cap or plug for the specific intended use and identified with ink markers as to source and labeled "Spare."

AA. All connections to motors or other vibrating equipment including dry type transformers or at other locations where required shall be made with not less than 12” of flexible steel conduit. Use angle connectors wherever necessary to relieve angle strain on flex conduit.

BB. Provide conduit seal-offs wherever conduit crosses obvious temperature changes (i.e. from inside to outside of coolers, freezers, etc.).

CC. Route conduit through roof openings for piping and ductwork or through suitable roof flashing or boot. Coordinate location with roofing installation specified under other Sections of these specifications.

DD. All raceways shall be run in neat and workmanlike manner and shall be properly in accordance with latest edition of NEC with accepted conduit clamps, hanger rods and structural fasteners.

EE. All raceway runs, whether terminated in boxes or not, shall be capped during the course of construction and until wires are pulled in, and covers are in place. No conductors shall be pulled into raceways until construction work which might damage the raceways has been completed.

FF. Electrical raceways shall be supported independently of all other systems and supports and shall in every case avoid proximity to other systems which might cause confusion with such systems or might provide a chance of electrolytic actions, contact with live parts or excessive induced heat.

END OF SECTION

SECTION 26 05 34

OUTLET BOXES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes wall and ceiling outlet boxes (and/or small junction/pullboxes).

B. Provide and install all outlet boxes (flush or surface) complete with all accessories as required to facilitate installation of electrical system and as required by the NEC.

1.3 REFERENCES

A. ANSI/NEMA FB 1 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable

B. ANSI/NEMA OS 1 Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports

C. ANSI/NFPA 70 National Electrical Code

D. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Submit catalog cut sheets/product data on:

1. Surface cast boxes.

B. For pullboxes and junction boxes not covered in Section 26 05 35 Pull and Junction Boxes. Submit product data showing dimensions, covers, and construction.

1.6 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.

B. Verify locations of outlets in offices and work areas prior to rough-in.

C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

PART 2 - PRODUCTS

2.1 GENERAL

A. All boxes and fittings shall be labeled by Underwriters Laboratories.

B. Provide box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, outlet boxes, and corrosion-resistant knockout closures compatible with outlet boxes being used and meeting requirements of individual wiring situations.

C. All boxes shall be of the size and shape required by NFPA 70 for their respective locations.

D. Boxes shall be of such form and dimensions as to be adapted to the specific use and location, type of device or fixtures to be used, and number and size of conductors and arrangement, size and number of conduits connecting thereto.

E. Handy boxes shall not be used.

F. Outlet boxes to be one-piece.

G. 4" x 4" boxes and 4 11/16" x 4 11/16" boxes used as junction boxes shall be one piece.

2.2 SHEET METAL OUTLET BOXES: ANSI/NEMA OS 1, GALVANIZED STEEL

A. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2” male fixture studs where required.

B. Concrete Ceiling Boxes: Concrete type.

C. Interior flush outlet boxes shall be galvanized steel constructed with stamped knockouts in back and sides, and threaded holes with screws for securing box coverplates or wiring devices. T&B, Steel City, Raco or accepted substitution.

D. Ceiling outlet boxes shall be 4" octagonal or 4" square X 1 1/2" deep or larger as required for number and size of conductors and arrangement, size and number of conduits terminating at them.

E. Switch, wall receptacle, telephone and other recessed wall outlet boxes in drywall shall be 4" square X 1 1/2" deep. For recessing in exposed masonry, provide one piece 4" square x 1-1/2" deep wall boxes with appropriate 4" square cut tile wall covers Steel City series #52-C-49/52-C-52 or accepted substitution. For recessing in furred-out block walls, provide 4" square box with required extension for block depth and required extension for drywall depth.

F. Sheet metal boxes shall be stainless steel fully weatherproof and watertight where installed outside.

2.3 CAST BOXES NEMA FB 1:

A. Interior surface outlet boxes and conduit bodies installed from 0" AFF to 90" AFF (including fire alarm device backbox) shall be the heavy cast aluminum or iron with external threaded hubs for power devices and threaded parts for low voltage devices; Appleton, Crouse Hinds or accepted substitution. Trim rings shall also be of one-piece construction.

B. Weatherproof outlet boxes shall be constructed of corrosion-resistant cast metal suited to each application with threaded conduit hubs, cast metal faceplate with spring-hinged waterproof cap suitably configured, gasket, and corrosion-proof fasteners.

C. Boxes to be Type FD unless otherwise noted on drawings.

D. Freestanding cast boxes are to be type FSY (with flange). Other cast zinc boxes are not acceptable.

PART 3 - EXECUTION

3.1 GENERAL

A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6” from ceiling access panel or from removable recessed luminaire.

D. Install boxes to preserve fire resistance rating of partitions and other elements.

E. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

F. Use flush mounting outlet boxes in finished areas.

G. Do not install flush mounting boxes back-to-back in walls; provide minimum 6” separation. Provide minimum 24” separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Use stamped steel bridges to fasten flush mounting outlet box between studs.

J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

K. Support all outlet boxes from structure with minimum of one 3/8" all-thread rod hangers. Boxes larger than 25 square inches shall be supported with two all-thread rod hangers, minimum.

L. Do not fasten boxes to ceiling support wires.

M. Support boxes independently of conduit.

N. Use gang box where more than one device is mounted together. Do not use sectional box.

O. Use gang box with plaster ring for single device outlets.

P. Use cast outlet box in exterior locations and wet locations.

Q. Comply with applicable portions of the NECA National Electrical Installation Standards.

R. Install outlets in the locations shown on the Drawings; however prior to rough-in, the Owner shall have the right to make slight changes in locations to reflect room furniture layouts.

S. The Contractor shall coordinate his work with that of the General Contractor so that each electrical box is the type suitable for the wall or ceiling construction provided and suitable fireproofing is inbuilt into fire rated walls.

T. The Contractor shall relocate electrical boxes as required so that once installed, electrical devices will be symmetrically located with respect to the room layout.

U. All boxes shall be installed in a flush rigid manner with box lines at perpendicular and parallel angles to finished surfaces. Boxes shall be supported by appropriate hardware selected for the type of surface from which the box shall be supported. For example, provide metal screws for metal, wood screws for wood, and expansion devices for masonry or concrete.

V. For locations exposed to weather or moisture (interior or exterior), provide weatherproof boxes and accessories.

W. As a minimum, provide pull boxes in all raceways over 150’ long. The pull box shall be located near the midpoint of the raceway length.

X. Provide knockout closures to cap unused knockout holes where blanks have been removed and plugs for unused threaded hubs.

Y. Provide conduit locknuts and bushings of the type and size to suit each respective use and installation.

Z. Boxes and conduit bodies shall be located so that all electrical wiring is accessible.

AA. Avoid using round boxes where conduit must enter box through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.

BB. All flush outlets shall be mounted so that covers and plates will finish flush with finished surfaces without the use of shims, mats or other devices not submitted or accepted for the purpose. Add-a-Depth rings or switch box extension rings (Steel City #SBEX) are not acceptable. Plates shall not support wiring devices. Gang switches with common plate where two or more are indicated in the same location. Wall-mounted devices of different systems (switches, thermostats, etc.) shall be coordinated for symmetry when located near each other on the same wall. Outlets on each side of walls shall have separate boxes. Through-wall type boxes shall not be permitted. Back-to-back mounting shall not be permitted. Trim rings shall be extended to within 1/8" of finish wall surface.

CC. Outlet boxes mounted in metal stud walls are to be supported to studs with two screws inside of outlet box to a horizontal stud brace between vertical studs, or one side of outlet box supported to stud with opposite side mounted to section of stud or device to prevent movement of outlet box after wall is finished.

DD. All outlet boxes that do not receive devices in this contract are to have blank plates installed matching wiring device plates.

EE. Mount Height.

1. Height of wall outlets to bottom above finished floors shall be as follows, unless specifically noted otherwise, or unless otherwise required by applicable codes including ADA. Verify with the Architectural Drawings and Shop Drawings for

installing:

Switches	4'-0" AFF to top
Receptacles	1'-4" AFF to bottom
Lighting Panels	6'-6" AFF to centerline of highest breaker/fuse
Phone outlets	1'-4" AFF to bottom
Intercom Call-in button/handsets	4'-0" AFF to top
Fire Alarm Pull Stations	4'-0" AFF to top
Fire Alarm Strobe Lights	80" AFF to bottom

2. Bottoms of outlets above countertops or base cabinets shall be minimum 2" above countertop or backsplash, whichever is highest. Outlets may be raised so that bottom rests on top of concrete block course, but all outlets above counters in same area shall be at same height. It is the responsibility of this Division to secure cabinet drawings and coordinate outlet locations in relation to all cabinets as shown on Architectural Drawings, prior to rough-in, regardless of height shown on Division 26 Drawings.

3. Height of wall-mounted fixtures shall be as shown on the Drawings or as required by Architectural Drawings and conditions. Fixture outlet boxes shall be equipped with fixture studs when supporting fixtures.

FF. Special Purpose Outlets.

1. Locate special purpose outlets as indicated on the drawings for the equipment served. Location and type of outlets shall be coordinated with appropriate trades involved. The securing of complete information for proper electrical roughing-in shall be included as work required under this section of specifications. Provide plug for each outlet.

GG. Outlets in Fire/Smoke and Smoke Partitions/Walls.

1. Electrical outlet boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearances between such outlet boxes and the gypsum board must be completely filled with joint compound or other accepted materials. The wall must be built around outlets of larger size so as not to interfere with the integrity of the wall rating.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Coordinate installation of outlet box for products furnished under all Sections of these specifications.

B. Coordinate locations and sizes of required access doors with applicable sections in these specifications.

C. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

D. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.

E. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

3.3 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closure in unused box opening.

END OF SECTION

SECTION 26 05 35

PULL AND JUNCTION BOXES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide and install pull and junction boxes as shown on drawings or as required by the NEC.

B. Provide and install pull and junction boxes wherever required for a complete and operating distribution system whether shown on drawings or not.

C. Where outlet boxes are used for pull and/or junction boxes, they shall meet the requirements of Section 26 05 34 Outlet Boxes.

1.3 REFERENCES

A. ANSI/NEMA FB 1 Fittings and Supports for Conduit and Cable Assemblies

B. ANSI/NEMA OS 1 Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports

C. ANSI/NEMA OS 2 Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

D. ANSI/NFPA 70 National Electrical Code

E. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Submit actual shop drawings of all pull boxes showing:

1. Covers.
2. Dimensions - inside and out.
3. Rating of concrete or gauge of metal.
4. Manufacturer.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations and mounting heights of pull and junction boxes.

1.7 PROJECT CONDITIONS

A. Verify field measurements are as shown on Drawings.

B. Verify locations of pull and junction boxes prior to rough-in.

C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose and to maintain required access.

PART 2 - PRODUCTS

2.1 GENERAL

A. Dimensions of pull and junction boxes shall meet dimensions shown on Drawings or dimensions required by NEC, whichever is largest.

B. Pull and junction boxes shall meet all requirements of UL and NEC.

C. Small pull boxes (i.e. 4" x 4") shall meet the requirements of these Specifications for outlet boxes as a minimum.

D. All boxes (above ground) of 100 cubic inches or more shall be constructed of 14 gauge steel with hot dip galvanized coating.

2.2 SHEET METAL BOXES

A. NEMA OS 1, galvanized steel.

B. Box to be stainless steel fully weatherproof and watertight where installed outside.

2.3 SURFACE-MOUNTED CAST METAL BOX

A. NEMA 250, Type 4; flat-flanged, surface-mounted junction box.

B. Material: Cast aluminum.

C. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. Provide all hubs as required for conduit connections.

2.4 IN-GROUND PULL BOXES

A. Material: Precast concrete with steel reinforcement.

B. Bottom: Open with 6" of gravel for drainage.

C. Cover: Meet Florida Dept. of Transportation requirements for installed location (pedestrian, heavy traffic, light traffic).

D. Solid sides constructed to facilitate conduit entries.

PART 3- EXECUTION

3.1 GENERAL

A. Install per NEC.

B. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

C. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6” from ceiling access panel or from removable recessed luminaire.

F. Install boxes to preserve fire resistance rating of partitions and other elements.

G. Align adjacent wall-mounted boxes with each other.

H. Use flush mounting boxes in finished areas.

I. Do not install flush mounting boxes back-to-back in walls; provide minimum 6” separation. Provide minimum 24” separation in acoustic rated walls.

J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

K. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

L. Pull and junction boxes larger than 25 square inches shall be supported with two 3/8" all-thread rod hangers minimum.

M. Pull and junction boxes used for Systems Division 28 larger than 25 square inches shall be hinged cover type.

N. Do not fasten boxes to ceiling support wires.

O. Support boxes independently of conduit.

P. Large Pull Boxes:

1. Boxes larger than 100 cubic inches in volume or 12” in any dimension.:

a) Interior dry locations per NEC with screw covers.

b) Other locations use hinged enclosure under provisions of Section 26 27 16 Cabinets and Enclosures.

Q. Outdoor Locations: All boxes installed outdoors to be NEMA 4, fully weatherproof and watertight.

3.2 IN-GROUND PULL BOXES

A. Provide and install ground rod in each pull box. Connect #2 copper ground wires (counterpoise) to ground rod, run out pullbox 6" over conduits to next pull box; tie to respective building electrical ground rod at each building.

B. Install pull boxes flush with finished grade. Provide extensions as required.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations and sizes of required access doors with applicable sections in these Specifications.

B. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

3.4 ADJUSTING

A. Install knockout closure in unused box opening.

END OF SECTION

26 05 37

SURFACE RACEWAYS

PART 1 - GENERAL

1.1 DESCRIPTION OF SYSTEM

A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

1. Wireways.

1.2 REFERENCES

A. NECA (National Electrical Co Association) Standard of Installation.

B. NEMA WD 6 - Wiring Device Configurations.

1.3 SUBMITTALS

A. Submit under provisions of the General Requirements of the Contract Documents and Section 26 05 07 Submittals.

B. Submit Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.

C. Submit Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NECA Standard of Installation.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this Section with minimum five years experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 WIREWAY

A. Manufacturers:

1. Hoffman.
2. Square "D"
3. Electrical Enclosures

4. Substitutions: Under provisions of Section 26 05 08 Substitutions.

B. Description: General purpose, Oiltight and dusttight or Raintight type wireway as indicated on drawings. If not indicated provide type required to meet applicable codes.

C. Knockouts: Manufacturer’s standard.

D. Size: As indicated on Drawings, or larger as required by the NEC.

E. Cover: Hinged cover with full gasketing for raintight and oiltight types.

F. Connector: Slip-in for general purpose and raintight types and flanged for oiltight types.

G. Fittings: Lay-in type with removable top, bottom, and side; captive screws for general purpose, and drip shield for raintight type, and removable top for oiltight type.

H. Finish: Rust inhibiting primer coating with gray enamel finish for interior applications. Stainless steel for exterior applications.

PART 3- EXECUTION

3.1 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.

C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

D. Wireway Supports: Provide steel channel as specified in Section 26 05 09 Hangers and Supports.

E. Close ends of wireway and unused conduit openings.

F. Ground and bond raceway and wireway under provisions of Section 26 05 26 Grounding and Bonding.

G. Install only in locations deemed accessible by the NEC. and local authority. Provide all access panels, etc.,as required to maintain required access.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide and install all equipment, labor and material for a complete identification system including but not limited to:

1. Nameplates and labels.
2. Wire and cable markers.
3. Conduit markers.

B. Identify all new and existing conduit, boxes, equipment, etc. as specified herein.

1.3 REFERENCES

A. ANSI/NFPA 70 National Electrical Code

B. Americans with Disabilities Act

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

PART 2- PRODUCTS

2.1 NAMEPLATES

A. Nameplates shall be laminated phenolic plastic, chamfered edges.

1. 120/208 Volt System:
   a) Black front and back, white core, lettering etched through outer covering, white engraved letters on black background.
2. 277/480 Volt System:
   a) Orange with white letters.
3. Emergency System:
   a) Red with white letters.
4. Emergency Power:
   a) Red front and back, white core, lettering etched through outer covering, white engraved letters on red background.

B. Letter Size:

1. 1/8” letters for identifying individual equipment and loads.

2. 1/4” letters for identifying grouped equipment and loads.

C. Nameplates shall adequately describe the function of the particular equipment involved. Where nameplates are detailed on the Drawings, inscription and size of letters shall be as shown and shop drawing submitted for acceptance. Nameplates for panelboards, switchboards, motor control centers, disconnects and enclosed breakers shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 120/208V, 3-phase, 4-wire." In addition, provide phenolic label in panel to describe where the panel is fed from and location. For example, "Fed From MDP-1:3:5 Electrical Room #E101 Level 1." Nameplates for equipment listed below shall describe particular equipment name and associated panel/circuit, if applicable. The name of the machine on the nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and pushbutton station nameplates for that machine.

D. The following items shall be equipped with nameplates:

1. All motors, motor starters, motor-control centers, pushbutton stations, control panels, time switches, disconnect switches, transformers, panelboards, circuit breakers (i.e., all 2-pole, 3-pole circuit breakers), contactors or relays in separate enclosures, power receptacles where the nominal voltage between any pair of contacts is greater than 150V, wall switches controlling outlets that are not located within sight of the controlling switch, high voltage boxes and cabinets, large electrical, and electrical systems (Systems Division 28), junction and pull boxes (larger than 4-11/16"), terminal cabinets, terminal boards, and equipment racks. Nameplates shall also describe the associated panel and circuit number, if applicable.

E. All Electrical system panels, transfer switches, motor control centers, disconnect switches, motor controllers, etc. shall be labeled as per branch, i.e.: "Panel ABC Emergency-Life Safety Branch" (similar for emergency legally required standby branch, or emergency optional standby branch).

2.2 WIRE MARKERS

A. Description: Cloth, tape, split sleeve or tubing type wire markers.

B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings including neutral conductor.

2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on shop drawings.

2.3 CONDUIT/JUNCTION BOX COLOR CODE

A. All conduit system junction boxes (except those subject to view in public areas) shall

be color coded as listed below:

COLOR CODE FOR JUNCTION BOXES	KRYLON PAINT NUMBER
System Emergency 277/480 volt	Cherry Red K02101
System Emergency 120/208 volt	Zinger Pink S01150
Fire Alarm	Safety Orange K02410
Normal Power 277/480 volt	Leather Brown K02501A00
Normal Power 120/208 volt	Gloss Black K01601A00
Fiber Optics	Safety Purple K01929
Sound System	Daisy Yellow K01813A00
Intercom	True Blue K01910
Computer/Data	Bright Gold K01701
BAS	Gloss White K01501A00
Security/CCTV	Saddle Tan K03554
Telephone	Safety Green K02012
Grounding	Fluorescent Green K10339

B. Conduit (not subject to public view) longer than 20’ shall be painted with above color paint band 20’ on center. Paint band shall be 4" in length applied around entire conduit. Where conduits are parallel and on conduit racking, the paint bands shall be evenly aligned. Paint shall be neatly applied and uniform. Paint boxes and raceways prior to installation or tape conduits and surrounding surfaces to avoid overspray. Paint overspray shall be removed.

C. Junction boxes and conduits located in public areas (i.e. areas that can be seen by the public) shall be painted to match surface attached to. Provide written request to A/E for interpretation of public areas in question.

2.4 CONDUIT/JUNCTION BOX MARKER

A. All new and existing junction boxes/cover plates for power, lighting and systems (except those installed in public areas) shall adequately describe its associated panel and circuit reference number(s) within (i.e. ELRW-2, 4, 6), or systems within (i.e. fire alarm, intercom, etc.). Identification shall be neatly written by means of black permanent marker. Paint one-half of cover plate with appropriate color above, and one-half with associated panel/circuit or system as described above. Junction box cover plates located in public areas shall be identified with small phenolic labels securely attached. Label colors to be determined by A/E. Large pull/junction boxes (8" x 8" or larger) shall be color identified by painting the corners of box cover plate with specified colors at 45 degree angles; phenolic labels as specified herein.

B. Identify conduit not installed in public areas with corresponding panel/circuit numbers or corresponding system type as described above. Spacing 20 ft. on center adjacent to color identification bands.

2.5 UNDERGROUND WARNING TAPE

A. Description: Minimum 6” wide plastic tape, detectable type, with suitable warning legend describing buried lines. Systems conduit shall have orange colored tape. Power/lighting conduit shall have red colored tape.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

A. Install nameplate parallel to equipment lines.

B. Secure nameplate to equipment front using stainless steel pop rivets.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

D. Nameplates installed inside on dead front cover shall be self-adhesive tape. Do not drill or install screws in dead front.

E. Identify new and existing conduit, junction boxes, and outlet boxes using field painting.

F. Identify new underground conduit using underground warning tape. Install a minimum of one tape per trench at 6” below finished grade. For trenches exceeding 24” in width, provide one tape per 24” of trench width spaced evenly over trench width.

G. Install wire markers at all new connections and terminations, and at existing connections and terminations modified or altered.

END OF SECTION

SECTION 26 08 13

TESTS AND PERFORMANCE VERIFICATION OF ELECTRICAL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section pertains to the furnishing of all labor, materials, equipment and services necessary to test and prove performance of the electrical system.

B. Operate system for a three-day period. Do performance verification work as required to show that the system is operating correctly in accordance with design. Supply instruments required to read data. Adjust system to operate at the required performance levels.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TESTS

A. System:

1. General: After installation of all conductors and before final acceptance, make required tests to determine proper functioning of all circuits. Furnish all necessary instruments required to make tests and correct any deficiencies found. Prior to energizing, circuits shall be "rung-out" to verify opens, intentional and non-intentional grounds, continuity and detect short circuits by accepted constant megger.

2. Procedure:

a) All wires in conduit that are shorted or unintentionally grounded shall be replaced.

b) Insulation resistance of all feeder conductors and all conductors AWG #1 and larger shall be tested. This is to include all new conductors and/or all existing conductors that are connected and/or extended. Each conductor shall have its insulation resistance tested after the installation is completed and all splices, taps, and connections are made, except connection to source and point of final termination at distribution or utilization equipment.

c) Insulation resistance of conductors that are to operate at 600 volts or less shall be tested by using AVO Biddle (or accepted equal) megger at not less than 1000 volts dc. Resistance shall be measured from conductor to conduit (ground). Testing methodology shall conform to short-time or spot-reading procedural recommendations of AVO Biddle Instruments for specific megger being used. Acceptable insulation resistance of conductors rated at 600

volts shall not be less than 500 megohm.

d) Conductors that do not satisfy test requirements of paragraph c) above, shall be removed, replaced, and testing repeated on new cable at no additional cost to the Owner. All tests shall be performed by licensed electrician trained in the use of test instruments. Contractor shall furnish all instruments and personnel required for tests, shall tabulate readings observed and complete Conductor Insulation Resistance Test form (see Section 26 01 00 Operation and Maintenance Manuals) and submit five copies to Engineer for acceptance. Test shall be witnessed by Owner's Representative and Engineer (if so desired). Final acceptance data is to be submitted in O & M Manual.

e) Test reports shall identify each feeder conductor tested, date, time and result of test, weather conditions and range, test voltage, and serial number of the megger instrument used. Any conductor or splice that is found defective shall be promptly removed and replaced, and additional test shall be performed.

f) Observe all safety instructions set by testing equipment manufacturer. Application of voltage testing involves risk of electric shock and sparking.

3. Take readings of voltage and amperage at building main disconnect switch and at main for each panel, at primary and secondary side of each transformer, and at the end of the longest branch circuit at each panel. The above readings shall be taken 1) "no load" conditions and 2) "full load" conditions with all equipment using electricity. Tabulate readings, complete Voltage and Amperage Readings (Tabulated Data) form (see Section 26 01 00 Operation and Maintenance Manuals) and submit five copies to the Engineer for acceptance. Final accepted data is to be submitted in O & M Manual.

B. Motors:

1. Test run each motor via motor's control unit in both manual mode and automatic mode. Verify proper operation, voltage and rotation.

C. Grounds:

1. Test each raceway for raceway continuity as called for in Section 26 05 26 Grounding and Bonding.

3.2 DATA PROCESSING

A. Testing Data.

1. Tabulate data for submission.

2. Submit data on 8 1/2" x 11" sheets with date and name of checker with one copy for each O & M Manual.

3. Where specific performance verification information is called for in the Specifications, use copies of the sheets provided for recording readings.

4. Data shall be submitted and accepted before Check Out Memos are signed or a request for final inspection is made.

B. Equipment Check-Out:

1. At completion of construction, after all performance verification and testing information has been gathered, submitted, and approved, provide one copy of this information to the Authorized Manufacturer's Representative of the equipment.

    a) Manufacturer's Authorized Representative must be trained by the manufacturer and authorized to inspect, adjust, test, and repair equipment.

2. Work required under this section shall include having the representative examine the performance verification information, check the equipment in the field while it is in operation, and sign a Check Out Memo form for a record. (See Section 26 01 00 Operation and Maintenance Manuals).

    a) Check out of equipment is to include examining performance of equipment and certifying equipment has been installed per manufacturer's recommendations that all necessary adjustments have been performed and that equipment is operating properly.

3. Submit one copy (for each O & M Manual) of the memo on each major item of equipment. Accepted memos shall be inserted in each O & M manual with the performance verification information and submittal data. Memos shall be submitted and accepted before instruction to Owner or a request for final inspection.

4. Items requiring Check Out Memos are all major items of equipment such as (but not limited to):

    a) Panels and distribution panels.

    b) Any other equipment noted to be checked-out by Engineer during construction.

5. Do not submit Check Out Memo form at the time submittal brochures are submitted. This form shall be completed and submitted before instruction in operation to Owner or a request for final inspection.

END OF SECTION

SECTION 26 27 16

CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

1. Hinged cover enclosures.
2. Cabinets.

B. Cabinets and enclosures are to include:

1. Terminal blocks,
2. Mounting panel,
3. Ground bus/bar, and
4. All accessories as required for a complete and operating system.

C. Provide and install cabinets and enclosures as specified herein for all systems specified in Divisions 26, 28 when included with these Specifications.

1.3 REFERENCES AND REGULATORY REQUIREMENTS

A. Conform to the requirements of the following:

1. NEMA 250 Enclosures for Electrical Equipment (1000 Volts Maximum)
2. NEMA ICS 4 Terminal Blocks
3. ANSI/NFPA 70 National Electrical Code

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.4 SUBMITTALS

A. Submit Product Data: Provide manufacturer's standard data for enclosures and cabinets.

B. Submit Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under “References and Regulatory Requirements.” Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

C. Submit actual shop drawings on all cabinets and enclosures showing:

1. Covers.

2. Dimensions - inside and out.
3. Gauge of metal.
4. Manufacturer.
5. Terminal mounting plate, construction, etc.
6. Ground bus/bar.

1.5 EXTRA MATERIALS

A. Provide two of each cabinet key.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless specifically called for otherwise on Contract Drawings, provide cabinets as specified herein for terminal cabinets mounted indoors. Similarly, provide hinged cover enclosures as specified herein for terminal cabinets mounted outdoors or in locations other then NEMA 1 locations. Also provide hinged cover enclosures for locations where size required is not available in cabinet construction, or if specifically specified as enclosure in Contract Documents.

B. Size:

1. Dimensions of cabinets and enclosures shall meet the dimensions shown on Drawings, dimensions required by NEC, or dimensions sized as required to facilitate all equipment/connections involved installation, whichever is largest.

C. Provide metal barriers to separate compartments containing control wiring operating at less than 50 volts from power wiring.

D. Provide accessory feet and/or mounting brackets for free-standing equipment.

E. Cabinets and enclosures installed outdoors shall be fully weatherproof and watertight.

2.2 HINGED COVER ENCLOSURES

A. Construction:

1. Interior Locations: NEMA Type 1 steel (unless otherwise noted).
2. Exterior Locations: NEMA Type 4X: 304 stainless steel.

B. Covers: Continuous hinge.

C. Enclosure Finish:

1. NEMA 1: manufacturer’s standard metallic gray enamel over phosphatized surfaces.
2. NEMA 4X: 304 stainless steel.

D. Lock/Handle:

1. Provide/install key lock handle on all enclosures mounted in rooms/areas/spaces that are not electrical rooms or mechanical rooms. Enclosures installed in electrical rooms need not be and are not required to be lockable.

E. Interior Mounting Plate:

1. Each enclosure is to have interior mounting plate/panel for mounting terminal blocks and electrical components.

2. Plate/panel is to be metal.

F. Ground Bus/Bar:

1. Each enclosure housing surge protective devices or other equipment shall have local ground bar/bus installed. See "Local Ground Bus/Bar" included with this Section.

G. Manufacturers:

1. Hoffman.

2. Electromate Corporation.

3. Austin Enclosures

2.3 CABINETS

A. Construction: Code gauge steel with removable endwalls.

B. Finish:

1. Boxes: galvanized steel.

2. Fronts: gray baked enamel.

C. Fronts:

1. Electrical or Mechanical Room Locations: Screw cover with flush handle or as noted below.

2. Other Locations: Mono-flat with concealed trim clamps, concealed hinges, and flush lock lockable handle.

3. Flush or surface type as shown or called for in Contract Documents.

D. Interior Mounting Plate:

1. Each enclosure is to have interior mounting plate/panel for mounting terminal blocks and electrical components.

2. Panel/plate may be constructed of wood if painted with fire retardant paint of a flame spread rating of Class A, if it meets all applicable codes, and it is acceptable to the Authority Having Jurisdiction, otherwise plate to be metal.

3. Panel/plate shall be metal.

E. Ground Bus/Bar:

1. Each cabinet housing surge suppression equipment or other equipment shall have local ground bar/bus installed. See "Local Ground Bus/Bar" included within this Section.

F. Manufacturer:

1. Sq. "D" Class 6650 Series.

2. Austin Enclosures
3. Hoffman

2.4 TERMINAL BLOCKS

A. Terminal Blocks: ANSI/NEMA ICS 4.

B. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors rated 600 volts.

C. Signal and Control Terminals: Modular construction type suitable for channel mounting with tubular pressure screw connectors rated 300 volts.

D. Provide ground bus terminal block with each connector bonded to enclosure.

2.5 LOCAL GROUND BUS/BAR

A. Size to handle #6 through #14 AWG copper ground wire.

B. Length as required for circuits.

C. Manufacturer:

1. Sq. "D" #PK***GTA Series.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.2 INSTALLATION

A. Install Products in accordance with manufacturer's instructions.

B. Install enclosures and cabinets plumb. Anchor securely to wall and structural supports at each corner.

C. Install cabinet fronts plumb.

D. Install per NEC and as required for proper clearance. Coordinate with panels.

E. Provide and install terminal cabinets as shown on Drawings or as required by the NEC.

F. Provide and install terminal cabinets wherever required for a complete and operating distribution system whether shown on Drawings or not.

G. Install local ground bus/bar in each terminal cabinet/enclosure that houses surge protective devices or other equipment and bond to cabinet enclosure via mounting screws or #6 AWG copper ground wire.

H. Ground local ground bus to systems ground bus/bar with minimum #6 AWG copper ground wire. Increase size if so required on drawings.

I. Install enclosures.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Provide and install all equipment, labor, material, accessories, and mounting hardware for a complete and operating system for the following:

1. Wall switches.
2. Receptacles.
3. Device plates and decorative box covers.

1.3 REFERENCES

A. NEMA WD 1 General Requirements for Wiring Devices

B. NEMA WD 6 Wiring Devices Dimensional Specifications

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Submit Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1. Submit product data on all types of wiring devices including plates and engraving.

B. Submit Manufacturer's Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years’ experience.

1.7 EXTRA MATERIALS

A. Provide a minimum of two screwdrivers of each type of tamper proof screw used on project.

B. Turn over to Owner and submit Spare Parts/Maintenance Stock Certification. (See Section 26 01 00 Operation and Maintenance Manual).

PART 2 - PRODUCTS

2.1 GENERAL

A. All devices shall be Specification Grade as minimum.

B. General purpose wiring devices shall meet NEMA standard WD-1, Wiring Devices, General Purpose. Special purpose devices shall conform to the requirements of NEMA standard WD-5, Wiring Devices, Special Purpose.

C. All wiring devices shall bear UL labels.

D. All devices of one type (i.e. all snap switches, all duplex receptacles, etc.) shall be by the same manufacturer. Hazardous Location and Special Purpose Devices may not be available from the same manufacturer; this shall constitute the only exception to this requirement of single-source.

E. Corrosion resistant devices shall be as specified for normal usage and fabricated of yellow color melamine plastic. Where "Weatherproof" type is indicated for exterior or wet locations, provide matching self-closing cover with gasketed seals at plate/wall junctions and for cover.

F. Provide factory packaged wiring devices having high impact strength molded plastic bodies.

G. Except where specifically required in these Specifications, use of interchangeable type or combination switch-receptacle-pilot devices is not acceptable and shall be removed.

H. All devices are to have terminals, terminations, lugs, etc rate at 75 degree C as a minimum for use with 75 degree C and higher conductor ratings.

2.2 WALL SWITCHES

A. Manufacturers:

1. See Drawings.

B. General:

1. Snap switches for general use shall be maintained contact types, and shall be single-pole, double-pole, three-way, or four-way as required for the specific switching arrangements shown on the drawings. They shall be quiet tumbler operation types, having silver alloy contacts, and meeting all NEMA performance standards. Color to match plates unless specifically noted otherwise in Specifications and/or on Drawings.

2. Switches shall be toggle or key-operated types, as indicated on the Drawings. All key-operated switches shall be keyed alike.

3. Where switches are denoted as having pilot lights, pilot lights shall glow when the switches are "On". Provide pilot light switch with lamp and miniature step-down transformer. The pilot light shall have a red lens, and the lamp shall be long-life type.

4. Jewels for use with switches controlling motors shall be green, and jewels for

other purposes shall be amber. All units shall be front relampable.

5. Snap switches installed in hazardous locations shall be UL listed for the type of location (class and division).

6. Voltage and ampere rating of switches shall be marked on switch and shall conform to voltage of system to which applied.

C. Description: NEMA WD 1, heavy-duty, ac only general-use snap switch.

D. Voltage Rating: 120-277 volts, ac.

E. Current Rating: 20 amperes minimum.

F. Ratings: Match branch circuit and load characteristics.

2.3 RECEPTACLES

A. General:

1. All receptacles shall be of standard NEMA configuration, as indicated on the Drawings, and shall comply with the respective ANSI C73 series standard for the NEMA configuration. Color to match plates unless specifically noted otherwise in specifications and/or on drawings.

2. Duplex receptacles shall have integral UL listed self-grounding clips. Similar, single receptacles shall be provided for plug-in connections of Industrial Fluorescent light fixtures on the same switching circuit. Receptacle face to be impact resistant nylon.

3. Weatherproof duplex receptacles shall be provided in all exterior locations and shall be ground fault circuit interrupting (GFCI) types, with weatherproof cover plates allowing use of receptacle with cover in closed position.

4. Special purpose receptacles for specific equipment shall be grounding types, having the number of poles, voltage and ampere ratings, and NEMA configurations required by the equipment. For each special purpose receptacle, provide an identical mating plug equipped with cord grip, secured to cord.

5. Duplex receptacles shall have back and side wired screw pressure terminals.

B. Description: NEMA WD 1; heavy-duty general use receptacle.

C. Configuration: NEMA WD 6; heavy-duty, general use type as specified and indicated.

D. Convenience Receptacle: Type 5-20.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

F. Manufacturers:

1. See Drawings.

2.4 COVER PLATES

A. All wiring devices shall be provided with standard size one-piece cover plates of suitable configuration for the number and type of devices to be covered.

B. Metallic cover plates shall be used in interior spaces, except as noted below, and shall

be fabricated of corrosion-resistant #302 stainless steel having a nominal thickness of .04" and a brushed finish. Screws securing the plates shall have flush (when installed) heads with finish to match plates. Metallic cover plates shall meet all requirements of the National Electrical Code and Federal Specifications.

C. Cover plates for switches located in corrosive atmospheres (where vapor proof is not indicated) shall be equal to Hubbell #17CM81/#17CM82/#17CM83/#17CM84 one-piece neoprene with matching presswitch.

D. Cover plates for exterior receptacles shall be gasketed covers with hinge allowing plug and cord to be plugged in and activated with cover closed.

E. Cover plate engraving, where required, shall be accomplished by cover plate manufacturer in accordance with instructions given on the Drawings. Metallic plates shall be engraved with black fill.

F. Unless specifically noted otherwise in Specifications or on Drawings, all outlets for telephone and other communications and data systems shall be provided with standard size one-piece cover plates having a minimum 3/4” diameter bushed hole in the center unless specifically noted otherwise in Specifications and/or on Drawings. Where telephone conductors are installed, plates shall contain telephone type, polarized plug-in receptacles.

2.5 COLOR

A. Wiring devices connected to normal power and located in unfinished spaces shall be grey color. Devices connected to normal power and located in finished interior spaces shall be of color selected by Architect from the following list of standard colors: ivory, beige, gray, white, brown, black.

B. Cover plates for devices connected to normal power and located in finished interior spaces shall be of color selected by Architect from the above list of standard colors or #302 stainless steel.

C. All devices and coverplates in paneled walls shall have finish to match paneling.

D. Contractor shall modify any given catalog numbers as required to procure devices and plates of the proper color.

PART 3- EXECUTION

3.1 EXAMINATION

A. Verify conditions under provisions of Division 01 General Requirements and any other applicable supplemental requirements/conditions.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and will be completely covered by wall plates.

D. Verify floor boxes are adjusted properly.

E. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

E. Do not share neutral conductor on load side of dimmers.

F. Install receptacles with grounding pole on bottom.

G. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

H. Electrical boxes shall be cleaned and completely free of any debris, dust, etc. prior to the installation of wiring devices.

I. Where two or more switches or receptacles are to be installed adjacent to one another, provide a multi-gang box and combination multi-gang coverplate. Provide proper NEC barriers in boxes which serve devices for both the Normal and Emergency Systems.

J. Provide device coverplates for every device installed. Cover plates shall be installed so that they appear straight with no gaps between plate edges and the wall. Maintain vertical and horizontal to within 1/16 of an inch.

K. In finished areas provide same type of plate for all surface mounted devices as for recessed mounted devices.

L. In any room where new and existing construction is present, all receptacles, switches, and coverplates which are existing to remain shall be changed as required to match new work.

M. Wiring devices shall not be installed in exposed masonry until cleaning of masonry with acids has been completed.

N. All receptacles and switches shall be grounded by means of a ground wire from device ground screw to outlet box screw and branch circuit ground conductor. Strap alone will not constitute an acceptable ground.

O. All wiring devices, relays, contactors, pushbuttons, selector switches, pilot lights, etc. shall be installed in approved enclosures rated for the appropriate NEMA classified environment.

P. All devices shall be installed so that only one wire is connected to each terminal.

Q. Once construction is substantially completed, replace all damaged, burned, or scorched wiring devices.

R. Receptacles shown to be floor mounted shall be installed in floor boxes (with coverplates) which are approved for this use.

S. Connect wiring devices by wrapping conductor around screw terminal.

T. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas,

above accessible ceilings, and on surface mounted outlets.

U. Install protective rings and split nozzle on active flush cover service fittings.

V. Install local room area wall switches at door locations on the lock side of the door approximately 4” from the jamb. Where locations shown on the Drawings are in question, provide written request for information to A/E prior to rough-in.

3.4 NEUTRAL CONDUCTOR CONNECTIONS

A. Each receptacle’s "in" and "out" phase and neutral conductors shall have an additional conductor for connection to device. The practice of "looping" conductors through receptacle boxes shall not be acceptable.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under other Sections of these Specifications to obtain mounting heights specified and indicated on Drawings.

3.6 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.7 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

END OF SECTION

SECTION 26 28 19

ENCLOSED DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Provide all labor, materials, and equipment necessary to properly install switches as shown on the Drawings and as required by codes.

B. Coordinate with Division 23 Contractor and Specifications as to who is to provide disconnect switches for mechanical equipment. Provide all disconnect switches not being provided by Division 23 Contractor.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver switches in factory wrapped packaging to the site. Handle switches carefully to prevent damage. Store in a clean, dry space protected from dirt, water, and physical damage. Do not install damaged switches.

1.4 QUALITY ASSURANCE

A. The manufacturer of switches shall be the same as that of the panelboards.

1.5 SUBMITTALS

A. Submit catalog cut sheet on each type of disconnect switch to be used on this project. Submit catalog cut sheet on enclosure locks to be used on this project.

PART 2 - PRODUCTS

2.1 CONSTRUCTION

A. Switches shall be heavy duty types with visible, quick-make, quick-break blades.

B. Units for 2-speed motors shall be 6-pole in a single enclosure. Use of two 3-pole units will not be acceptable.

C. Provide ground bus and where required a solid neutral bus.

D. Switches shall be fusible or nonfusible as denoted on the Drawings or as required by the equipment served from the switch. Fusible switches shall have rejection type fuse holders.

E. Terminal lugs shall be rated for 75 degrees Centigrade.

F. Enclosures, unless otherwise noted, shall be NEMA 1 for indoor locations and NEMA 4X stainless steel for outdoor locations as a minimum. All switches mounted outdoors including those noted to be NEMA 3R on drawings shall be heavy duty type 4X, watertight, corrosion resistant

G. The enclosure shall be interlocked with the switch handle such that the enclosure door

or cover cannot be opened with the switch in the "ON" position. The switch handle shall be capable of being padlocked in the "OFF" position but not in the "ON" position.

H. Finish for NEMA I units shall be standard baked gray enamel finish over a rust inhibiting phosphate primer.

I. Each disconnect switch shall be provided with a Homac #ELB-2 or similar enclosure lock. Homac #ELB-2 is available from Graybar Electric.

J. Disconnect switches installed between any variable speed drive type of unit (VFD, AFD, USD, etc.) and its respective motor(s), shall have auxiliary break before break (open) interlock control contact.

K. Disconnect switches installed to disconnect HVAC equipment are to be fusible type with fuses as recommended by HVAC manufacturer.

2.2 RATING

A. The size, number of poles, and fusing for each switch shall be as denoted on the Drawings. As a minimum, no less than one pole for each ungrounded conductor shall be provided. Switches shall be rated 250 VAC or 600 VAC as required by the circuit to which it is connected.

B. Switches serving motors with more than one set of windings shall have the number of poles necessary to disconnect all conductors to all windings in a single switch. Switches serving motor loads shall be horsepower rated of sufficient size to handle the load.

2.3 SERVICE ENTRANCE EQUIPMENT

A. Switches used as service entrance equipment shall be listed and labeled by UL for use as service equipment.

2.4 KITCHEN EQUIPMENT

A. All switches in kitchen areas, wet areas, etc. to be NEMA 4 stainless steel.

2.5 ENCLOSED CIRCUIT BREAKERS

A. Molded Case Circuit Breakers: NEMA AB1, plug-on type for 250V or less, bolt-on type for over 250V, thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Breakers shall be HID rated. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers.

B. Thermal-magnetic, molded case, with inverse time-current overload and instantaneous magnetic tripping, unless otherwise shown. Breakers shall be calibrated for 40 degrees C or shall be ambient compensating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all switches in accordance with the manufacturer's written instructions, NECA National Electrical Installation Standards, the applicable requirements of the NEC, and recognized industry practice.

B. All switches shall be firmly anchored to walls and supporting structures (where used)

using appropriate installation. Switches shall be installed with the turning axis of their handles approximately 5'-0" above finished floor unless otherwise indicated. Provide rigid steel (galvanized for exterior use) mounting stands, brackets, plates, hardware, and accessories for a complete installation.

C. Switches shall be mounted in accessible locations chosen where the passageway to the switch is not likely to become obstructed. Where a switch serves as the disconnecting means for a load, the switch shall be located as close as practical to the load with the switch handle within sight of the load.

D. Provide and install lugs on disconnect switch as required to accept conductors called for on Drawings.

E. Disconnect switches shall not be mounted on equipment unless specifically noted or required, and meet all applicable codes, etc. If switches are noted or required to be mounted on equipment, they shall have vibrator clips on fuses and be connected to conduit system with liquid tight flexible conduit.

F. Provide and install enclosure lock on each disconnect switch. Enclosure lock bolt shall be tightened firmly but not tight enough to break bolt.

G. Coordinate all requirements for controls between variable speed drive unit and its respective motor with drive specification, manufacturer, provider and installer. Provide auxiliary contacts, relays, etc. as required.

END OF SECTION

SECTION 26 29 13

MOTOR CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section of the Specification covers factory-assembled, metal-enclosed motor control units for distribution and control of power from incoming line terminals to outgoing feeder terminals, installed and tested in place.

B. Motor control units shall include all protective devices and equipment as listed on drawings or as included in these specifications, with necessary interconnections, instrumentation, and control wiring.

1.3 FURNISHING OF EQUIPMENT

A. Unless specifically noted otherwise, automatic motor starters for all equipment requiring them shall be furnished under the section or division where equipment is specified and shall be installed under this Section of the Specifications.

B. Unless specifically noted otherwise, manual motor starters shall be furnished and installed under this Section of the Specifications.

C. Disconnect switches for 120V fractional hp exhaust fans to be provided by Division 23 Contractor at exhaust fan. Any other required disconnect switch to be provided and installed by Division (26 27 28) Contractor.

D. Provide and install 75 degree rated lugs on all non-unitary mechanical equipment such as pumps, air handling units and individual motor units/equipment. Coordinate with Division 23 Contractor prior to bid.

1.4 CONTROL ITEMS

A. Unless specifically noted otherwise, all control, alarm and interlock wiring required for proper operation of equipment furnished by any other contractor, and the required raceways, shall be furnished and installed under the division where the equipment is specified.

B. Where required by Electrical Drawings, Division 23 Specifications, and/or Mechanical Drawings this Contractor shall connect power feeder to mechanical equipment via control devices furnished by Division 23 Contractor; (i.e. starters, line voltage, t'stats, line voltage switch, control relays, etc.).

C. Provide and install power circuits to all control devices requiring them (i.e. 120V dampers, control panels, control devices, etc.) whether shown on Drawings or not. Coordinate requirements of all Divisions and/or Sections of these Specifications prior to bid.

1.5 SUBMITTALS

A. Shop Drawings and Product Data:

1. Shop Drawings, Individually mounted AC Manual Starter:

a) Shop Drawings shall clearly indicate:

1. Frame sizes and interrupting capacity of manual starter and/or disconnect unit.
2. Horsepower rating at rated voltage of manual starter and/or disconnect unit.
3. Electrical ratings.
4. Single line diagram for power and control connections with numbered terminals and all required accessories.
5. All required accessories.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Square D

B. Accepted Substitutions:

1. General Electric
2. Siemens/ITE

2.2 GENERAL

A. Motor starters shall be manual, magnetic, or combination type as denoted on the Drawings.

B. Pilot lights shall have long-life lamps rated 7500 hours minimum.

C. Enclosures shall be NEMA 1 for indoor locations and NEMA 4SS for outdoor or wet locations except where indicated as NEMA 4.

D. Multi-speed or stop type controllers shall have thermal overload relays in each ungrounded conductor for each speed or step.

E. Where multi-speed motors are scheduled on the Drawings, the motor controls shall be compatible with the type motor and have adjustable time deceleration for transition from high to low speeds.

2.3 INDIVIDUALLY MOUNTED AC MANUAL STARTERS

A. Where manual motor starter switch is called for on Drawings, it shall be a combination across-the-line manual type starter with overloads and disconnect rated in accordance with NEMA standards, sizes and horsepower rating. Final rating of overloads shall be field set and recorded. Unit shall be mounted on NEMA 1 enclosures, unless otherwise noted.

B. Manual motor starter switch shall include green "run" pilot light, and shall be surface or

flush mounted as noted on Drawings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine area to receive motor-control units to assure adequate clearance for motor control unit installation.

B. Start work only after unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install motor control units in accordance with manufacturer's written instructions and NEC.

B. All starters and their respective enclosures shall be firmly anchored to walls and supporting structures (where used) using appropriate hardware. Provide supporting (unistrut type) channels on walls constructed of gypsum board or where otherwise necessary to provide a mechanically secure and permanent installation. Starters shall be installed with their turning axis of their handles approximately 5'-0" above finished floor. Provide rigid steel (galvanized for exterior use) mounting stands, brackets, plates, hardware, and accessories for a complete installation.

C. Starters shall be mounted where shown on the drawings. Where the starter also provides the code-required disconnecting means for a load, the starter shall be located within sight of the load and as close as feasible.

D. Provide fusing for all fusible switches.

E. Provide properly sized heater elements for every starter overload relay. The element shall be sized using the nameplate full load running current of the actual equipment supplied to the job.

F. Provide a heater element selection chart on the inside of each starter door.

G. Provide spare pilot light lamps to the Owner. Provide two of each type and size load.

H. Provide nameplate for each control unit.

I. Coordinate conductor terminations on all equipment connections. Replace all 60 degree lugs/connections with 75 degree lug/connection.

3.3 ADJUSTMENT AND CLEANING

A. Adjust operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finish.

C. Tighten bus connections and mechanical fasteners.

END OF SECTION

SECTION 26 43 00

SURGE PROTECTIVE DEVICES

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for surge protective devices.

1.3 REFERENCES

A. The latest edition of the following references shall apply to the work of this section:

1. ANSI/IEEE C62.33 Standard Test Specifications for Varistor Surge Protective Devices
2. ANSI/IEEE C62.41 IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
3. ANSI/IEEE C62.45 IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits
4. NFPA 70 National Electrical Code
5. NFPA 780 Standard for Installation of Lightning Protection Systems
6. UL 96A Standard for Lightning Protection Components
7. UL 1363 Standard for Safety Relocatable Power Taps
8. UL 1449, 5th Edition Standard for Surge Protective Devices

1.4 REGULATORY REQUIREMENTS

A. Equipment Certification: Surge protective devices shall be listed by Underwriters Laboratories shall bear the UL seal and be marked in accordance with referenced standard. Surge protective devices shall be UL listed and labeled for intended use.

B. Surge protective devices shall be installed and located in accordance with requirements of all applicable National Fire Protection Association (NFPA) codes (including NFPA 70 and NFPA 780).

C. Comply with all standards and guides as listed under “References” above.

1.5 DESIGN REQUIREMENTS

A. Provide and install all materials, labor and auxiliaries required to furnish and install complete surge suppression for the protection of building electrical and electronics systems from the effects of line induced transient voltage surge and lightning discharge as indicated on Drawings or specified in this Section for systems with voltages between 120 VAC and 480VAC (single phase or three phase).

B. Equipment specified covers Surge Protective Devices (SPD).

C. Provide surge protective devices for the following equipment:

1. On distribution and branch panels as called for on Drawings or in these Specifications.

1.6 SUBMITTALS

A. Submit under provisions of the General Requirements of the Contract Documents and Section Submittals.

B. Submit Product Data for each type of surge protective device:

1. Dimensions.
2. Means of mounting.
3. Compliance with UL Standards referenced.
4. Compliance with IEEE Standards referenced.
5. Design type (Hybrid, MOV).
6. Internal fusing.
7. Recommended overcurrent protection.
8. Size of wire leads.
9. Visual failure indicator.
10. Warranty.
11. Performance data showing compliance with performance as specified herein.

1.7 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance (O & M) data as called for in Section 26 01 00 Operation and Maintenance Manuals.

B. O & M data to include:

1. All accepted shop drawings, product data, and/or cutsheets.
2. Installation, connection, and maintenance information on each type of surge suppression.
3. Procedure and/or time table for recommended periodic inspection of devices to determine continued usefulness.

1.8 QUALITY ASSURANCE

A. All surge protective devices shall be manufactured by a company normally engaged in the design, development, and manufacture of such devices for electrical and electronics systems equipment.

B. The surge protective device manufacturer shall offer technical assistance through support by a factory representative and local stocking distributor. Factory representatives are to accept installation prior to Substantial Completion.

1.9 COORDINATION/PROJECT CONDITIONS

A. Verify proper grounding is in place.

B. Verify proper clearances, space, etc. is available for surge protective devices.

C. Coordinate so that proper overcurrent device, as recommended by manufacturer, is installed to feed each surge protective device.

1.10 WARRANTY

A. All surge protective devices shall be warranted to be free from defects in materials and workmanship for a period of ten years.

B. Any surge protective device which shows evidence of failure or incorrect operation during the warranty period shall be repaired or replaced by the manufacturer and installer at no cost to the Owner.

1.11 DEFINITIONS/ABBREVIATIONS

A. VPR: UL Voltage Protection Rating

B. MCOV: Maximum Continuous Operating Voltage

C. SCCR: Short Circuit Current Rating

D. IN: Inominal

PART 2 - PRODUCTS

2.1 GENERAL

A. Surge protective devices shall be designed for the specific type and voltage of electrical service and shall provide clamping action for both normal (L-N) and common (N-G) mode protection.

B. Surge protective devices shall be of a hybrid design, and include circuitry with tight, wave-tracking clamping characteristics.

C. Surge protective devices shall be designed to withstand a maximum continuous operating voltage of not less than 115 percent of nominal RMS line voltage.

D. Surge protective devices shall contain internal safety fusing to disconnect the surge protective device from the electrical source if the surge protective device fails, in order to prevent catastrophic failure modes.

E. Surge protective devices shall be fail safe, shall allow no follow-through current, shall have repeated surge capability, shall be solid state, shall be self-restoring, and shall be fully automatic.

F. Surge protective devices shall be UL 1449 listed under UL Category Code VZCA and shall be accepted for the location in which they are installed.

2.2 SECOND LEVEL SURGE PROTECTIVE DEVICES.

A. General. Provide second level surge protective devices on each second level of the distribution system (including sub panels). Surge protective devices shall meet or exceed the following (in addition to requirements under ‘General’ above):

1. Surge protective devices shall be tested as per UL 1449 requirements to determine voltage protection ratings (VPR – 3 kA).

2. Surge protective devices shall be sequential surge tested as per IEEE C62.45, and shall withstand 1000 test cycles at 3 kA, Cat. B3 test criteria.
3. Enclosure:
   a) UL listed.
   b) Fire retardant.
   c) NEMA 1, 2, 3R, 3S, 12, or 13 as required for each location.
   d) Flush, Switchboard and/or Surface mounted as required for each location.

B. Non-Modular Design with remote monitoring.

1. Remote Monitoring. Provide complete with:
   a) Normally open and normally closed dry contacts for remote annunciation of unit status for interfacing with building management system.
2. Status indicators shall be provided to indicate individual module status. When a module has failed, the module LED status indicator shall indicate said failure. The LED status indicators shall be located on the front cover to redundantly indicate module or unit failure.
3. Minimum Surge Capacity:
   a) 200 kA per phase.
4. Voltage protection rating (VPR) and maximum continuous operating voltage. Comply with the following maximum voltages for UL 1449 testing requirements:

200 kA Unit	L-L	L-N	L-G	N-G	MCOV	In
120/208 V, 3ph, 4W, wye					150V	
UL 1449	1000V	700V	700V	600V		20 kA
277/480 V, 3ph, 4W, wye					320V	
UL 1449	2000V	1200V	1200V	1200V		20 kA

5. Short Circuit Current Rating: 100,000 amps.
6. Manufacturers:
   a) 200 kA Units:
      1. Schneider Electric Model EMB for applied voltage for applied voltage in enclosure as required on drawings, as specified above, and/or as required by applicable codes.
      2. Siemens TPS3 11 Series for applied voltage in enclosure as required on–drawings, as specified above, and/or as required by applicable codes.
      3. Square D XDSE (Previous Model Name APT TE/***XDS/20) for applied voltage in enclosure as required on drawings, as specified above, and/or as required by applicable codes.

4. Siemens TPS4 11 Series for applied voltage in enclosure as required on drawings, as specified above, and/or as required by applicable codes.
5. PQ Protection PQC320 Plus series for applied voltage in enclosure as required on drawings, as specified above, and/or as required by applicable codes.
6. Atlantic Scientific ZoneMaster All-Mode series for applied voltage in enclosure as required on drawings, as specified above, and/or as required by applicable codes.

PART 3 – EXECUTION

3.1 GENERAL

A. Provide, install and connect surge protective devices at branch panels as noted on drawings.

3.2 INSTALLATION OF SURGE PROTECTIVE DEVICES

A. Surge protective devices other than Division 28 equipment shall be installed as close as practical to the electric panel or electronic equipment to be protected, consistent with available space.

B. Surge protective devices shall be close nippled to the device being protected in a position near the neutral bus which will minimize lead length between surge protective devices and the buses or control breaker to which the surge protective device connects. Suppressor leads shall not extend beyond the surge protective device manufacturer's recommended maximum lead length without specific acceptance of the Engineer.

C. Location shown on Drawings is diagrammatic only. Provide flush mount trim for surge protective device units at flush mounted panelboards. Provide NEMA 4X enclosures for TVSS units in exterior locations.

D. Surge protective devices shall be installed in a neat, workmanlike manner. Lead dress shall be as short and as straight as possible and be consistent with recommended industry practices for the system on which these devices are installed.

E. Supplementary grounding and bonding connections required between the bonding bus or ground plane for each equipment cluster and other locations as indicated herein shall be accomplished using #6 AWG core copper conductor and accepted connections unless otherwise noted. Referenced to a common earth ground.

F. Surge protective devices shall be installed in a manner that allows simple replacement within short periods of downtime.

G. Surge protective devices other than point of use type and those for exterior lighting poles shall be installed with a means of disconnecting the suppressor at the panel. At the distribution secondary and/or subpanels location, provide dedicated 30-amp, 3 phase CB, for the surge protective device. Label disconnect or CB "Surge Protector." Contractor to change rating of CBs noted above as required to properly provide system as recommended by manufacturer.

END OF SECTION

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Interior luminaires and accessories
2. LED drivers
3. LED Chips / Light Source
4. Luminaire accessories

B. Light fixtures furnished under this Division shall be furnished complete with LED chips and all necessary trim and mounting hardware and installed as shown on the Drawings.

C. Light fixtures shall be neatly and firmly mounted, using standard supports for outlets and fixtures.

1.3 REFERENCES

A. ANSI C78.379 Classification of the Beam Patterns of Reflector Lamps

B. ANSI C78.377-2011 Specifications for the Cromaticity of Solid State Lighting Products

C. ANSI/NFPA 70 National Electrical Code

D. ANSI/NFPA 101 Life Safety Code

E. NEMA WD 6 Wiring Devices - Dimensional Requirements

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of

1. ANSI/NFPA 70
2. NFPA 101
3. ADA
4. ANSI/UL8750 Standards for Light Emitting Diode(LED) Equipment for Use in Lighting Products
5. ANSI C78.377-2011 Specifications for the chromaticy of Solid State Lighting Products
6. IES LM-79-08 Electrical and Photometric Measurements of Solid-State Lighting Products

7. IES LM-80-8 Measuring Lumen Maintenance of LED Light Sources
8. IES TM-21-11 Projecting Long Term Lumen Maintenance of LED Light Sources
9. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

1. Shop drawings shall be submitted for all fixtures that require modifications, either as specified or as required to fit architectural field conditions of this project. (i.e., luminous ceiling, wall/slot fixtures, special fixtures).
2. Shop drawings shall be complete showing all dimensions and installation instructions required for conditions on this project.
3. Custom Fixture Shop Drawings: Shall include plans, elevations, sections, and mounting/attachment details.

B. Submit Product Data: Provide dimensions, ratings, and performance data. Product data shall be submitted for all light fixtures showing:

1. Dimensions
2. UL Label
3. Fusing
4. Luminaire Disconnect
5. Metal gauge
6. Lens/louver thickness
7. Finish
8. Voltage
9. Total Fixture Input Wattage and selected Driver current.
10. Fixture efficacy
11. Lumen Output (Delivered and Total)
12. Color Rendering Index
13. IES LM-79 and LM-80 Testing Data for total lumen life/deprecation.
14. US DOE LED Lighting Facts label.
15. Heat Management.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit Maintenance Data and include replacement parts list.

1.7 MANUFACTURER’S QUALIFICATIONS

A. Company specializing in manufacturing products specified in this Section with minimum five years experience.

1.8 PRODUCT STORAGE AND HANDLING

A. Physically protect fixtures against damage as recommended by manufacturer.

1.9 MAINTENANCE MATERIALS

A. Provide to Owner:

1. Five of each size/type of fuses.

2. Two – Additional LED drivers for each type of driver used in the project. For fixtures that do not have field replaceable LED drivers one additional complete fixture may be provided in lieu of the two additional LED drivers.

3. Two additional surface mount light fixtures of fixture type used in mechanical spaces.

1.10 WARRANTY

A. All fixtures furnished under this Division shall be covered by a 10 year warranty.

PART 2 - PRODUCTS

2.1 LUMINAIRES/FIXTURES

A. Furnish products as specified in schedule on Drawings.

B. Install drivers, LED chips, and specified accessories at factory.

C. All light fixtures shall adhere to UL Test Standard 1598 and NEC 410.115(C). All manufacturers shall provide the required thermal protection as required.

2.2 LED Chips / Light Source

A. Manufacturers

1. Cree, Phillips, Samsung, Bridgelux, or approved equivalent

B. Correlated Color Temperature (CCT):

1. 4100K(Unless noted otherwise) for estimated product life.

2. Derived: Phosphor conversion, RGB, Color Tuning.

C. Efficacy: Minimum 100 lumens/watt

D. Lumen Maintenance:

1. A minimum of 50,000 hours at L90

2. A minimum of 70,000 hours at L70

E. Color rendering index (CRI):

1. A minimum of 80 unless noted otherwise

2.3 LED Drivers

A. Manufacturers:

1. Lutron, Phillips Advance, Hatch, to match fixture manufacturer or accepted substitution.

B. Drivers:

1. Driver shall be integral into fixture unless noted otherwise. (Refer to plans)
2. Programmable
3. Voltage: Match luminaire voltage and voltage of system to which applied.
4. Efficiency > 90%
5. Total Harmonic distortion < 20%
6. Power Factor: 0.9
7. Expected lifetime: 50,000 hours
8. Drivers to be protected with in-line fuse/fuseholder.
9. Provide disconnecting means for driver that simultaneously disconnects all supply conductors to the ballast, including the grounded conductor.
10. Replaceable Constant current reduction dimming driver.
11. Warranty 10 years.

C. Dimming:

1. Driver shall be provided with compatible lighting control devices. Provide and coordinate drivers with controls provider prior to bid.
2. Dimming Range: 1% or 10% - 100% output
3. Control System: 0-10V

D. Heat Management:

1. Operating temperature: -22°C(-4°F) to 55°C(131 °F)
2. Each fixture shall be provided with a passive heat sink to maintain fixtures working temperature below maximum operation temperature.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate and supporting grids for luminaires.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and NEC.

B. Install suspended luminaires using pendants supported from swivel hangers. Provide pendant length required to suspend luminaire at indicated height.

C. Support luminaires larger than 2' x 4' size independent of ceiling framing.

D. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

E. Install surface mounted luminaires plumb and adjust to align with building lines and

with each other. Secure to prohibit movement.

F. Exposed Grid Ceilings: Support surface mounted luminaires on grid ceiling directly from building structure.

G. Install recessed luminaires to permit removal from below.

H. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

I. Recessed luminaires not rated for contact with insulation (Type IC) shall not be installed within 3” of any insulation or as required by the NEC. All recessed luminaires installed within three inches of insulation shall be identified for contact with insulation and bear the UL Type IC label.

J. Install wall mounted luminaires at height as indicated on Drawings, or as required by ADA, local codes and state codes. Where conflict exists between what is shown on Drawings and what is required by codes, install fixture as required by codes.

K. Install accessories furnished with each luminaire.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Bond products and metal accessories to branch circuit equipment grounding conductor.

N. Where ceiling mounted fixtures are called for in the Light Fixtures Schedule and on the Drawings, this Contractor shall provide fixture trims and supports as required to match type of ceiling system which will be furnished. No ceiling fixtures shall be ordered until the Ceiling System Installer has given written acceptance of the method and location of fixture hanging and fixture type.

O. Fixtures supported by suspended ceiling systems shall have four independent support wires that are tied to structure to support them independent of ceiling grid.

P. All interior and exterior light fixtures shall not have any labels exposed to normal viewing angles. This includes manufacturer’s labels and UL labels. All labels shall be concealed within the body of the fixture and/or luminaire. Manufacturer’s name or logo shall not appear on the exterior of any light fixtures unless accepted in writing by the Engineer.

Q. Miscellaneous (provide and install complete):

1. Tents as required for fixtures in fire rated ceilings as per applicable codes.

2. Thermal protection for all fixtures with tents or fixtures surrounded by insulation as per applicable codes.

R. Ceiling surface mounted fixtures installed in exposed ceiling areas are to be suspended from ceiling structure with minimum 3/8" all-thread rods and 1-1/2" x 1-1/2" Kindorf channels, full length of fixture/row. Mount outlet box at structure with flexible connection to fixture.

S. Coordinate fixtures installed in mechanical rooms with piping and ductwork prior to installation and relocate fixtures as required to provide proper illumination and access.

T. Electrical Contractor shall remotely locate all transformers called for in these Specifications in a well ventilated and easily accessible space to comply with all codes. Revise circuitry as shown on plans as required to facilitate transformer/fixture location.

U. Voltage for all fixtures shall match the voltage of the lighting circuit fixture is connected to. Coordinate with electrical drawings.

V. Verify all fixtures have a luminaire disconnect. Provide luminaire disconnect in any luminaires where factory failed to install luminaire disconnect.

W. Verify all fixtures have in-line fusing. Provide in-line fusing in any luminaires where factory failed to install in-line fusing.

3.3 ADJUSTING

A. Aim and adjust luminaires as directed.

3.4 CLEANING

A. Clean electrical parts to remove conductive and deleterious materials.

B. Remove dirt and debris from enclosure.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

3.5 DEMONSTRATION

A. Provide demonstration of luminaire operation.

3.6 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.7 CLEAN-UP

A. Luminaires:

1. Clean free from dust and dirt. Wash lens and glassware using cleaner such as Windex and dry with absorbent paper. Clean plastic per manufacturer's recommendations; do not wipe. Lenses which are kept in original containers until immediately prior to final inspection may not require cleaning. Clean Alzak aluminum surfaces (reflectors, fixture cones and the like) per manufacturer's recommendations being careful to remove finger prints and smudges.

2. It is the Contractor's responsibility to remove any UL labels or manufacturers labels from areas of fixture exposed to view and relocate label to non-obtrusive area on fixture.

END OF SECTION

SECTION 26 52 13

EMERGENCY LIGHTING EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Emergency LED Power supplies/inverters.

1.3 REFERENCES

A. Americans with Disabilities Act (ADA)

B. ANSI C78.379 Classification of the Beam Patterns of Reflector Lamps

C. ANSI C82.1 Lamp Ballast – Line Frequency Fluorescent Lamp Ballast

D. ANSI/NFPA 70 National Electrical Code

E. Florida Building Code (FBC)

F. Fed. Spec. W-L-305D Light Set, General Illumination (Emergency or Auxiliary)

G. NFPA 101 Life Safety Code

H. NEMA WD 1 General Requirements for Wiring Devices

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of the following:

1. ADA
2. ANSI/NFPA 70
3. FBC
4. NFPA 101

B. Furnish products listed and classified by Underwriters Laboratories as suitable for purpose specified and shown.

1.5 DESCRIPTION

A. Light fixtures furnished under this Division shall be furnished complete with lamps and all necessary trim and mounting hardware and installed as shown on the Drawings.

B. Light fixtures shall be neatly and firmly mounted, using standard supports for outlets and fixtures.

C. Lamps/LEDs shall be included in the system guarantee for a period of thirty days after final acceptance of the building.

1.6 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

1. Shop drawings shall be submitted for all fixtures that require modifications, either as specified or as required to fit architectural field conditions of this project; (i.e., specialty exit signs).

2. Shop drawings shall be complete showing all dimensions and installation instructions required for conditions on this project.

B. Product Data: Provide dimensions, ratings, and performance data. Product data shall be submitted for all fixtures showing:

1. Dimensions

2. UL label

3. Fusing

4. Metal gauge

5. Lens/louver thickness

6. Finish

7. Voltage

8. Lamps

9. Batteries

1.7 OPERATION AND MAINTENANCE DATA

A. Submit maintenance data including replacement parts list.

1.8 MANUFACTURER'S QUALIFICATIONS

A. Company specializing in manufacturing products specified in this Section with minimum five years' experience.

1.9 PRODUCT STORAGE AND HANDLING

A. Physically protect fixtures against damage as recommended by manufacturer.

1.10 MAINTENANCE MATERIALS

A. Provide to Owner:

1. Five of each size/type of fuses.

1.11 WARRANTY

A. All ballasts furnished under this Division shall be covered by a warranty against defects. Warranty shall include payment for normal labor costs of replacement of inoperative in-warranty ballasts.

PART 2 **- PRODUCTS**

2.1 LUMINAIRES/FIXTURES

A. Furnish products as specified in schedule on Drawings.

B. Install ballasts, lamps, and specified accessories at factory.

C. All light fixtures shall adhere to UL Test Standard 1598, UL 924 and NEC 410.115(C). All manufacturers shall provide the required thermal protection as required.

2.2 LED EMERGENCY POWER SUPPLY/ INVERTER

A. Manufacturers (Internal):

1. Bodine Model BSL Series
2. IOTA ILB-CP Series
3. Dual-Lite UFO Series

B. Manufacturers (Centralized/Grouped):

1. Bodine Model ELI Series
2. IOTA IIS Series
3. Dual-Lite Lite Gear Series

C. Description: Emergency battery power supply suitable for installation in ballast compartment of LED luminaire.

D. Ratings: Driver shall be capable of driving LED fixtures a constant full output for 90 minutes.

E. Battery: Sealed nickel cadmium type rated for 7-10 years.

F. Operating Temperature: 0-55 degrees Celsius

G. Include TEST switch and AC ON indicator light, installed to be operable and visible from the outside of an assembled luminaire or centralized inverter.

H. Inverter/charger unit shall be completely solid state with automatic transfer in case of power failure and automatic cutout to prevent deep discharge of batteries. Recharge time shall be twenty-four hours maximum.

I. Units to be installed shall be a type compatible for use with this equipment.

J. Drivers shall be connected local lighting circuit ahead of all switches. Provide and install wiring to as required to provide fully operational system in event of loss of power in each space.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units plumb and level.

B. Aim directional lampheads as directed.

C. Adjust units as required to align with building lines and with each other. Secure to prohibit movement.

D. Adjust exit sign directional arrows as indicated. Readjust project completion as

required by Authority Having Jurisdiction.

E. Install illuminated exit signs as shown on Drawings, as herein specified, or as required by applicable codes.

F. Connect exit signs, inverter/battery units to local lighting circuit ahead of all switches.

G. Install suspended exit signs using pendants supported from swivel hangers.

H. Mount all exit signs at 7'-6" AFF to bottom of fixture or as required to meet ADA requirements. Provide all mounting accessories/hardware as required for proper mounting including pendant/swivel hangers.

I. Evenly space all emergency egress lighting units and provide proper lumen output of units as required to provide lighting levels and uniformity ratios required by applicable codes.

1. FBC Section 1006.2.3.1 Emergency lighting facilities shall be arranged to provide initial illumination that is at least an average of 1 footcandle and a minimum at any point of 0.1 footcandle measured along the path of egress at floor level. Illumination levels shall be permitted to decline to 0.6 footcandle average and a minimum at any point of 0.06 footcandle at the end of the emergency lighting time duration. A maximum-to-minimum illumination uniformity ratio of 40:1 shall not be exceeded.

END OF SECTION